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NATIONAL BUILDER

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Number 1

The Situation

NOVEMBER proved to be nearly as good a month for the construction industry as October. It lagged about 12 to 15 per cent in volume of construction work behind the October record figure, but nevertheless was greater than any other November record. It was 45 per cent greater than the volume of building in November, 1920. About twice as much more projected work was reported during the same month.

This spurt in new construction during October and November has had the invariable result of increasing the prices of many building materials in various localities. The general level of prices for November rose over the October level for the country as a whole, according to competent authorities, about 1 per cent. Of course many commodities and in many localities, the prices rose much more than this. The chances are that these rises are of a temporary nature. They have served to check projected building.

Prices in 1922 Up or Down?

From statistics gathered from its own thousands of readers NATIONAL BUILDER finds a very widespread belief that 1922 building material prices will be higher than the prices in 1921. Of course, a large number believes prices will remain about stationary, while not a few look for further cuts.

Undoubtedly many cuts made by building material producers in 1921 prices were deliberate bids for "starting something," and were made with an equally deliberate intention to increase them again as soon as construction work did start. These building material producers—and most of the rest of us probably—have gone on the assumption that there was an immense volume of necessary construction work in prospect, and that once the program was begun nothing would stop it.

As a matter of fact, the replies to many thousand questionnaires sent out by NATIONAL BUILDER to its readers, confirmed by information from many other sources, show that the building situation is extremely sensitive. There is very good reason to believe that while prices may make sudden spurts to get back to the 1921 basis if possible, the general tendency in 1922 will continue downward.

Any student of economics knows that the logical and natural course for commodity prices to take is a slow steady recession

to something justifiable with our changed conditions. Such a course is toward stability. Sudden upward spurts are evidence of instability and are a hindrance to resumption of construction activity. This is better explained in the words of an Ohio contractor as follows:

Ohio Contractor's Explanation

"The trouble with the whole situation, as we see it, is that the leaders in the industry have the idea that the whole thing is psychological, and that by advancing prices they can scare the people into buying. The fact is the general determination to take a holiday is making the country poorer every day, so that the farmer can't buy and the laborer can't rent.

"A firm determination to give service for a reasonable profit and to see that every element of cost comes under that rule, we believe is the true remedy.

"To illustrate: This spring (1921) when settling with a client he remarked, 'this job could not be put off, but I have a factory to build and a lot of other work to have done, but not a dollar's worth will I build while you have to stand for such practices as are forced upon you by material men and labor.'

"As soon as the lumber man gets an extra order he advances the prices. Our people are disgusted. The builder must add a neat sum to all estimates to take care of these uncertainties.

"If we had a *slow and steady* decline in both material and wages, the building industry would be healthy. As prices declined more and more new jobs would come within the range of investment possibilities.

"Every building material manufacturer should endeavor to show the public that price advances are at an end and that every decline is a bona fide one. Present policies, we believe, are more likely to bring calamity than a boom next year (1922)."

NATIONAL BUILDER's own knowledge of conditions in the Central West States, shows that the farmers are actually on a buying strike until such time as the difference between big drops in the value of farm produce and the little drops in the value of manufactured articles are somewhere near equalized.

The great bulk of the building work done in 1921 was housing in cities. There was very little improvement work on farms and in strictly agricultural communities. The

city folks were temporarily profiting by the farmers' adversity, but the time will come shortly, if present conditions continue, where the city man, depending in a large measure upon the farmer as a buyer, will meet with adversity also.

Why Prices Probably Will Not Increase Appreciably

It is true that manufacturers of building material in their association meetings, and in their publicity work, have used precisely the argument that building would pick up just as soon as prices reached rock bottom and started to rise again. The trouble is that neither they or any one else can be quite sure what rock bottom is. They have got to do a little experimenting to see what rock bottom is. Hence, very likely, there will be sporadic increases in prices.

But there are many sound reasons why prices can not be artificially kept up long. There is little reason for believing that 1922 will be a boom year for agriculture or for the industry in general. It is probable that construction will be the only industry that shows great activity. There will be as always plenty of new capital seeking outlets, plenty of enterprising men looking for new opportunities. They will naturally be attracted to the building material industry as the liveliest prospect, especially so if it is generally believed extraordinary profits are being made there.

Since the production of most ordinary building materials is generally a comparatively simple manufacturing process, and one requiring no tremendous amount of initial capital, with numerous market outlets, it is very likely to attract much new capital and enterprise, unless the present producers are exceedingly cautious in the way they handle the situation. This fact must be so evident to them that they will hold themselves down to a fair profit or invite an avalanche of new competition.

The far-sighted manufacturer of building materials looks ahead to profit in 1922 on the increased volume of his sales, rather than from increased prices. It is true that many have made little or no profit in 1921, but the reason is largely because the volume of business, for the year as a whole, has not been great enough to take care of their overhead and leave much of a margin. A greater volume of business at current prices would have paid them good profits.

"Open-Price" Associations on Uneasy Seat

Again, the Supreme Court of the United States has upheld the Tennessee circuit court decision against the defendants in the famous American Hardwood Manufacturers' Association case. The same court will probably soon rule on the decision of Judge Carpenter in the American Linseed Oil Co. case, referred to in the December issue of NATIONAL BUILDER.

These two cases were similar in that both brought into question the legality of the "open-price policy," or the exchange of price quotations, production statistics, etc., among producers of building material. In the Tennessee case the evidence against the producers was particularly damaging because an indiscreet secretary had sent broadcast letters soliciting membership and dues, pointing out how this "open-price" policy had increased prices and given the association members unexpected prosperity. Consequently the court found the association a violation of the Sherman anti-trust law and enjoined the members from maintaining the "open-price" policy.

In the recent Chicago case of the American Linseed Oil Co., Judge Carpenter ruled that there was no evidence that prices had been artificially raised or maintained, and ended by actually commending the "open-price" policy as a stabilizing influence on business in general.

If Judge Carpenter is overruled by the United States Supreme Court, on the basis that the "open-price" policy is inherently illegal, there will be dismay and disorganization in the ranks of building material producers and dealers. If it is upheld on the basis that there can be both good and bad "open-price" associations, the situation will be so lacking in clearness that all such associations will proceed with the utmost caution.

So, whichever way the Supreme Court rules, and under the present circumstances until it does issue a decision, both producers and dealers are pretty likely to fight shy of anything resembling in the remotest way an artificial manipulation of prices. And if natural laws apply unrestrictedly something like that which has already happened to farm-product prices will very likely come about in commodity prices—for better or for worse.

Involved with the question prices is of course the problem of freight rates. The Interstate Commerce Commission has already begun an extensive investigation into the whole subject of possible rate reductions. Hearings will be held all through January, at which manufacturers of every commodity will present pleas for reductions on their particular products. The building material interests will make a very well organized fight, and it is generally admitted that their prospects of getting appreciable rate reductions are very bright indeed.

Wages in 1922

Strangely enough the great majority of those who look for material prices to increase in 1922, at the same time look for wages in the building trades to decline. This is largely due to the fact that in many localities wages have declined little or not at all from the 1920 peak, while some cuts in the prices of building materials have been practically universal.

Small cuts in wages are evidently being generally accepted by building trades unions in places where they have consistently held out all the season. In St. Louis, Mo., for example, the employers' proposition to cut the basic wage of the principal trades from \$1.25 to \$1 per hour, was countered by the men with an offer to accept \$1.12½ as "reasonable." In other words, the sentiment of the men themselves is changing and they are accepting the prospect of some cut as inevitable. It is a hopeful sign.

Chicago Labor Fight

In Chicago the fight goes on as bitterly as before. Judge Landis has heard some of the petitions of the various trades for a reconsideration of his award, and as a result has increased his original wage figures for machinery movers and marble setters from 85 cents to 92½ cents per hour, and of marble setters from 87½ cents to 97½ cents.

Architectural iron workers, structural iron workers, drain layers, gasfitters, steamfitters, sprinkler fitters, plumbers and cement workers were among those whose applications were rejected. In denying rehearings Judge Landis said these trades had failed to make the required working agreement revisions. He referred particularly to rules which prohibit an employer from working on his own job and which require skilled men to do work laborers or helpers could do.

Upon their contention that there should be a differential for mixers and moulders and for rubbers and polishers, scagliola workers, marble and tile rubbers and marble polishers are to be given a rehearing.

For composition floor workers and slate and tile roofers' helpers, it was urged that these workers heretofore had customarily received wages above that of common laborers, but that the working agreement submitted for them did not provide for this. Judge Landis indicated he will reopen the hearing on this point, if it is shown an error was made.

The marble, mosaic, terrazzo layers, helpers and floor rubbers' union contended there should be a distinction between rubbers and polishers. They will be heard on this.

The excavating, wrecking and common laborers' union will be heard on their contention that there was a misunderstanding as to the relation of the pay of men in this class to that of building laborers.

Tile layers and helpers, tuck pointers, pipe coverers, stonecutters, slate roofers, marble setters and common laborers appealed for

rehearings on general principles. They were denied.

Judge Landis' comment on these petitions reads:

"The substantial reduction in these trades was due to the obviously erroneous horizontal scale whereby their wages had previously been fixed out of proportion to the wages of other skilled trades. The fact is, however, the wages awarded are generally higher than the average paid in other large cities. This is especially true in the case of the laborers (whose authorized wage rate was reduced from \$1 an hour to 70 cents).

"I have carefully examined the petitions and have again gone over the whole question and am obliged to say that I can see no reason at this time for changing the award."

Eighteen thousand members of the carpenters' union joined in a bill filed in the Superior Court by their attorney, Hope Thompson, which asks for an injunction against some of the leaders in Chicago's financial district.

The petition asks that the "citizens' committee to enforce the Landis award," including among its 173 members, almost every prominent banker and man of wealth in Chicago, be restrained from interfering with the business of the employers of the members of the carpenters' union and the work of the carpenters themselves.

The contention of the carpenters is that the citizens' committee is composed of men who have no part in the building business, but have set themselves to the task of dictating to the men who are so engaged.

The carpenters' union, it is averred, never came before Judge Landis, nor did he arbitrate or set a price on their labor. Mr. Thompson has declared that almost all of the 18,000 men were now employed and were receiving \$1.25 an hour. He said that the attitude of the citizens' committee was similar to that of strike breakers and picketers in that coercion and intimidation was being used.

Building Prospects in 1922

In the cities the prospect for a continuation of the present building pace, and even an increase variously estimated at from 25 to 200 per cent, looks good. Every builder acknowledges that there is an obvious shortage of housing facilities. The great volume of building work in 1921 has been houses and apartments, and the great volume of 1922 work, according to every indication, will follow the same lines.

While the pent-up demand for farm buildings of all kinds is probably as great as the need of housing in the cities, few rural builders in the Central West look for much increase in business next year. However, the financial situation of the farmers is being relieved by the United States Government, which through the War Finance Corporation is administering the \$1,000,000,-

000 loan, voted by Congress last August. Up to November 30 the corporation had advanced for agricultural and livestock purposes a total of more than \$82,000,000, of which the principal items were loans on cotton aggregating \$22,000,000, on grain

\$16,000,000, livestock \$13,000,000 and for general agricultural purposes \$34,000,000.

These loans will undoubtedly assist the farmers to market their material to better advantage. Moreover, there is a very rapid development of co-operative marketing as-

sociations, these, too, being especially fostered by the national government.

The conclusion is that while 1922 probably will not be a boom year, it will be a better year for building than 1921; and 1923 will be a better year than 1922.

To Standardize Construction Contracts

Joint Conference of Engineers, Architects and Constructors Launch Long Hoped for Plan to Standardize Construction Contracts

THE standardization of construction contracts towards which all far-sighted men in the industry have been looking for the last twenty years seems destined to be achieved at last through the united efforts of a "conference" held in Washington, D. C., December 15 and 16.

This conference was composed of delegates appointed by eight national societies representing the engineers, architects and contractors of the United States, and the definite plan adopted was one which would ultimately produce a standard form of contract "agreement" which would be acceptable in all sections of the country and in all phases of this huge industry which now ranks second only to agriculture in national magnitude.

Every constructor and owner who has wrestled with the intricacies of a contract, or worried over the exact yet doubtful meaning of its many complicated and legalised phrases, will approve this first attempt to frame in simple Anglo-Saxon words an equitable and universal document.

A survey of the situation made several months ago by Brigadier-General R. C. Marshall, Jr., formerly chief of the construction division, U. S. Army, during the world war, disclosed the fact that today there are in common use throughout the construction industry, *over 200 different forms of contract*, and that no one state or section had yet been able to establish any one form as standard or customary.

Expert engineers at the headquarters of the Associated General Contractors of America in Washington were then assigned to the task of analyzing these 200 different forms in order to discover whether the variety of "jobs" involved required any such variety of forms.

After many months of painstaking comparison and research, W. P. Christie, in charge of this work as research engineer for the Associated General Contractors reported that the differences were chiefly superficial differences of words and phrasing rather than differences of meaning or stipulations, and that at least two-thirds of all the provisions contained in each of the 200 documents were common to all documents, and therefore could be included in *one standard contract form*, if rewritten in simple, universal style.

It was found that stipulations which were characteristic or peculiar to the building trades, or to the railroad construction field, or to waterwork projects, or to highways could be assembled together in one standard form, entitled "general conditions," applicable to that one field of construction only, and added to the standard agreement form as addenda.

In this way, it would be quite possible to draft a standard contract which would cover all cases of construction work, no matter in what field, and the only alteration that would ever need to be made to it would be in selecting the standard form of "General Conditions" which covered the type of job concerned. Experts believed that a half dozen such forms would cover the main subdivisions involved in the construction industry.

This plan, together with a "tentative outline," was submitted for consideration to the American Association of State Highway Officials, American Engineering Council, American Institute of Architects, American Railway Engineering Association, American Society of Civil Engineers, American Waterworks Association, Associated General Contractors of America, National Association of Builders Exchanges, Western Society of Engineers.

All made favorable responses and appointed representatives to come to Washington to constitute a conference on the subject and proceed with the drafting of a tentative form of contract which could later be officially submitted by the conference to its constituting bodies for criticism, amendments, and ultimate ratification.

The conference met in the assembly room of the Department of Commerce Building, in Washington, December 15 and 16, and was addressed by Secretary of Commerce Hoover and General Marshall, both of whom expressed a very lively and sincere hope that the conference would ultimately devise a form which would become as standard in its field as the standard forms of bank checks, notes and mortgages are in the field of banking and commercial trade.

The aim of the conference in beginning work on this difficult task was to achieve the following advantages for the entire construction industry and all its affiliations:

(1) Less expenditure and legal service;

(2) Less duplication of work in the professions; (3) Elimination of disputes; (4) Better safeguard for owners and increased public confidence; (5) An improved standard of construction service throughout the country.

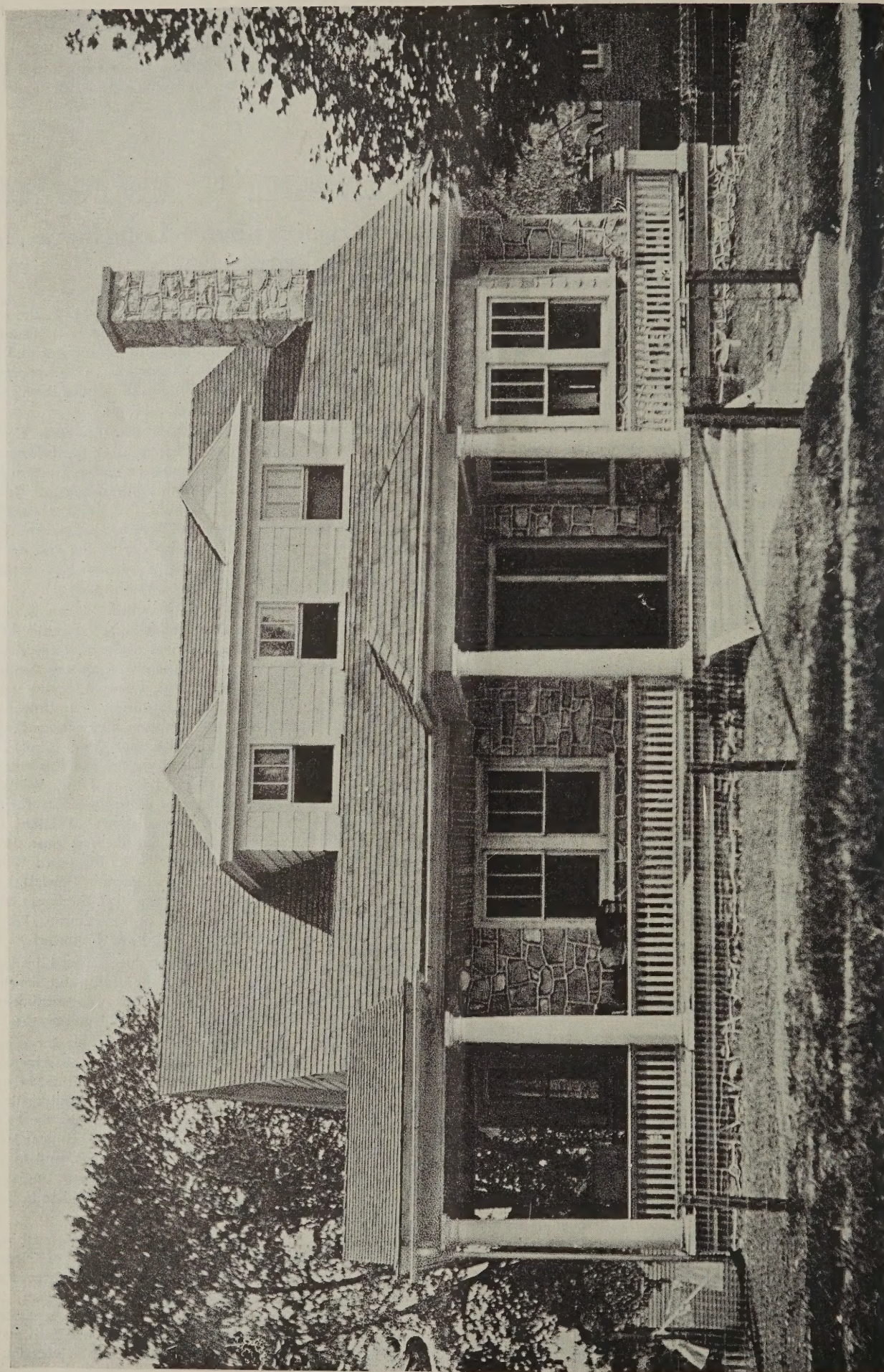
Officers of the conference were elected as follows: Chairman, Onward Bates of Chicago, representative of the Western Society of Engineers; Vice-Chairman, J. W. Cowper of Buffalo, N. Y., representative of the Associated General Contractors. (He served as chairman during the first session owing to Mr. Bates' sickness.); Secretary, W. P. Christie of Washington, D. C.

General R. C. Marshall, Jr., and William B. King, representing respectively the Associated General Contractors and the American Bar Association, were elected members of the conference. Other delegates were: W. A. Rogers of Chicago, substitute delegate for the Western Engineers; E. W. Reaugh of Cleveland for the Builder's Exchanges; A. P. Davis for the Engineering Council, substituted for by L. W. Wallace; J. Waldo Smith of New York City for the Waterworks Association; William S. Parker of Boston for the American Institute of Architects; H. K. Bishop of Washington for the Highway Officials; H. Eltinge Breed for the Civil Engineers, substituted for by J. S. Langthorne; W. D. Faucette for the Railway Engineers.

A course of procedure devised by General Marshall for the study and development of standard forms was unanimously adopted as the method of handling the job.

References were made to similar efforts which had been made by the American Engineering Standards Committee in setting standards for materials and methods of construction; also to work by the Engineering Council in drawing up standards for government contract work, and to the effort of the American Railway Engineering Association along the same line in their special field.

The final session of the conference was devoted to a detailed study of clauses which could be approved for incorporation in the standard contract "agreement," the members voting on each topic separately until a definite list of topics had been made which seemed acceptable for universal use.



A Home With a Doctor's Office

See description on opposite page and working drawings in detachable insert in this issue

A House With a Doctor's Office

Working Drawings of this House are Shown in the Detachable Insert in this Issue

THE house which forms the subject of this month's supplement has several features which distinguish it from the ordinary. First, stone, the material of which it is built, has become somewhat a rarity for use in residence work, even in localities where this material is easily available. As a matter of fact, we Americans seem to feel that the use of stone—except in a very limited manner for trimming—detracts from the true "home feeling." This is probably due to the fact that in thinking of stone as a building material, the most of us visualize a blank, gray surface, utterly devoid in charm of color or texture.

The stone used in this house, however, is that variety of native Pennsylvania stone which is noted for its warm, harmonious variegations, ranging from rich browns to golden yellows. A wall of this material flooded with sunlight is a revelation to those who object to stone because of its "coldness."

The second important distinction of this house is due to the office which occupies one corner of the front portion. Aside from the very evident practicability of such a room in a physician's home, there is no reason—except the added expense—why such a room should not be included in the scheme of many other professional and business men's homes. And as for the farm home, the office has become almost as standard a portion of the plan as the kitchen. With most busy men of today it has become customary to carry office work home at night. With the house of ordinary arrangement, without any provision for space to be utilized for such purposes, the resulting confusion is a thorn in the side of the housekeeper, and sooner or later she may be expected to demand that proper provision must be made for an office or study (by which latter name it is often dignified) to take care of that "accumulation of junk that is always being carried back and forth!"

The exterior of the house is homelike to say the least. It has none of that excessive "prettiness" that characterizes so many late houses. You know the kind, houses that we admire, but can't bring ourselves to imagine that we should care to call home. This house, however, clearly expresses a home. The side porch has a somewhat detached appearance and the entrance porch and bay window are a little at odds, but the low eaves, the interesting dormer and the long sweep of the roof more than make up for these slight discrepancies.

It should be noted that a great deal of the charm of this house is due to the use of wooden construction in the gables and the separation of the stone walls and the frame

construction by means of a wide belt course or modified Germantown hood at the eave line. Both of these features are found in old colonial work and are valuable in insuring a domestic effect. From a practical standpoint it is of course evident that it is simple and usually cheaper to build a frame gable than a masonry one.

Another structural feature that should not be overlooked is the use of wooden window sills in the stone walls. This is manifestly cheaper and simpler than the use of cut stone for this purpose, and insofar as durability is concerned, we have only to remember that wooden sills were quite commonly used in connection with masonry work of the colonial period, and in many cases the originals are still in service.

Although the house is high enough out of the ground to permit basement windows without the use of areas, the front and a portion at the sides has been terraced in a manner to give a low effect to the entire house.

The basement is one large room without partitions and is reached by both an inside stair and an exterior entrance which is located in an area a few steps below grade.

The bearing partitions are carried on steel beams and concrete pier construction in the basement.

The entrance to the first floor opens directly into the hall. At the left is a door into the office and at the right, a cased opening to the living room. With regard to a physician's office it seems that a direct entrance from the outside should be provided. This is particularly true in view of the fact that the cased opening makes the living room and hall practically one, and the somewhat disturbing possibility of a chance patient (say an accident case) being virtually thrust into the midst of guests who are being entertained in the living room, is too evident to be ignored. This, of course, does not usually hold true for a home office used by a business man or those of other professions.

The living room contains a bay window at one end and a fireplace at one side. An inter-room opening connects the living room and the dining room. The dining room also contains a bay window and has a built-in buffet the back of which has an opening into the kitchen.

The kitchen contains the usual fittings, including a built-in cabinet at one side. A store pantry and a small rear porch open from the kitchen, and an icing door opens from the pantry onto the porch so that the refrigerator may be iced without entering the house. The kitchen also opens into the

rear portion of the hall, thus making both the basement stair and the main stair accessible without passing through the main rooms.

The entrance end of the hall, opposite the entrance, is given over to a bath room which serves the bedrooms on this floor and also provides downstairs toilet facilities. Its location for the latter purpose is excellent, being convenient to the kitchen and to the basement stair.

Two bedrooms opening from the hall complete the arrangement of this floor. Each bedroom is quite large and contains a closet, and one of them has cross ventilation. To those who object to bedrooms opening directly into a main hall, it may be suggested that a slight shifting of the stair toward the front would make it feasible to throw a partition across the hall at the rear of the staircase, dividing the hall into two portions connected by a door between. The rear hall would thus serve to establish privacy for the family portion of the house without disturbing the present ease of circulation between all of the rooms and the hall.

The second floor contains two large bedrooms, a bath room and a sleeping porch. Each bedroom has cross ventilation and contains a large closet. Both the bath room and sleeping porch opens into the hall near the head of the stair, and a glazed door at one end of the hall and a window at the other provide plenty of light for this portion.

The house was designed by A. T. Rolph for William H. Walker of Kennet Square, Pennsylvania. It is adaptable for either town or country and combines the advantages of both a bungalow and a two-story house in a very satisfactory manner.

Concrete Blocks and Vibration

IN the making of concrete blocks for the Alwen Dam, in connection with the Birkenhead water supply, a system of vibration was employed during the progress of molding, with undoubted success, says Municipal Engineering and Sanitary Record, London, England. Two methods are described. In one case the molds were placed on a table which was vibrated by means of a cam arrangement mechanically operated; in the other case, a pneumatic hammer was applied to the bed of the mold, which projected a few inches from the side. The vibration had the effect of consolidating the concrete more thoroughly and completely than if hand ramming had been employed.

Cashing In on the "Elimination of Waste in the Building Industry"

Developing a Saleable House—Successfully Advertising It—Systematizing Its Construction—Financing the Owner Without the Help of Banks and Mortgage Brokers—Joseph Phillips, of Cincinnati

A SUCCESSFUL building contractor must sometimes be more than a good builder. He must be a good salesman—and houses are not the easiest thing in the world to sell. But in the final analysis selling houses and selling clothes may be made

ing, are publicity and advertising, and the two go hand in hand.

Mr. Phillips has spent about \$800 per month for local newspaper advertising. However, he did not throw this money broadcast. He spent it systematically—

vious technical experience as a designer, builder and financier. His early experience developed his love of art and turned it into practical channels. If an architect may be defined as a man who applies art to building construction, Mr. Phillips could be



Forest Glen Apartments, Cincinnati. Joseph Phillips designer and builder

pretty much the same kind of a business proposition. It has been thoroughly demonstrated how to sell clothing successfully. Why not adopt the same methods in selling houses?

Joseph Phillips, real estate operator and building contractor of Cincinnati, Ohio, is primarily a salesman. He has sold big building jobs in tile for the Rookwood potteries of Cincinnati. He has for a long time been a speculative builder, and he thus found out where his heart really was—in creative building work. So the construction and selling of houses has become his hobby and his whole vocation.

He tackled the problem of establishing himself in the building game from the salesman's point of view. He must have a saleable article and he must sell it by modern methods. The most important factors in modern sales methods, or merchandis-

mostly in Wednesday and Sunday editions of the daily papers, and in no particular one, but in all the papers. Coincident with his advertising he undertook a real estate development of a rather unusual kind and he developed a cheap serviceable house, that he could build anywhere for a known cost. He calls it a "tailor-made" house.

There are various other ways of establishing a reputation and a business as a home builder and it is not the purpose of this article to attempt to say which is the best; but this can be said, that Mr. Phillips in six months, by the methods he has pursued, has established a reputation and a clientele that many builders have taken years to acquire.

Architectural and Building Experience

Don't let it be supposed that Mr. Phillips jumped into the building game without pre-

safely termed an architect. He has more-over the vision and the imagination necessary for a constructor. And besides these qualities, he has, as already referred to, the hard practical business sense of a good salesman.

His first experience in the building field on his own initiative was the erection of the apartment house known as the Forest Glen apartments, illustrated herewith. This was built on the edge of a gulley or ravine, long known as "The Devil's Hole" and reputed to be about the least valuable piece of real estate in the locality—so much so that it was used chiefly as a rubbish dump.

The fact that the rear of the projected apartment was approximately 30 ft. below the street front did not deter him. He figured the view from the rear overlooking a real forest on the opposite side of the ravine, and beyond into one of the finest

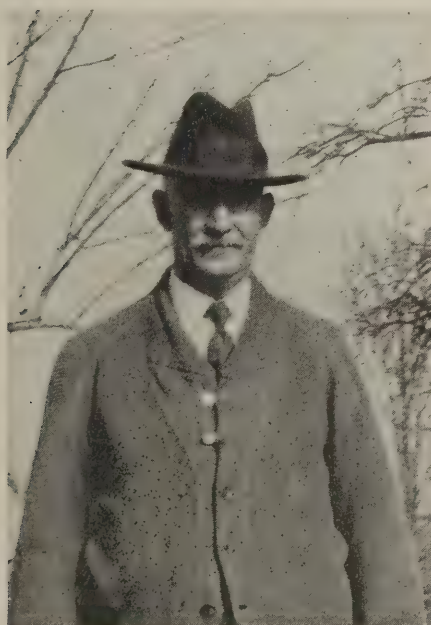


C. J. Wolentarskey, architect of the "tailor-made" houses

residential sections of the city would compensate for the shortcomings. The reinforced-concrete wall which carries the rear of the apartment house cost in the neighborhood of \$25,000, but the apartments have always been filled with high-class tenants, and after the first struggle to get it completed, has always been a paying proposition.

This apartment house embodies a number of Mr. Phillips' original ideas. In the first place it consists of three distinct units, separated by a space of several feet. Inclosed bridges, or hallways, on the first floor level constitute the only connection between the three units. In spite of the extra cost, this was done to provide the extra windows and ventilation as well as an added fire protection.

Another feature is that the entrance



C. A. Smith, general superintendent

halls, wainscoting and floors are all surfaced with Rookwood tile—something usually found only in the highest class residence and hotel construction. The apartments themselves are different from the usual run of city apartments. They are laid out on what Mr. Phillips terms a "bungalow plan." That is, there is an interior hall running lengthwise of the apartment giving access to all the rooms without passing through any. The living rooms are all very large and roomy and have fireplaces. In fact, the "bungalow" effect is real.

The sun parlors are provided with closets, and the closets are provided with folding beds, so a quick change from a sun parlor by day to a sleeping porch by night is easily accomplished. The kitchen is provided with a refrigerator built in the wall between the back porches and the kitchen under a window. The inside doors of the



Joseph Phillips

refrigerator are flush with the inside wall, but the refrigerator itself, which is a stock design, of course projects beyond the exterior face of the wall. This provides an outside icing door, a refrigerator not wholly exposed to the heat of the kitchen and utilizes what would otherwise be waste space, saving just so much valuable space in the kitchen itself.

The back porches are built of structural steel throughout, and while they are as roomy and convenient as the average back porch, they are in reality fire escapes as well.

The extra basement space provided by the unusually high rear wall is utilized, below the usual janitor's quarters, as a store room for tenants, and below this a very high ceiled boiler room, coal pockets and basement storage. It was originally intended to put a row of garages below the store rooms under a part of the building, but at the time this building was erected the city ordinances would not permit this to be done.

Besides the Forest Glen apartments, Mr.



Mitchel A. Abel, secretary and advertising manager

Phillips built a row of dwelling houses in another location under very similar conditions. He also owns the "forest" in the rear of Forest Glen and has had it surveyed by landscape architects and has already "visualized" it into one of the prettiest residential plots in the entire city.

Standardizing House Building and Selling

A builder who builds to sell must first determine what the public wants. This varies a great deal with the locality. Apparently the great majority of Cincinnati people do not take kindly to apartment house life. They are too thrifty to be



James Rich, "the cellar-a-day" excavating foreman

HOUSES FOR SALE

HOUSES FOR SALE

FOR SALE—HOUSES.

HOUSES FOR SALE

HOUSES FOR SALE

ANNOUNCING

The opening Monday, August 1st, of my new office, 207 Mercantile Library Building, where I will engage in the business of buying, selling, leasing and renting real estate; financing the erection of homes and business buildings; and the insurance of real property in Cincinnati and its suburbs. You are cordially invited to call and inspect my headquarters, which mark a new departure in Cincinnati real estate offices, and at the same time see me regarding any of the following which may interest you:

JOSEPH PHILLIPS.

BOWMAN TERRACE

IN THE HEART OF AVONDALE—READING ROAD NEAR MELISH. THE FINEST SITES FOR COMB. STORE AND APARTMENT BUILDINGS IN THIS SUBURB; RESIDENCE PLOTS IN THE SECLUSION OF A GARDEN COCKET. YET CLOSE TO THE CARS; SEE PLANS FOR BUSINESS AND HOME BUILDINGS IN MY OFFICE; WILL FINANCE STRUCTURES FOR PURCHASERS OF LOTS. THE LOCATION IS A MARKET PLACE IN THIS BUSTLING SUBURB. RIGHT AT A TRANSFER CORNER: AVONDALE, WINSTON PLACE, BOND HILL AND ZOO-EDEN CARS; MANY LOTS ALREADY SOLD; SEE ME AT ONCE FOR CHOICE PLOTS.

AVONDALE—Clinton Springs ave. Finest building lots in this neighborhood. AVONDALE—Reading road; location suitable for high-class apartment, garage or auto distributing station, or may be subdivided for residence buildings; beautifully situated opposite park, 15 minutes from post-office. Reasonably priced. AVONDALE—Glenwood ave. Building lots for small homes in the cool shade of giant trees; priced low for quick sale.

CITY (for lease)—Fourth st. Two lots adapted to any high-class wholesale or retail business; right in busy location on this street; new building; can be arranged to suit tenant. CITY—Canal Blvd. desirable location for auto salesroom and garage; rent reasonable; see this. PRICE HILL—Overlook ave. Substantial residence; four bedrooms, full bath and shower; garage for three cars; a bargain. Adjoining lot may be had.

WHEN THE ROBIN WELCOMES SPRING

When the first robin welcomes the springtime with his song, be ready to greet him from the window of your own little home. I'm here to help you. I'm doing my bit toward making Cincinnati a city of beautiful individual homes, and I'm going to do more. I want to see every thrifty family that is appreciative of a real home get it—that's why I've cut the inflation out of building prices. An artistic, cozy home with flowers, trees, shrubs and hedges is a builder of better citizens—and I'm determined to build.

300 NEW HOMES WITHIN A YEAR

My specialty is the bungalow—the very essence of home comfort and satisfaction. My \$4,500 5-room home has set the city talking, and what is more interesting it has placed many families in position to realize their dream of a pretty little home of their own. If you have dreams of this kind now is the time to make them come true. All you need is to select a lot from the hundreds I have listed in East Hyde Park, Hyde Park, Avondale, Price Hill or Norwood. You are then entitled to this unbeatable price of \$4,500 on a one or two-floor plan 5-room bungalow of stucco construction.

Get ready own little home with these plans and same time lovely home special price for you see for support. Oh, yes—this is a home which will be a bungalow.

ORDER A BUNGALOW FOR XMAS—THERE STILL IS TIME

"THE WAY HOME"

That's the title of a book I'm preparing and let me send to you which I want to send to every one in and around Cincinnati who wants a little home of his own. It tells how to purchase a lot, how to finance your home so you can comfortably meet the payments. It shows pictures and plans of cozy, homey little homes at reasonable prices.

HOUSES FOR SALE

HOUSES FOR SALE

GIVE YOURSELF A BUNGALOW FOR CHRISTMAS

5-Room, One or Two-Floor Plan, Built Complete for \$4,500

Eat your Christmas dinner in your own cozy bungalow. I am prepared to build your home on any of the high-class lots in East Hyde Park, Hyde Park, Avondale, Price Hill or Norwood purchased from me within the next ten days at the above unbeatable price of \$4,500.00. Take your choice of the snappy one-floor plan or a pretty semi-bungalow, either plan calls for hardwood in all rooms except the kitchen, modern bath and heating system. Both houses are finished in high-grade stucco and the one-floor plan has a Holmes "In-a-closet" Bed in the living room. Doubtless are saying this can't be done, but two of these houses have already been sold and one is being erected now on Bowman Terrace in Avondale. Go out and see it in course of construction; see the tractor excavate a cellar day. Make up your mind to be in one of these cozy homes by Christmas, then come and see me.

JOSEPH PHILLIPS

"Real Estate Headquarters,"
Main 5315
207 Mercantile Library Building.

YOUR DREAM HOME Make It Come True This Spring

You need wait no longer to realize your dream of a dear little home of your own; by acting now, you can be living in your own cozy bungalow by spring. When the birds are moving into their new homes, you can be moving into yours. Here's how easy it is. Select your home site from the hundreds of beautiful lots in Hyde Park, East Hyde Park, Price Hill, Avondale or Norwood, which I have listed; you are then entitled to the special low price of \$4,500 on a stucco bungalow or semi-bungalow of 5 rooms and modern conveniences. Three of these pretty homes are now being built on Bowman Terrace, Reading Road and Shillito (Melish Ave.); see them; note that they are sturdy, substantial homes such as any one might be proud to own; then see me about your home. Call Main 5315 for appointment, or come to the office Monday, Wednesday or Friday evening.

BOWMAN TERRACE HIVE OF INDUSTRY

People passing Reading Road and Shillito Street have wondered if another Panama Canal was in the making—not realizing that they were looking on Bowman Terrace, the Market Place of Avondale. Bowman Terrace, with a little army of workmen on the ground, excavating, road-making and building, is a perfect hive of industry. If you didn't attend "Inspection-of-Progress" day, last Sunday, come out this Sunday afternoon. I will be there between two and four. Retail merchants especially are invited to learn the advantages of the Market Place of Avondale.

8 HOME SITES ON SUNNY PRICE HILL

Do you like to have your home on Sunny Price Hill; on a spot overlooking a charming valley? Then here's the big news. Every one of these lots is level and ready for building. In a block of the property, car line is being extended to inspect these home sites.

AM IN PERFECT ACCORD WITH THE FACTS

INSPECTION OF PROGRESS" DAY AT BOWMAN TERRACE—SUNDAY

There's a cordial handshake and a sight to gladden your eyes waiting you at Bowman Terrace, Sunday, for the "Market Place of Avondale" has undergone a transformation since summer. Come out Sunday and participate in "Inspection of Progress" Day. Come out even though you haven't any intention of buying real estate—just for the pleasure of seeing a good work in course of development.

Merchants especially should be on hand. I'm betting that they will see at first glance the advantage of a store location on this busy, wealthy suburb's main artery of traffic—Reading Road—with four car lines and enormous automobile traffic all day long, and a part of the night.

Take Avondale, Winton Place, Bond Hill or Zoo-Eden cars to Reading Road and Shillito (Melish Ave.) and you're at Bowman Terrace—the "Market Place of Avondale."

WEDNESDAY WILL BE TOO LATE TO ORDER A XMAS BUNGALOW

It will be the last day on which orders for Xmas Bungalows are accepted—Wednesday will be too late. Many families are to eat their Xmas dinners in their own new homes, built the way for only \$4,500. If you want to be one of the bunch, before Tuesday evening. After that time I can not promise a your home ready for Xmas. If you're ready to say "Go!" at Bowman Terrace on Sunday. You can then see one of pretty 5-room, all modern stucco homes in course of completion.

"HOME ESTATES" IN ROSE HILL SECTION—GET ONE QUICKLY

Section that is fast-building up with palatial homes. I have just four home estates in Redbud Ave., Avondale—in Rose Hill—because the owner wants quick action. He will get it. If not one of these lovely home sites in the prettiest suburban of Cincinnati, act quickly; call Main 5315 for appointment then.

Business property in the heart of the retail and theatrical district; substantial brick and stone building with modern stores; about 100 feet.

Walnut St.; in retail business section; approx. 4,700 sq. ft. (Sixth St.; 7,000 feet ground floor space in best retail district.

CITY Factory consisting of brick, 8,000 sq. ft.; frame, 4,000 sq. ft.; deep; 20 and 30 per foot. These lovely home sites are greatly underpriced and want fast sale. Property open only at 2:30 and 4:30. Call Main 5315 for appointment.

AVONDALE Clinton Springs ave. and in 1st Ave. (the Layman acreage; fine 30 ft. lots, 100 ft. deep; 20 and 30 per foot. These lovely home sites are greatly underpriced and want fast sale. Property open only at 2:30 and 4:30. Call Main 5315 for appointment.

JOSEPH PHILLIPS

"Real Estate Headquarters,"
207 Mercantile Library Building
Main 5315
Once Open Monday, Wednesday and Friday evenings.

HERE'S THAT \$4,500 HOME ALL CINCY IS TALKING OF



You can't photograph the soul of a charm of a flower garden, the bloom on a lily's equally impossible for me to show you here that reveals the homelike atmosphere hobby—the 5-room stucco semi-bungalow can't be done, and the only way you can feel the coziness, warmth, cheer, convenience, and that's packed into this little place is to constructed on Bowman Terrace. I'll be Sunday from 2 to 4 p. m. Come out and show you this home.

THIS IS NOT A READY-CUT HOUSE, but built from ground to gables, from foundation to the stucco of its construction doesn't detract from its beauty—inside or out. It's time to then you can be in your own home in just select your lot. You are then entitled to special price on your home. Let's talk it over at Bowman Terrace Sunday, Avondale, Winton Place, Bond Hill or Zoo to Reading Road and Shillito (Melish Ave.) miss Bowman Terrace.

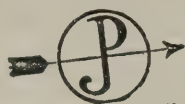
I want to meet a few retail merchants at Bowman Terrace who are from the state of Ohio, corn-cobs and "shells" to show them what the "Market Place of Avondale" can do. Come as early as you can.

JOSEPH PHILLIPS

"Real Estate Headquarters,"
207 MERCANTILE LIBRARY BLDG. M
Open Monday, Wednesday and Friday

HOUSES FOR SALE

HOUSES FOR SALE



THEY'RE BUYING BUNGALOWS NOW FOR XMAS PRESENT

\$4,500 BUILDS A ONE OR TWO-FLR

The phenomenal values I am giving to those who p listed with me was strikingly illustrated during the week less than four men having purchased these pretty little presents for their wives.

Make your wife happy: give her her Christmas dinner home. All you have to do is select a lot from among the sites which I have listed in Avondale, East Hyde Park, Hill or Norwood. You are then entitled to this special bungalow or semi-bungalow.

Remember, these are not cheap, shell-like houses, but structed rock bound stucco dwellings with five nice room in living room and dining room; dandy porch and ever fence, including built-in features. The one-floor plan in "Closet" Bed in the living room, thus giving an addition See this bed in my office.

I can build only a limited number of these homes - not delay or it may be too late. Call Main 5315 and n see me at my office.

THEY ALL LOOK ALIKE TO

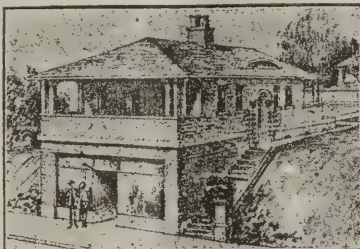
I'm not partial. Violets or mimms—they all lo here to serve you whether you want to buy or sell a dollar business property. Come in and see me; or, I 5315 and make an appointment. I can give you quick

JOSEPH PHILLIPS
HOUSES FOR SALE



Meet Me Sunday at Bowman Terrace!

I will be at Bowman Terrace on Sunday, between 10 and 12:30 and 2 and 4, rain or shine. Every storekeeper in Cincinnati who has the ambition to own his own store building should come out and see the market place of this big suburb, amid tremendous traffic, are sites for groceries, delicatessens, bakeries, confectioneries, etc., which can be had at about half their actual value.



You can put this combination store and bungalow lot complete, including the lot, for \$14,000, as location on Reading Rd., with four car lines in the heart of this big suburb, and at 1 ur home in the bungalow above, fronting on al park



THANK YOU, FRIENDS

For your good wishes and whole-hearted support which have contributed so much to the successful inauguration of my business. I will offer in this paper each Wednesday an attractive special in real estate—residences, apartments, lots and business buildings—of which today's is the first. Watch for them!

WEDNESDAY REAL ESTATE SPECIAL NO. 1

SELECT a lot in Bowman Terrace, Reading Rd. and Main



ONLY A HOLLOW LOG—

Out in the woods no animal pays tribute to a landlord. Even the fox has his own home, although it's only a hollow log. It's home—not a place that he occupies on sufferance; he doesn't pay rent for it.

It's time for Cincinnatians to realize the lessons which birds and beasts teach us. You undoubtedly have dreamed and planned the home you want, but have deferred action for financial reasons. Personally I can say to you that it's folly to wait longer. By chopping the inflation out of building prices, I have made it possible for every one to own his own home—IF HE REALLY WANTS IT.

My 5-room stucco semi-bungalow, with its pretty, cheerful interior, attractive exterior, modern bath and heating system has set a record for homes at \$4,500; and it's a home that any man might point to with pride.

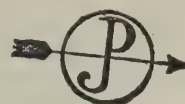
To obtain the big savings on this home—or my 5-room, one-floor plan bungalow at the same price—you need only select your lot from among the lovely home sites I have listed in Hyde Park, E. Hyde Park, Norwood, Avondale or Price Hill. A small deposit then enables you to go ahead with your home.

See me at Bowman Terrace, Sunday, between 2 and 4 p.m., or call Main 5315 for appointment to discuss your individual home problem at my office. But—by all means—act now that you may move into your own home in the spring.

JOSEPH PHILLIPS

"Real Estate Headquarters"

207 MERCANTILE LIBRARY BUILDING. MAIN 5315.
Office Open Monday, Wednesday and Friday Evenings.



You, the sparrow hath found an house and the swallow a nest for herself, where she may lay her young.—Ps. 84:3

YOUR NEST CAN BE READY FOR YOU NEXT SPRING

down another barrier between you and you can now get the benefit of the big lot right now, or maybe you'd prefer to move into by spring if you'll come out to Bowman Terrace, (Shillito st.), noon between 2 and 4 and see one of

tuco Semi-Bungalows—\$4,500

s almost completed and many others you can't come Sunday, phone Main 5315, or see me at the office Monday, Tuesday evening. I'm building bungalows, let-live prices for people who really them. But I can only build a limited number right away if you want to be only one.



WHEN A CLUB WON A HOME

Back in the stone Age men won their homes at they won their mates—with a club. Even in those dark days the idea that every man should own his home was predominant. Both courting and housing methods have advanced since then, but the dominant idea is with us just the same. The enthusiastic reception accorded my \$4,500 home proves that. If you plan to build, do it now and move into your own little home early in the spring. Just select your lot from these I have listed in Hyde Park, Norwood, Price Hill, Avondale and East Hyde Park. You are then entitled to this low price of \$4,500 on a five-room stucco bungalow, modern throughout.

Come out to Bowman Terrace Sunday and see the lovely little homes under construction. I will be on the ground from 2 to 4 p.m. See me at once if you want to build or purchase a home between now and summer. I have many other beautiful bungalows and semi-bungalows at prices to fit your pocket. Let's talk it over. If you can't see me Sunday, call or phone me for appointment. I'm in the office Monday, Wednesday and Friday evenings.

Send me your name and address so I can mail you a copy of "The Way Home," my booklet, which tells you how to go about selecting a home site, building a home and financing the whole affair without fuss or red tape. Write your name and address plainly—a postal card will carry it nicely—but do it now, as the edition will be limited.

JOSEPH PHILLIPS



WEDNESDAY SPECIAL NO. 2



THIS BUNGALOW, \$6,500

I will build this cozy 5-room bungalow for you on a fine level lot in Bowman Terrace, Reading Rd. and Melish ave., on 4 car lines only 20 minutes from the city, grade and sod your lot all complete. All you need do is buy the lot; I will finance your home and you can pay for it like rent; many other handsome home plans to choose from. Phone me and I will take you to the property in an automobile.

JOSEPH PHILLIPS

"REAL ESTATE HEADQUARTERS"

207 Mercantile Library Bldg. Phone Main 5315.



Why He Gasped

Thanksgiving Day, while I was showing a young couple over Bowman terrace, a man stopped me and, pointing to one of the bungalows that is nearly completed, said: "You don't mean to say that that's the home you build for for \$4,500, do you?" He actually gasped when I told him that I not only build these pretty homes for \$4,500, but that the home and the lot together would cost the proud owner less than \$6,000. "I don't see how you do it," he finally remarked. I do it easily—because I'm willing to accept a reasonable profit on my work, and although Thanksgiving is over I'm ready at any time to talk "turkey" with you if you're serious about wanting your own home. Call me at Main 5315 for an appointment or see me Sunday between 2 and 4 p.m. at Bowman Terrace. Take Avondale, Bond Hill, Winton Place or Zoo-Rden cars to Reading road and Melish (Shillito street).

"The Way Home," my booklet on home building, is free to anyone who is interested. Send in your name and address and a copy will be mailed to you as soon as it's off the press.

I have a cozy little Queen Anne home of eight rooms, bath and electric, in Mt. Auburn that should interest someone who wants a close-in location. It's priced to sell, but any reasonable offer will be considered.

Joseph Phillips

"Real Estate Headquarters"

207 Mercantile Library Building. Main 5315.

The quick success of Mr. Phillips' enterprises is ascribed by him to the influence of his advertising, due to the thought and style put into it



Rear view of Forest Glen Apartments, showing the \$25,000 reinforced concrete wall

willing to spend all their income for rent and too self-respecting to herd into old-fashioned tenements. A five or six-room house that costs in the neighborhood of \$10,000 Mr. Phillips' decided was not the type most in demand.

Many people he found could finance a house at from \$5,000 to \$6,500 who would have difficulty with a \$7,500 proposition. A capital of \$2,200 to \$2,500 and the financing of the building of a \$7,500 to \$10,000 house would involve second mortgages and endless financial problems. A capital of \$2,100 and the financing of a \$4,500 house and a \$1,000 lot purchase are as simple as A, B, C by Mr. Phillips' method.

But, it is obvious on the face of it, in order to build and sell a five or six-room house in these days for \$4,500 involves rigid economy in construction and a narrow margin of profit.

Mr. Phillips has achieved the economy in construction by standardizing materials and methods and more than all else by standardizing his scheme of operations. There is no loss of material, time, labor or effort. By co-ordination of the work of his construction crew and by having a certain number of houses in various stages of construction constantly in the process of building he has not only eliminated much of the waste in ordinary building operations, but he has so standardized his crew to their work that he knows to a dollar how much this particular house will cost.

The views herewith show one of these houses completed and two in the process of erection. They are very simple rectangular structures of ordinary balloon framing, covered with Byrketts sheathing

and stuccoed with pebble-dash magnesite, after the manner shown in Fig. 5, p. 33, NATIONAL BUILDER, December, 1921. The interior is finished in hard-wall plaster on wood lath and papered.

The lumber used throughout is a fair grade of Southern yellow pine, with hardwood floors on the lower story. The roof has stained wood shingles. The equipment includes a hot-air furnace (piped) and the usual grade of hardware, plumbing, etc.,

for the ordinary house of this character. No attempt is made to economize in necessary quality. Mr. Phillips is aiming to build up a reputation for service and he knows the true limits of economy in these directions.

The completed house, shown in the accompanying views, has a fire place and extra chimney, a cellar under the front porch and hardwood floors throughout, all which added about \$500 to the cost of original structure. The views of this house give some idea of how the false gables change its appearance. Structurally it is the same as the two houses shown in the process of construction. A wide variety of exterior treatments are obviously possible.

So much for the house. The most interesting phase of Mr. Phillips' business is the way he sells them. He is not a speculative builder in the ordinary sense of the term. His houses are sold before he starts to build them. The only condition is that the prospective purchaser must own the lot clear and have enough cash to pay 25 per cent of the price of the house. The purchaser pays this in advance and Mr. Phillips does the rest.

As soon as the cellar is in and the lumber on the ground Mr. Phillips takes out a five-year insurance policy, which has a paragraph covering all losses incurred by fire or tornado while the building is under construction. This is subsequently transferred to the owner. The premiums paid during construction are charged as construction costs. When the contract with the purchaser is signed arrangements are at once made by Mr. Phillips with one or another of various building and loan asso-



The building site used for the Forest Glen Apartments



A row of Joseph Phillips' houses, Avondale, Cincinnati

ciations to take a first mortgage on the property. These mortgages have been standardized for this particular house so that any of these associations will loan \$4,000 as a first mortgage on one of Mr. Phillips' \$4,500 houses and the lot. Payments on this loan are made direct to Mr. Phillips by the building and loan association, in installments, as the work progresses. This loan and the purchaser's original cash payment cover the whole price of the house. There are no second mortgages, no brokerage fees and no bank loans to finance the builder. The building and loan associations and the purchaser finance the builder without cost to him. Consequently there is no overhead expense whatsoever in this \$4,500 house; it is "all house."

This explains one reason why the house can be built for \$4,500. The profit in building them, according to Mr. Phillips, comes from a quick turnover and many sales—the same formula that has been applied successfully to cash sales of many kinds of merchandise.

Phillips also has a \$5,500 house that follows on a similar scheme, and as his operations expand he intends to develop many other houses. The interested reader will see that the essential point in Mr. Phillips' operations is not the particular house that he builds, or the methods by which he standardizes its construction. It is the fact that he has evolved a scheme of house building which eliminates wastes of all kinds. In other words, he has already begun to cash in on a plan for "elimination of waste in the building industry," which

is agitating learned heads in Washington and elsewhere.

Associated with Mr. Phillips is his son-in-law, Mitchel A. Abel, who, as secretary and advertising manager, has played an important part in building up the business.

The rest of the staff consists of C. J. Wolentarskey, architect; C. A. Smith, general superintendent; James Rich, excavating foreman, and James White, concrete foreman. A construction crew of about 50 men is employed the year round.

Effect of Temperature on the Hardening of Concrete

HEAT hastens and cold delays the hardening of concrete. When the temperature is around 80 degrees F. concrete sets

or hardens quite rapidly. As it falls below this point the speed of hardening decreases. When the temperature is around 50 degrees



Starting excavation for combined store and bungalow at Bowman Terrace



Front, side and rear elevations of the Joseph Phillips' \$4500 house, with \$500 worth of extras

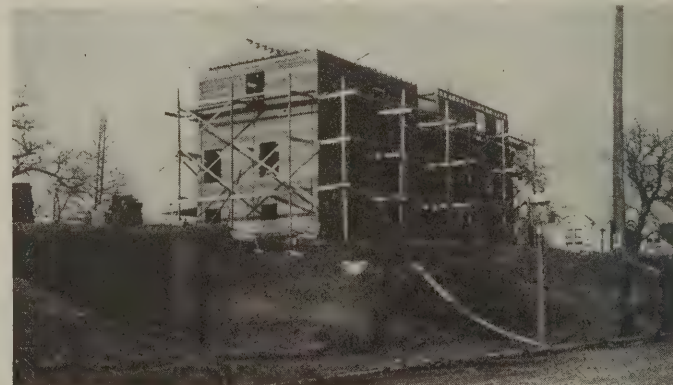
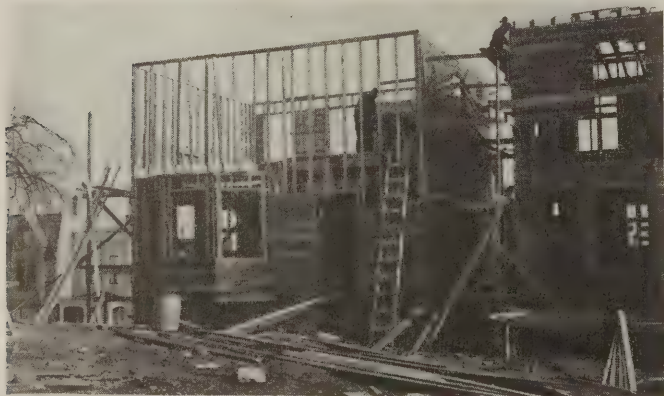


The \$4500 Joseph Phillips' house near completion

sooner will it reach this degree of hardness. If an average temperature of 45 degrees can be maintained, the temperature at the time going below freezing, four or five days should be allowed. In many cases as long as three or four weeks is necessary if the temperature is kept only slightly above freezing.

The hardening process can be accelerated by heating the water, sand and pebbles, which make up the concrete mixture, and then by quickly mixing the concrete, placing it and furnishing protection to retain the heat thus supplied as long as possible. Sand and pebbles always must be heated if they contain any frozen particles.

Concrete that has frozen before the cement has hardened may look and feel exactly like properly hardened concrete. Frozen concrete has deceived many builders and caused losses running into thousands of dollars. Never strip forms from concrete in cold weather or build upon winter placed concrete without first carefully testing. To



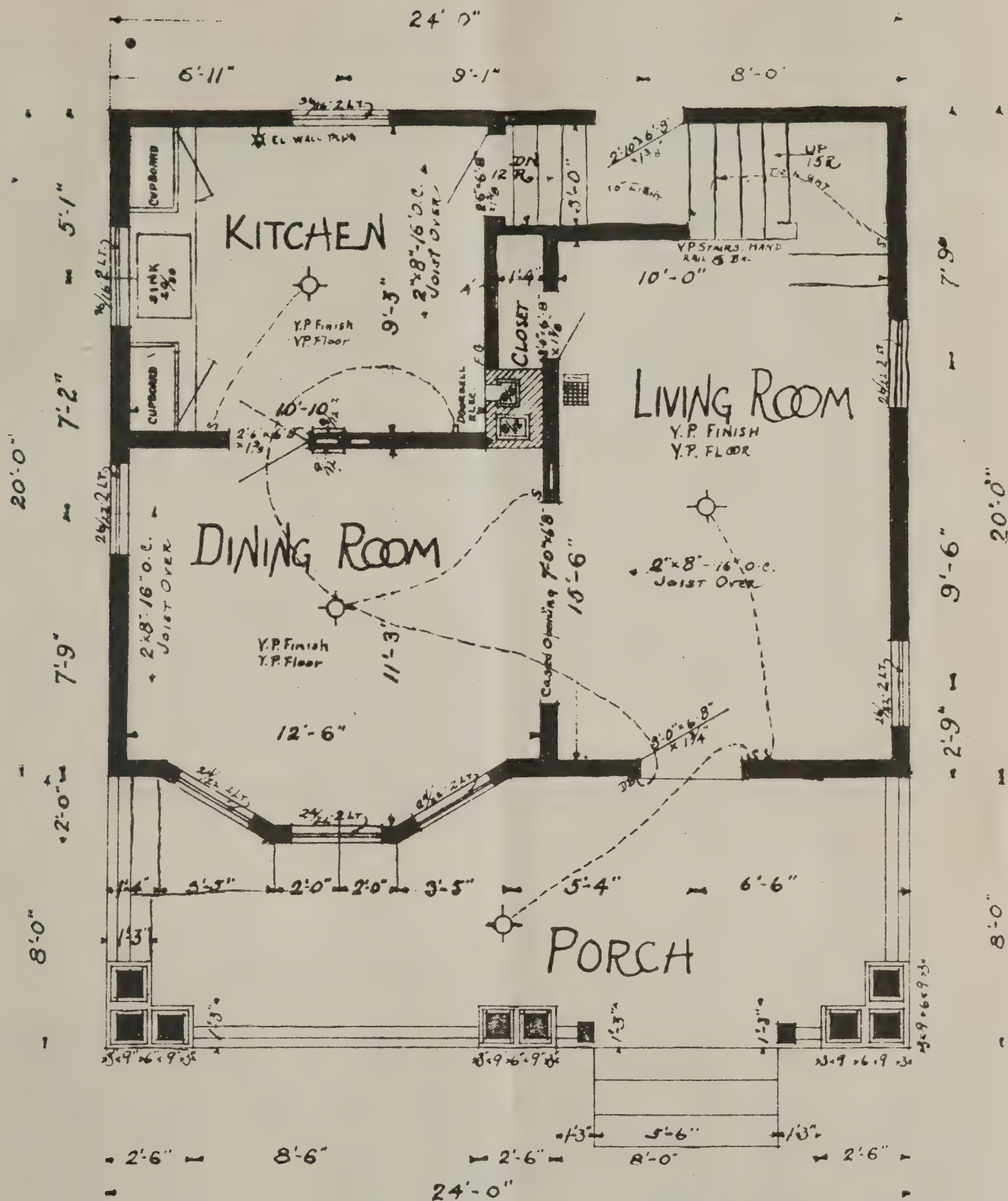
Construction views. These houses will not have the false gables but are otherwise identical with that type

slowing up of the setting process is decidedly noticeable; as the temperature falls still lower the rate at which concrete gains strength is very slow; and it almost ceases to set as the temperature approaches the freezing point.

Freezing will damage new concrete, especially alternate thawing and freezing. However, concrete that has favorable conditions for setting or hardening soon acquires sufficient strength to be safe against frost damage. The warmer the concrete is kept the

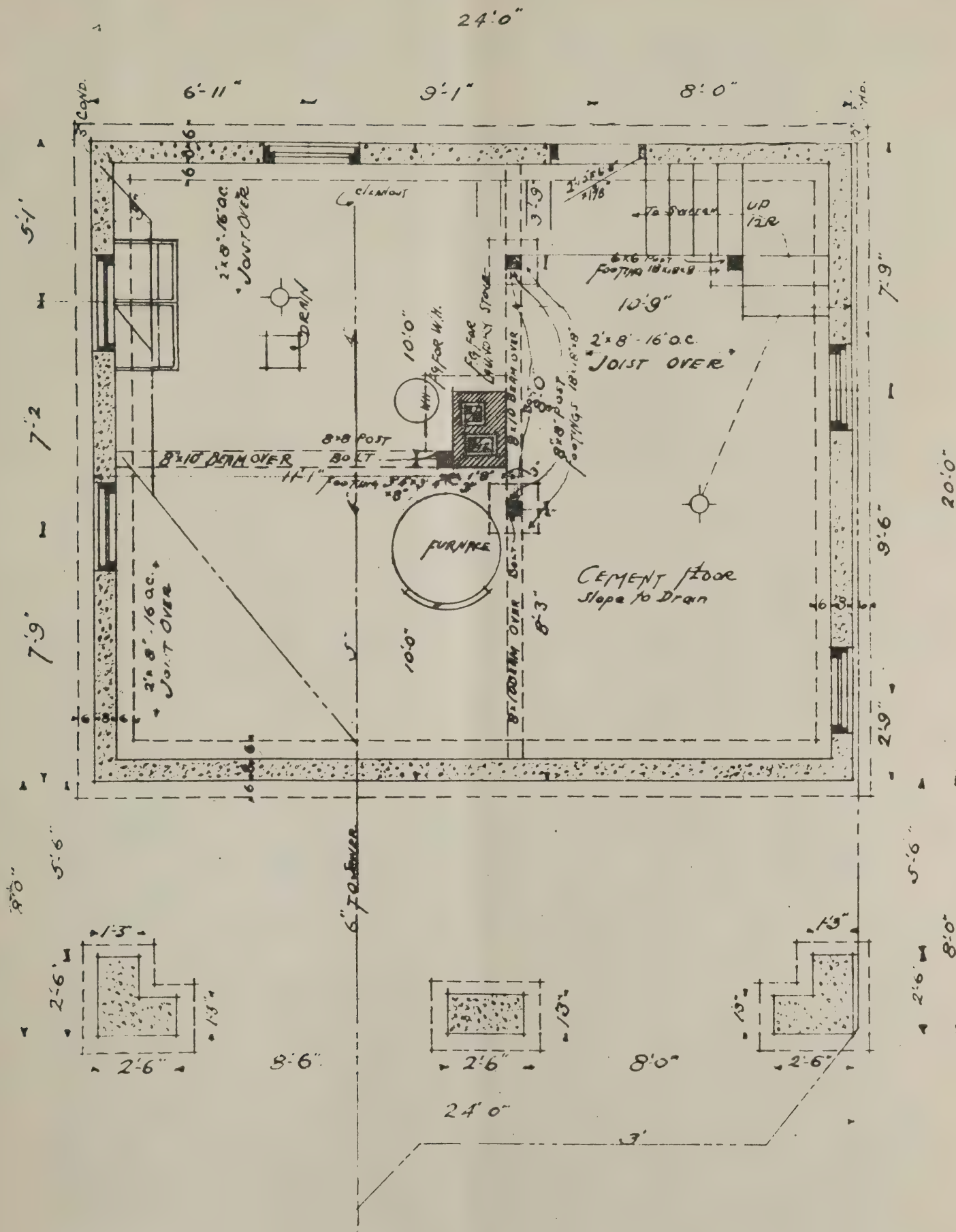
all cold weather concreting operations the slogan "Safety First" is particularly applicable.

The advice given above is based on the experience of the engineers of the Portland Cement Association the country over.



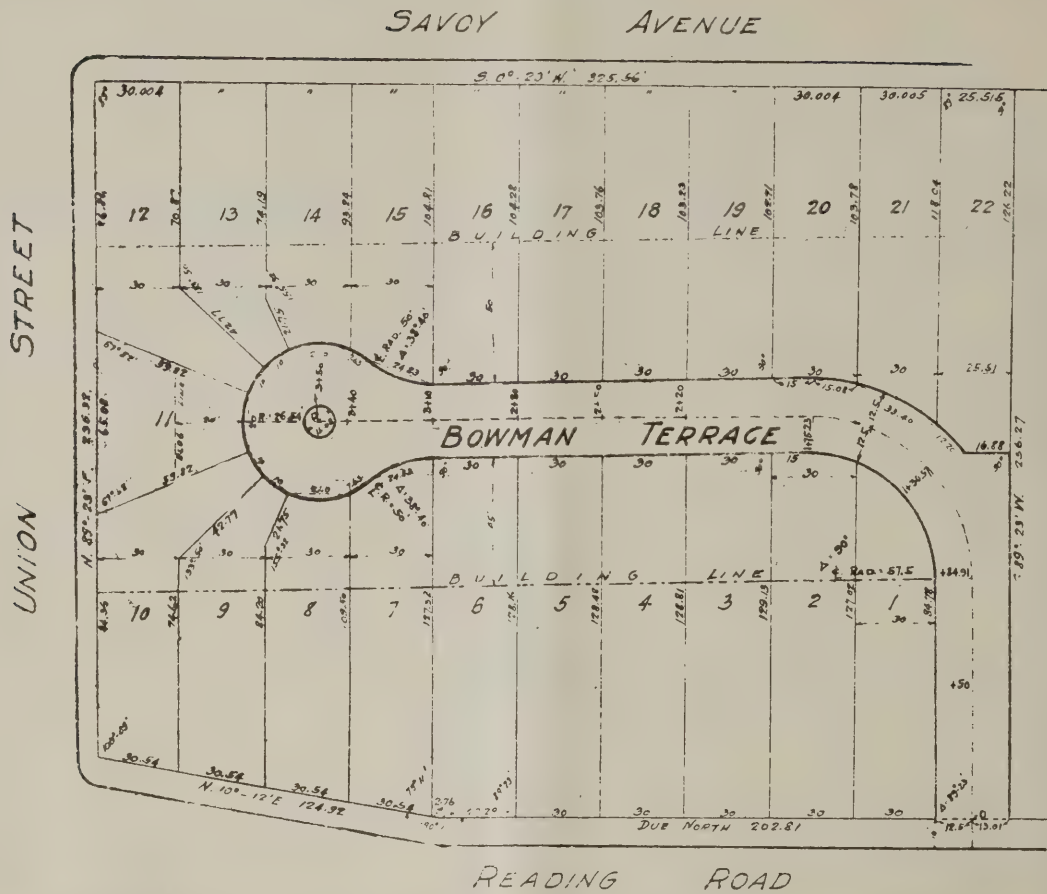
FIRST FLOOR PLAN OF THE JOSEPH PHILLIPS' \$4,500 HOUSE

Scale: $\frac{1}{4}$ equals 1 foot. These plans have been photographed directly from the blueprints without reduction



BASEMENT PLAN OF THE JOSEPH PHILLIPS' \$4,500 HOUSE

Scale: $\frac{1}{4}$ inch equals 1 foot. Reproduced directly from the blueprints without reduction



Plan and architects' sketch of the Bowman Terrace development of Joseph Phillips, Cincinnati. This is an old homestead property on a hump of ground several feet above street level on both sides. Various other projects contemplated the expenditure of tens of thousands of dollars for removing this hump. Mr. Phillips' plan capitalizes this very drawback, as the above plans show

Gypsum Block and Stucco Houses in Canada

FOR many years it has been the ambition of builders and others to find a more economical structural material which would stand the severe climate of the North and which would be permanent in every respect.

ter board was also perfect. There were no cracks in the wall, which had proved to be absolutely waterproof and did not show any signs of wear or deterioration. A small sample of exterior stucco was sub-

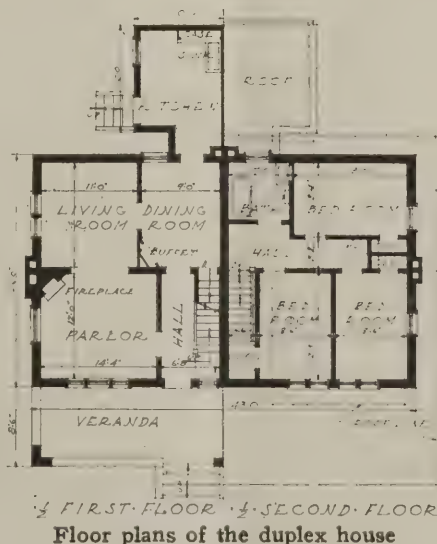
jected to the following test. After being on the wall two years it was soaked in water, allowed to freeze and then placed on a steam radiator. No failure of any kind took place.



This house is built of gypsum blocks plastered with magnesite stucco

In the spring of 1919 Mr. R. E. Haire, general manager of the Ontario Gypsum Company, Ltd., Paris, Ontario, made the discovery that if gypsum plaster was applied on a wall and this coat was followed with an application of cement mortar before the hardwall plaster had set the bond between the two mortars was perfect.

Experiments were carried on and several houses were built according to this system. The only test of the new construction worthy of the name being the element of time, no publicity was given to the work or further experiments made until after the first winter and spring had passed. On close examination of the building the following spring it was found that the bond between the cement mortar and hardwall plaster was permanent and perfect and the bond between the hardwall plaster and plas-



This new type of construction for exterior walls was normally regarded as a very important discovery inasmuch as it promised to allow the builder of moderate means to secure a dwelling absolutely fire-proof, warmer in winter and cooler in summer, and also permitted a variety of finishes by the use of stucco.

The most important item of all the building to construct is the exterior walls. These could be constructed at a very moderate cost, cheaper than brick or tile and no more costly than sheathing, paper and ship-lap.

Building trades, however, are very conservative and in order to verify the statements and to prove that this method of construction was practical and economical, the company, as already stated, built several dwellings in various parts of Ontario, and

in some instances had the work done for others under their supervision and guaranteed the work. These jobs have been successful in every instance.

The following specifications were observed:

Lath shall be $\frac{3}{8}$ -in. thick gypsum board, made by Ontario Gypsum Co., Ltd. The gypsum board shall be 36x32 $\frac{3}{8}$ in. thick.

Gypsum board shall be applied on studs at 16-in. centres with nails $1\frac{1}{4}$ x11 gauge, 7-16 in. flat head, nailed every four inches, or 27 nails to each board.

Cover all exterior walls of building (except as otherwise specified) with gypsum board, spaced about $\frac{1}{4}$ of an inch apart both horizontally and on studs.

Lay all sheets in parallel courses, following direction of studding, break angles to studding. Over the board apply 2-in. mesh galvanized wire netting, properly stapled. (Optional.)

First coat of plastering to be of hardwall plaster (mix 1 part plaster to 1 part sharp sand by measure) applied directly to the board $\frac{3}{8}$ in. thick, and followed immediately, and before it has time to set, with coat of portland cement stucco, made up of one part portland cement to three parts clean sharp sand, to which add 25 per cent hydrated lime by weight, to which add an integral waterproofing compound $\frac{1}{4}$ in. thick.

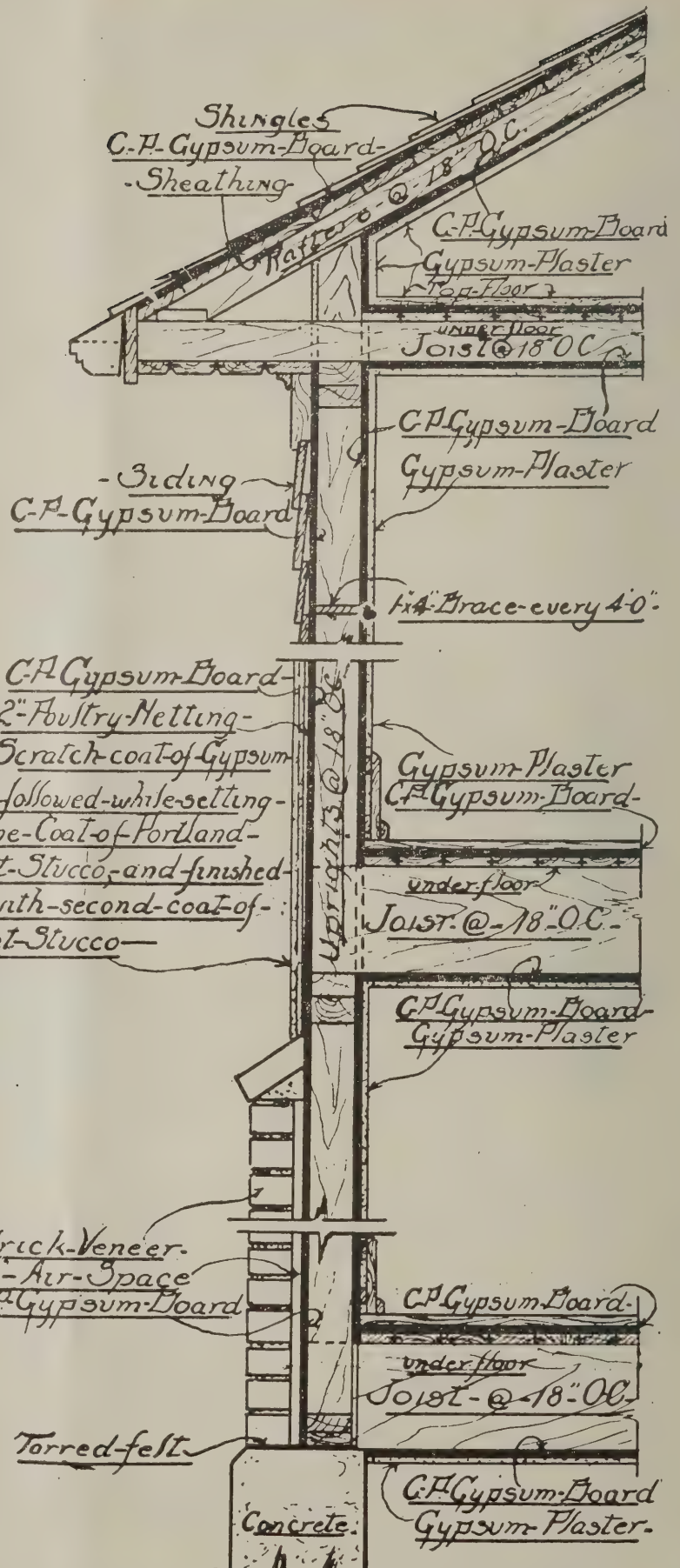
Third and finishing coat to be applied when second coat has set, composed of: One part of portland cement to three parts clean sharp sand. Adding 25 per cent hydrated lime by weight, to which add an integral waterproofing compound, to be

C-P Gypsum Board
2" Foultry Netting
Note-Scratch-coat of Gypsum
plaster followed while setting
with one-coat of Portland-
cement-Stucco, and finished
later with second-coat of-
Cement-Stucco

Brick-Veneer
1" to 2" Air-Space
C-P Gypsum Board

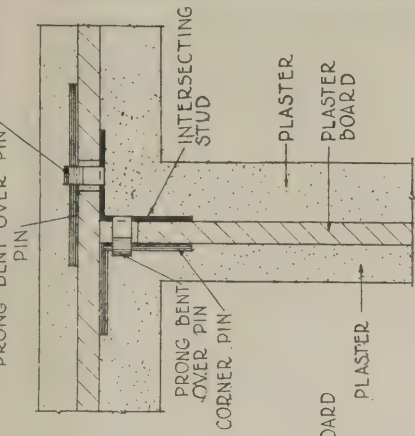
Torred-felt

Concrete

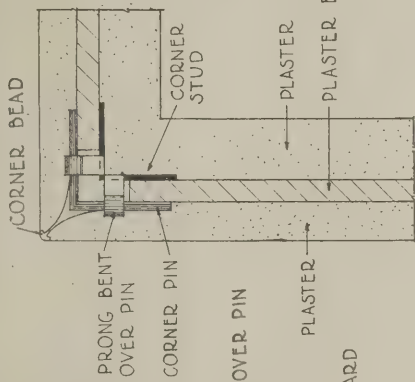


Fire test of gypsum stucco house with wood supported members

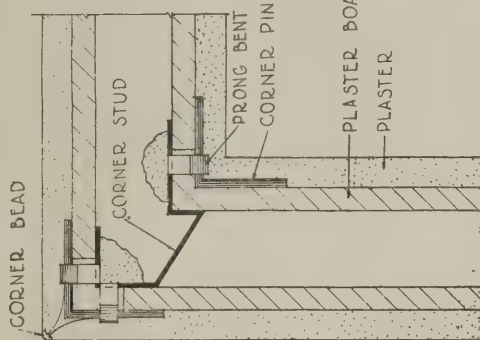
Section of recommended specifications for stucco house built with wood supported members



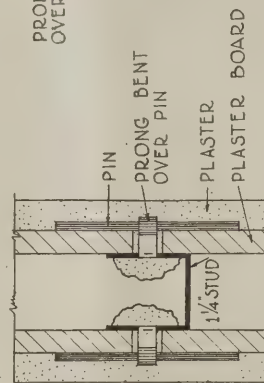
SIMPLEX CORNER STUD FOR 2" SOLID PLASTER PARTITION.



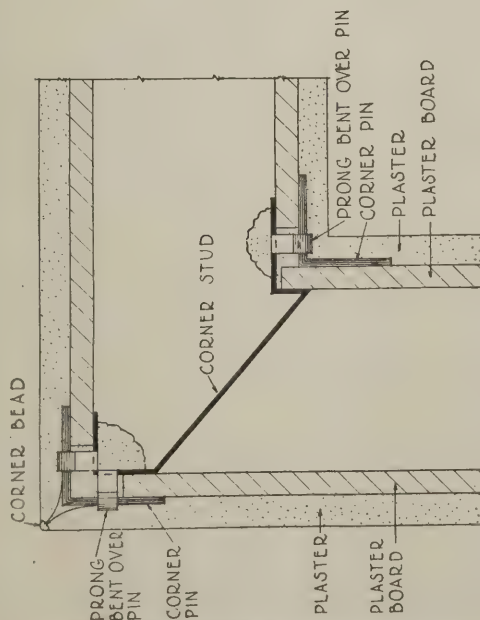
SIMPLEX CORNER STUD FOR 2" SOLID PLASTER PARTITION.



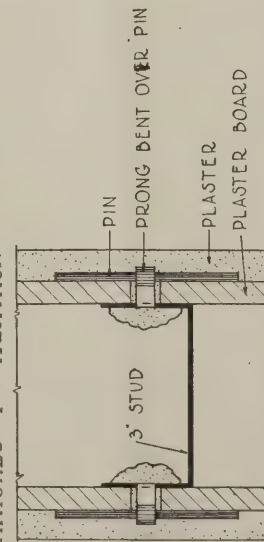
SIMPLEX CORNER STUD FOR FINISHED 3" PARTITION.



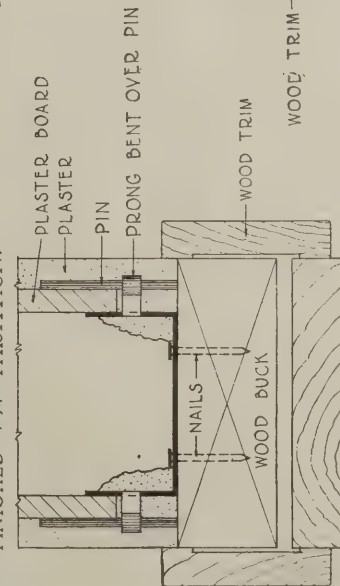
SIMPLEX STANDARD STUD FOR FINISHED 3" PARTITION.



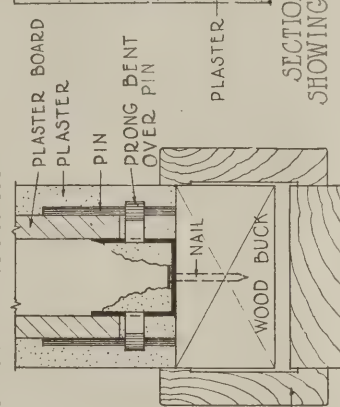
SIMPLEX CORNER STUD FOR FINISHED 4 3/4" PARTITION.



SIMPLEX STANDARD STUD FOR FINISHED 4 3/4" PARTITION.



DOOR JAMB DETAIL FOR 4 3/4" FINISHED SIMPLEX PARTITION.



DOOR JAMB DETAIL FOR 3" FINISHED SIMPLEX PARTITION.



DOOR JAMB DETAIL FOR 2" SOLID PLASTER PARTITION.

STANDARD CEILING RUNNER AND SOLID PLASTER PARTITION STUD.

ELEVATION OF THE "TIE THAT BINDS".

SECTION THRU HOLLOW STUD SHOWING "THE TIE THAT BINDS".

DETAILS OF SIMPLEX SOLID AND HOLLOW PARTITIONS.

Details of steel stud and plaster partitions one-third full size

used according to manufacturer's directions for pebble dash, float or any effect desired.

A Fire Test

On June 4, 1921, in Toronto, Ontario, there was carried out the largest and most elaborate fire test that has been given gypsum products in house construction. A four-room bungalow complete in every detail was erected, the construction of the floors, roof and side walls being the same as specified. The fire chief of Toronto, city architects and other interested parties were then invited to come out and try to burn it down. This was attempted by lighting piles of wood in the front room, on the roof and

The houses are cool, easily heated and the interior walls are dry and no moisture penetrates. They have gone through two Canadian winters and display every evidence of permanency. They are also fireproof and are economical to construct, as gypsum block lays up very rapidly and is easily handled.

In the city of Winnipeg in 1920 there were fifty houses erected using similar construction, and in 1921 some were built in Montreal, Que.

All Steel and Gypsum

A further development by the company is to build houses entirely of steel, gypsum

policy. If this warrant is violated this policy shall be null and void.' Of course I dropped this company. Would be glad to be enlightened on the subject of cement flues." *Answer*—This inquiry has been referred to the Portland Cement Association, who reply: "A properly constructed concrete flue is fireproof and efficient. Although a special flue lining does not seem absolutely necessary, yet most building regulations provide that such a flue lining shall be used so as to be absolutely on the safe side. An objection to a concrete flue with a proper flue lining such as is contained in the insurance policy of the English company mentioned in your letter is new to us and we do not see any basis for the objection. We imagine that if you call the following information to the attention of that company or its representative he will agree with you on the value of a concrete chimney. The National Board of Fire Underwriters, 76 William Street, New York City, recommends the use of Portland cement mortar only in constructing chimneys or flues, that the chimneys should have walls at least four inches thick and be lined with a suitable flue lining. In monolithic concrete chimneys this flue lining can serve as an inside form. They also recommend that if chimneys are not lined, the walls should be reinforced in both directions, that not more than two flues should be permitted in the same chimney space, that the joints of the two sets of flue linings should be offset at least six inches and that the joints on the inside of the wall, chimney and flue should be struck smooth."



Gypsum stucco house with wood supporting members practically intact after the fire test

against the exterior walls. The result was that the building was practically undamaged. The roofing was, of course, quickly consumed, but the gypsum under it was intact. The interior walls were covered with smoke and the plaster cracked in one or two places, but outside of this there was no damage. Illustrations for this test which was a great stimulus to gypsum construction are shown herewith.

Gypsum Block Houses

It is believed that this company was the first to adopt gypsum block for exterior wall construction in dwellings. The two houses here illustrated were constructed at Paris, Ontario, the exterior walls of which were gypsum block. Air spaces were provided in these walls by laying the block up in two separate courses. The outer wall is 3-in. solid gypsum block with 2-in. air space and the inner wall 4-in. solid block.

Bearing walls in the basement, outside of the centre dividing wall between the two houses, were also constructed of gypsum block, as was the partition wall between the two houses above the foundation. The exterior of this double house was finished in stucco as per the specifications. On the interior the plaster was applied direct to the block, thus saving a considerable amount of furring and lathing.

board and gypsum mortar, using light structural steel for all carrying members and using steel lumber for joists. When this is completed the structure is self supporting and it is then possible to use non-bearing curtain walls for exterior construction and non-bearing walls for the interior divisions. For such walls use is made of steel studs and plaster board construction as shown in the detailed sketch of simplex partitions.

Such a house is now being built in Toronto, Canada, and it is proposed to subject it to a severe fire test in the presence of invited builders and architects in the United States and Canada.

Fire Hazards of Cement Flues

J. S. M., a subscriber from Seat Pleasant, Maryland, writes in to us as follows: "I built three flues ten years ago, of concrete, using flue lining of course, and so far have no reason to regret. But an insurance policy issued to me by an English company has a cement flue warranty attached to it which reads: 'It is warranted by the assured that the building thereto described in this policy contains no brick-on-edge, tile, cement or metal flue, and that no such flue shall be erected during the term of this

Strength of Wooden Beams

J. H. A., one of our Canadian subscribers, writes us: "I want to know what should be the size of the wooden beam above the plate glass of a store front, 20-foot span, to be strong enough to support the wall (17 feet high) above. Also the size of the brick columns which stand at each end of the front of the building and receive the plate glass show front and sides." *Answer*—A wooden beam to span the 20-foot opening and carry your brick wall 17 feet high over the store windows would require a 14x14, a 10x16, or an 8x18. The way this is computed is to assume that the brick wall is solid and the beam carries the whole load. Brick weighs 140 pounds to the cubic foot, and there would be 120 cubic feet in this wall, making a load of approximately 24,000 pounds. As a matter of fact, there are undoubtedly window openings in the wall and some arching effect in the brick which would reduce the load materially. The figures given can be used with the utmost safety. The size of the brick columns or piers should of course not be less than the width of the beam used. A 12x12 inch brick pier will be of ample strength.

Chicago's Largest Bungalow Project

RIVALLING the project of Mills & Sons, Chicago, who are erecting 63 2-flat buildings, details of which were presented in the August issue of NATIONAL BUILDER, Neils Buck & Co., also of Chicago, have completed 108 bungalows at Central Avenue and Grace Street, a growing sub-division on the northwest side, while in 1922 Neils

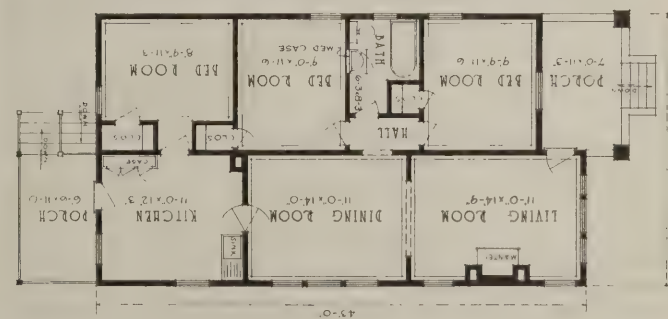
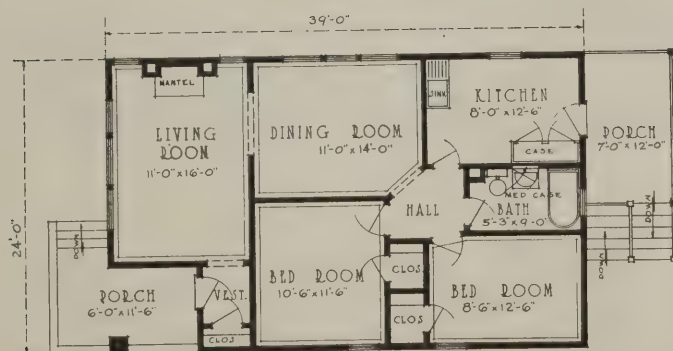
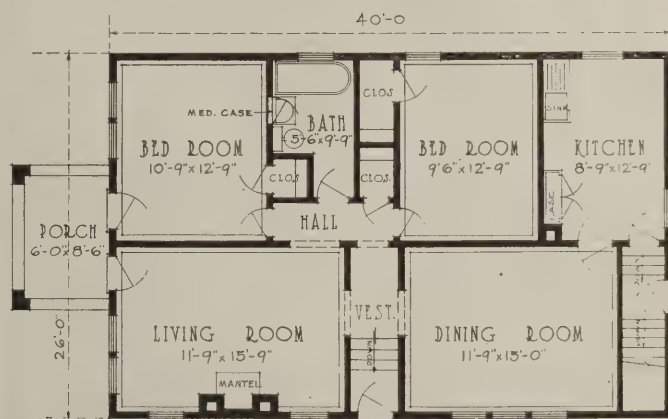
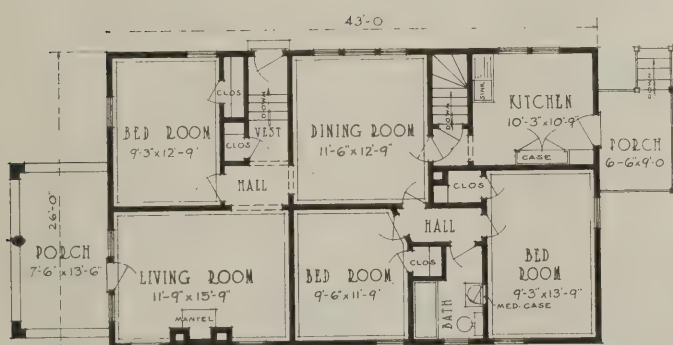
Buck & Co. expect to put up 500 bungalows and arrangements for that great undertaking are now under way. The bungalows completed and planned in 1921 have sold on the time payment plan, having prices ranging from \$6,000 to \$6,850, which includes all improvements. The sum of \$800 is required for the initial payment, which is fol-

lowed with a payment of \$25 a month, plus interest, which amounts, the first year, to between \$46 and \$56 a month, according to the price of the bungalow.

In a special interview with Fred Buck, son of Neils Buck who founded the company bearing his name in 1885, he gave NA-



Double row of bungalows erected by Neils Buck & Co.



Four representative plans of the fifteen bungalow floor plans designed by Neils Buck & Co.



Other views of the bungalow development

NATIONAL BUILDER the following details of this bungalow project:

"The 108 bungalows we are erecting on the northwest side of Chicago, a little south of the district known as Portage Park, are of the squatty California type, and prospective buyers are given 15 layouts from which to select their ideal home. The bungalows have 5 or 6 rooms, varying from 24 to 26 ft. in width and 38 to 43 ft. in length. We are getting away from the unsightly sameness in exterior treatment in large projects of this kind by having attractive, artistic combinations of siding, shingles and stucco, which are mixed up in sufficient variety to give each block a distinct atmosphere. The accompanying illustrations are evidence of our success in this endeavor.

"The lots measure 33x125 ft., corners being 5 ft. wider but of the same depth. The 5-room bungalows have 2 bedrooms, the 6-room 3 bedrooms. All bungalows have front and rear porches. No pantries, however, have been provided whatever, but in each plan there is a commodious kitchen with a large case which is 18 in. deep. Fireplaces are provided in each living room, and every dining room has a buffet.

"Frame construction is used on all dwellings and continuous trim provided throughout with the exception of bedrooms. All bungalows have an inside stairway to the basement.

"Interior trim is usually either birch or red gum, but the prospective buyer has the option of choosing his own interior or ex-

terior decorations. Our base price calls for furnace heat, using tubular furnace. Steam, hot water or other heat is installed if the owner pays the difference. The same is true of plumbing fixtures, which includes a



Typical bungalow erected by Neils Buck & Co.

bathtub on legs, wall-hung lavatory, low-down closet combination, medicine cabinet, 1-piece kitchen sink, and a 2-part laundry tray in the basement. These are all of standard manufacture. The owner has the privilege of installing a built-in tub, pedestal lavatory, etc., at the additional cost.

"All roofs are covered with asphalt shingles and stucco work is magnesite on wood lath. The roofs are alternated red and green in each block. Flooring throughout is oak, except the kitchen which has maple. Portland cement is used for all concrete foundation work.

"We have enjoyed a splendid response in the sale of these bungalows, the low first payment of \$800 being one of the magnets that appeals to home owners. The compactness of the plans, harmonious blending of the exterior treatment, and the low range of prices from \$6,000 to \$6,850, have altogether made such an appeal to the public that in 1922 we intend to go ahead on a much larger scale. We expect 1922 to be one of the very best years in our history which dates back to 1885."

Ratio of Dwelling-Space Production

Rent reductions, representing the first fruits of the tax exemption ordinance on habitation building construction, is bringing with it a new problem, that of maintaining the recent rate of dwelling space production, which alone can make housing relief permanent.

A report from New York City says that "in the Bronx, apartments built to rent for \$25 to \$27 a room are being offered at \$20. This represents, roughly speaking, a return of from 10 to 15 per cent on the investment. Even at 10 per cent the owners say that they can find investment incentive on habitation building speculation. When, however, the courts set up a limit of 8 per cent the

speculator quails in the face of the ascending price of materials and the slight prospect of a marked reduction in labor wage scales. He has no assurance but that some other judge in a still higher court will rule that 6 per cent is the proper return upon a home-building project for the investor."

Questions, Answers, Kinks and Discussions--V. L. Sherman, Editor

Herein is a Department of Mutual Help for the Exchange of Experiences and Ideas.
It is Not Only Well Worth Your While to Give Your Experiences for
What You Get Back from Others, but National Builder
Pays You for Doing So in Good Hard Cash

Putting Up Corner Beads

F. M. W., a civil engineer of Norfolk, Va., writes: "Metal corner beads are sometimes awkward to get up straight, especially when they are in long lengths. The accompanying sketch, Fig. 1, shows my way of putting them up. Set the bead corner of the metal corner bead into the groove of a

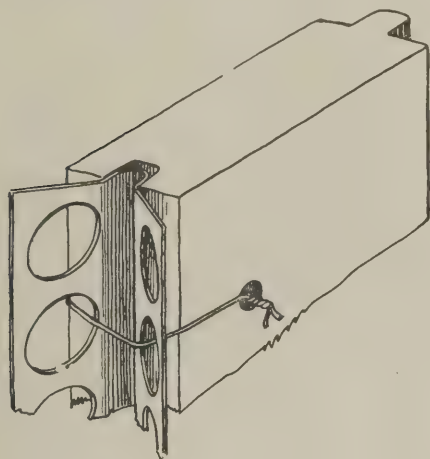


Fig. 1

straight piece of flooring, wiring the metal to the wood as indicated. This holds the metal straight. The piece of flooring can then be held against the corner where the bead is to go, and the bead can be readily secured in place. Cut the wires and remove the flooring."

Scaffold for Putting on Diagonal Sheathing

O. S., a Silverton, Ore., subscriber, sends in the accompanying sketch, Fig. 2, "illustrating," he says, "my idea for a convenient time and labor-saver for putting on diagonal sheathing. I have used this on two different jobs lately, and it has more than paid for its cost, to say nothing of the ease with which the work is done as compared with the effort when any other scaffold is used. It can be used for either inside or outside work, and is easily moved around. Two men can work to advantage with it, one working mostly on the ground. What leads the boss to find these time-saving de-

vices at the present time is not a shortage of mechanics but the keen competition that is always at hand when these jobs are in sight. Try this one on your next job, if for nothing more than the ease with which the work will be done."

Roof Framing

By E. P. McCaslin, Indianapolis, Ind.

From the number of articles appearing from time to time bearing on the subject of roof framing, I am convinced that this subject is the early nightmare of all beginners in the art of carpentry. I have been a carpenter since I was 15 years of age. My father was a barn framer, but I never knew him to cut any roof except half, third or fourth pitch; i. e., 12 run, 12 rise; 12 run, 8 rise; 12 run, 6 rise. Whether he could frame other pitches without considerable effort or not I do not know, but I am inclined to the belief that any other pitch was a problem that the carpenters of

was about the easiest problem that ever came down the pike.

In the system which I have developed no drafting whatever is necessary, as everything takes care of itself in proper sequence. I make here a drawing, Fig. 3, so that the beginner can visualize the method. In the illustration a right-angle triangle is shown. What in trigonometry is designated as the sine, cosine (equivalent) and the radius, and in geometry as the perpendicu-

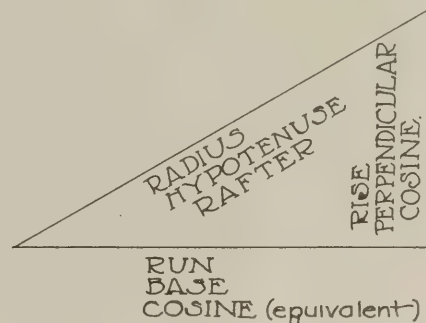


Fig. 3

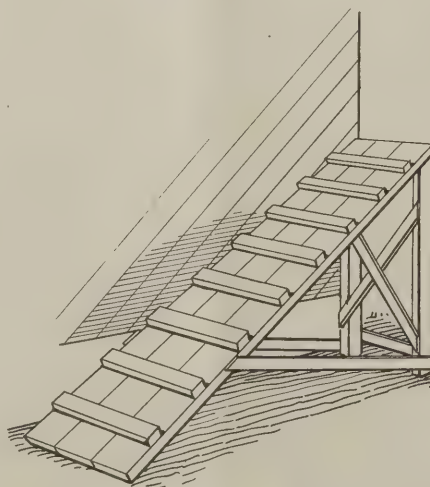


Fig. 2

that day studiously avoided. Now I was unfortunate in having but one teacher who could give thorough instruction in geometry, algebra and trigonometry in my school days, and he taught but a three months' term. With the smattering of these sciences thus obtained I started out to apply them in my carpentry work. I soon found that roof framing, no matter what the pitch,

lar, base and hypotenuse we in terms of roof framing call the rise, run and rafter. Now, no matter what is the width of the building to be roofed, first find the length of rafter required to cover a 24-ft. building of the pitch desired. Then call this length inches instead of feet. This number is the "key" to all subsequent operations. If the building is 18 ft. wide, the "key" multiplied by 9, one-half of the width of the building, gives the exact length of the rafter, expressed in inches. [The editor suggests that a simpler way for the beginner would be to stick either to the multiplication or to the addition and subtraction.] If a building is 26 ft. wide, the length of the rafter for a 24-ft. building plus the "key" is the exact length of the rafter. If 22 ft. wide, the length of rafter for a 24-ft. buildings, less the "key," is the exact length of the rafter. And so on. I submit here a few pitches with the length of rafters in feet and fractions thereof, expressed in decimals. These lengths, called inches instead of feet, are the "key" numbers to be multiplied by one-half the width of any building you may be called upon to erect.

Run	Rise	Length of Rafters (in feet)	Hip Cut	Pitch
12	12	17 (nearly)	17-12	45°
12	10	15.624 or 15'-7½"	17-10	39° 49'
12	9	15	17-9	36° 53'
12	8	14.422 or 14'-5" strong	17-8	33° 42'
12	7½	14.15 or 14'-1½"	17-7½	32°
12	7	13.89 or 13'-10 11-16"	17-7	30° 12'
12	6	13.42 or 13'-5"	17-6	26° 36'
12	5	13	17-5	22° 37'

Note that this last is almost exactly half as steep as the 12-12 pitch. The rafter length is the key to use in any width of building, but must be called *inches* instead of feet, and when multiplied by half the width of the building gives the length of the rafter in inches, as in a 12-9 pitch 15 is the key number and a 10-ft. building would call for a 75-in. rafter, a 26-ft. building would call for a 15-ft. rafter plus 15 in. Now, the length of the main rafter is the key to all that is involved in cutting jack rafters, valley shingles, etc. If jacks are to be 2 ft. on center, then twice the length of the main rafter, expressed in inches, is the amount the jacks shorten for each succeeding set. If 1 ft. on center, then once the length expressed in inches, and so on. The length of the main rafter is also the key to the jack bevel cut. Always use the length of the main rafter (expressed in inches) with the number 12 and you will have the exact bevel for valley and hip jacks, valley shingles, cut of sheathing where turned around the hips, etc., etc.—no mental problem to solve, nor draft to ponder over. If you *know* the system here laid down roof framing becomes a game.

And now to recapitulate a bit: Let us take a 12-7½ pitch with a hip roof. What is the retreat in jack lengths when set 2 ft. on center? Answer: The rafter length is 14.15 ft. Twice that is 28.3, or 28.3 in., the amount of retreat. What is the bevel cut? Answer: The rafter length is 14.15, and 12x14.15 (the long slant) is the exact cut. The 14.15 is almost exactly 14 5/32 in. What is the cut of edge board (gutter board) to turn the hip? Answer: 12x14.15, but the *short* slant, the reverse of above. What is the under cut of said board? Answer: Just the same as the top end of the hip rafter.

The English pitch is 60°, run 12, rise 20 6/10 (approximately), rafter 24 ft., or exactly the same as the width of the building. A hip cut in such a pitch would be 17-20 6/10.

Raising a Heavy Girder

"When my copy of the NATIONAL BUILDER comes in, the first thing I look for is the new Kinks," writes J. W. G. of Columbus, Ohio, and furnishes us with the following kink of his devising: "This summer I was building a brick garage and had an iron girder to place over the door. With only one helper and no tackle it looked like a big job. But I remembered that 'where there's a will there's a way,' and 'necessity is the mother of invention,' and this is what we did. After moving

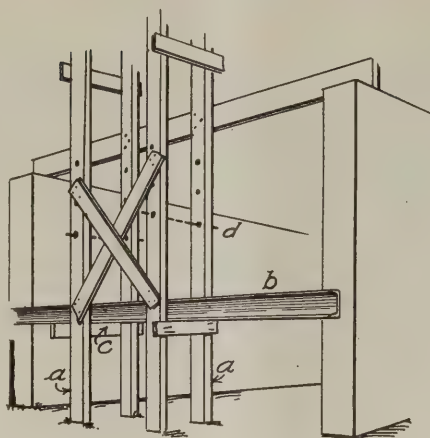


Fig. 4

the girder in front of the door and raising it on some blocks, I placed four 2x4 uprights, as shown in Fig. 4, and braced them. Two of them were placed inside the wall and two outside of the girder, about 3 ft. apart. After getting some 1-in. slats we were ready to start up. My helper raised one end as high as he could and I nailed a

slat to the uprights under the girder. Then we raised the other end and nailed another slat to the other two uprights. In this way we soon had the girder on the wall with very little effort. If a very heavy girder was to be raised I would bore holes in the uprights and use an iron rod instead of the slats. By spacing the uprights closer together a heavier load can be raised, as this increases the leverage."

The Steel Square

A contributor to an English weekly, "The Illustrated Carpenter and Builder," observes that English carpenters are not so well versed in the uses of the steel square as are the American. We surmise that the difference between British and American tool makers in advertising and descriptive publications may have something to do with it. Few concerns in this country fail to show the manner of using their wares to the man who is to use them. The American journeyman has also a wider experience both in locality and type. Re-

COMMON RAFTER										HIP OR VALLEY RAFTER.																													
PITCH OF ROOF		PLUMB CUT (in degrees)		SEAT CUT (in degrees)		LENGTH OF COMMON OR JACK RAFTER PER FOOT OF RUN.		SIDE CUT OF JACK FOR SQUARE CORNER		SIDE CUT OF JACK FOR OCTAGON CORNER		DIFFERENCE IN LENGTH OF JACK'S SQUARE CORNER ~ 16" O.C.		DIFFERENCE IN LENGTH OF JACK'S SQUARE CORNER ~ 24" O.C.		PITCH OF ROOF		PLUMB CUT (in degrees)		SEAT CUT (in degrees)		LENGTH OF HIP OR VALLEY PER FT. OF RUN OF COMMON RAFTER		SIDE CUT OF HIP OR VALLEY RAFTER.		BACKING OF HIP IN DEGREES		AMOUNT OF DROP WITH HIP OF NO BACKING.											
	0'	0'	In.	0'		0'		Pt. In	Pt. In			0'	0'	In.	0'		0'		0'		0'		0'		0'		In.												
3/4	33.40	56.20	21.6	29.0	0	13.0		2 45 3 7 1/4		3/4	43.20	46.40	24.72	34.30		53.50		7/8																					
17/24	35.10	54.50	20.8	30.0		13.20		2 34 3 5 3/8		17/24	47.0	45.0	24.00	35.20		54.40		3/4																					
2/3	36.50	53.10	20.0	31.0		14.0		2 23 3 4		2/3	46.40	43.20	23.31	36.0		55.30		3/4																					
5/8	38.40	51.20	19.2	32.10		14.30		2 15 3 2 1/2		5/8	48.30	41.30	22.64	36.50		56.30		1 1/16																					
7/12	40.40	49.20	18.45	33.0		15.0		2 8 3 0 7/8		7/12	50.30	39.30	21.99	37.40		57.30		5/8																					
13/24	42.40	47.20	17.7	34.10		15.40		2 3 2 11 3/8		13/24	52.30	37.30	21.37	38.20		58.40		5/8																					
1/2	45.0	45.0	17.0	35.20		16.20		2 2 2 10		1/2	54.50	35.10	20.78	39.10		59.50		9/16																					
11/24	47.30	42.30	16.28	36.20		17.0		2 14 2 8 3/8		11/24	57.10	32.50	20.22	40.0		61.30		1/2																					
5/12	50.10	39.50	15.62	37.30		17.40		2 7 2 7 1/4		5/12	59.30	30.30	19.69	40.50		63.10		7/16																					
3/8	53.10	36.50	15.0	38.40		18.20		2 0 2 6		3/8	62.10	27.50	19.21	41.30		64.50		7/16																					
1/3	56.20	33.40	14.41	39.50		19.0		19 1/4 2 4 7/8		1/3	64.50	25.10	18.76	42.10		67.00		3/8																					
7/24	59.40	30.20	13.9	41.0		19.40		18 1/2 2 3 3/4		7/24	67.30	22.30	18.36	42.40		69.10		5/16																					
1/4	63.30	26.30	13.42	41.50		20.20		17 3/8 2 2 7/8		1/4	70.30	19.30	18.00	43.20		71.30		5/16																					
5/24	67.20	22.40	13.0	42.40		21.0		17 3/8 2 2		5/24	73.40	16.20	17.69	43.50		74.10		1/4																					
1/6	71.30	18.30	12.65	43.30		21.30		16 7/8 2 1 1/4		1/6	76.40	13.20	17.43	44.10		77.0		3/16																					
1/8	76.0	14.0	12.37	44.10		21.50		16 1/2 2 0 3/4		1/8	80.0	10.0	17.23	44.30		80.10		1/8																					
1/12	80.30	9.30	12.17	44.30		22.10		16 3/8 2 0 1/4		1/12	83.20	6.40	17.09	44.50		83.20		1/8																					
1/24	85.10	4.50	12.04	44.50		22.20				1/24	86.40	3.20	17.00	45.0				1/16																					
						22.30							16.97	45.0																									
TAKE 12 ON TONGUE AND LENGTH OF COMMON RAFTER ON BLADE. SCRIBE ALONG BLADE.										TAKE 5 ON TONGUE AND LENGTH OF COMMON RAFTER ON BLADE. SCRIBE ALONG BLADE.										TAKE 17 ON TONGUE AND LENGTH OF HIP OR VALLEY ON BLADE. SCRIBE ALONG BLADE.										TAKE RISE ON TONGUE AND LENGTH OF HIP OR VALLEY ON BLADE. SCRIBE ALONG TONGUE.									

ARRANGED BY GRIFFITHS.

Fig. 5

peated inquiries, however, have been rather puzzling, and lead me to guess that the inquisitors are not using framing squares. Before the next number is issued we hope to have a paper on squares and their uses by some authoritative member of a tool concern. The best exponent of any tool is one of its makers, and I know of no patent or copyright on squares.

On the preceding page is a table (Fig. 5) for roof framing taken some years ago from one of Griffith's texts which may be of interest.

When Sash Weights Act Ugly

F. R., Easton, Pa., writes: "Very often, in weight-balanced windows, the weights stick. This may be caused by scant box room, warpage or imperfect jagged-edged weights. Pulling with all your might only sinks the weight deeper into the wood. The remedy would seem to be the removal of the casing, with all the ruin that goes with it. I take great pleasure in submitting a 'cure' which I worked out myself and which remedies the trouble with a minimum of inconvenience. First remove the parting strip, tap on the jamb and thus locate the weight. Then bore a half-inch (or less) hole through the plow. Run a screw driver or a steel rod through it and against the weight and pry down. If it fails to move, bore another hole. The right hole should be nearly in line with the top of the weight, then the trouble is over. In stubborn cases the use of a button hook or bent steel wire to pull the jamb away will help. No matter how many holes, the parting strip will hide them."

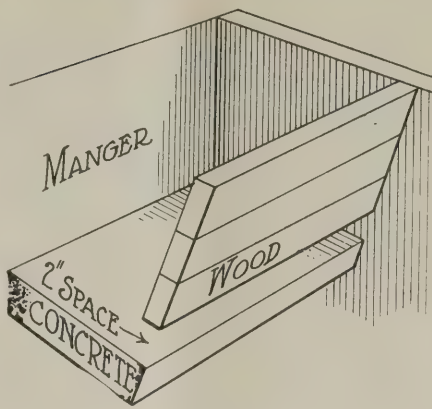


Fig. 6

A Clean Manger

"Everyone who has had experience taking care of horses," writes B. M. D., of Marshall, Wis., "knows how dust and leaves collect in the bottom of the mangers and what a job it is keeping the mangers clean. The accompanying illustration, Fig. 6, shows a way of eliminating this trouble. Leave a space of about 2 in. between the bottom of the manger, which is built of concrete and stones to the usual height above the floor, and the planks which finish the front of the manger. The horses in eating the hay keep working the dust and leaves through this opening or crack, and thus automatically keep the manger clean."

Framing a House Without Help

J. P., of Wagoner, Okla., tells how he managed to raise the walls and rafters of his new home which he is building by him-

self during the slack season. He says: "I am building myself a house without a carpenter to help me. I expected to get some one to help raise the walls and the 22-ft. rafters, but was forced to do without help. My house is 32x40 ft., and the main rafter is 19 ft. long. I raised a purlin half way on each side, shoved the rafter up on it and nailed the bottom. Then I made a horse and pulled it along through the center and nailed the tops. Lastly, I nailed on the 3-ft. rafter foot. The main rafters were of native oak, some over 2½x5 in. and none less than 2x4."

English Floor Plans

A Scotch architect recently remarked that American architects were at present more conservative than the British—that bizarre effects were far less likely to be seen on Broadway than in Regent street. The statement may be true enough and a deserved compliment to American architects, but there is no virtue in the fact that most small dwellings are "strictly American" when so many advantages of the old-country houses could be taken without importing the faults. The English small dwelling, not being equipped with a heating plant equal to northern winters, would have to be altered, except where the new self-contained plants are used. It would also require alteration because of domestic arrangements. But whenever an attractive English floor plan appears I wonder if the American small home couldn't be a bit more private.

The sketch, Fig. 7, is taken from "Tonic," in an English paper, and illustrates the point.

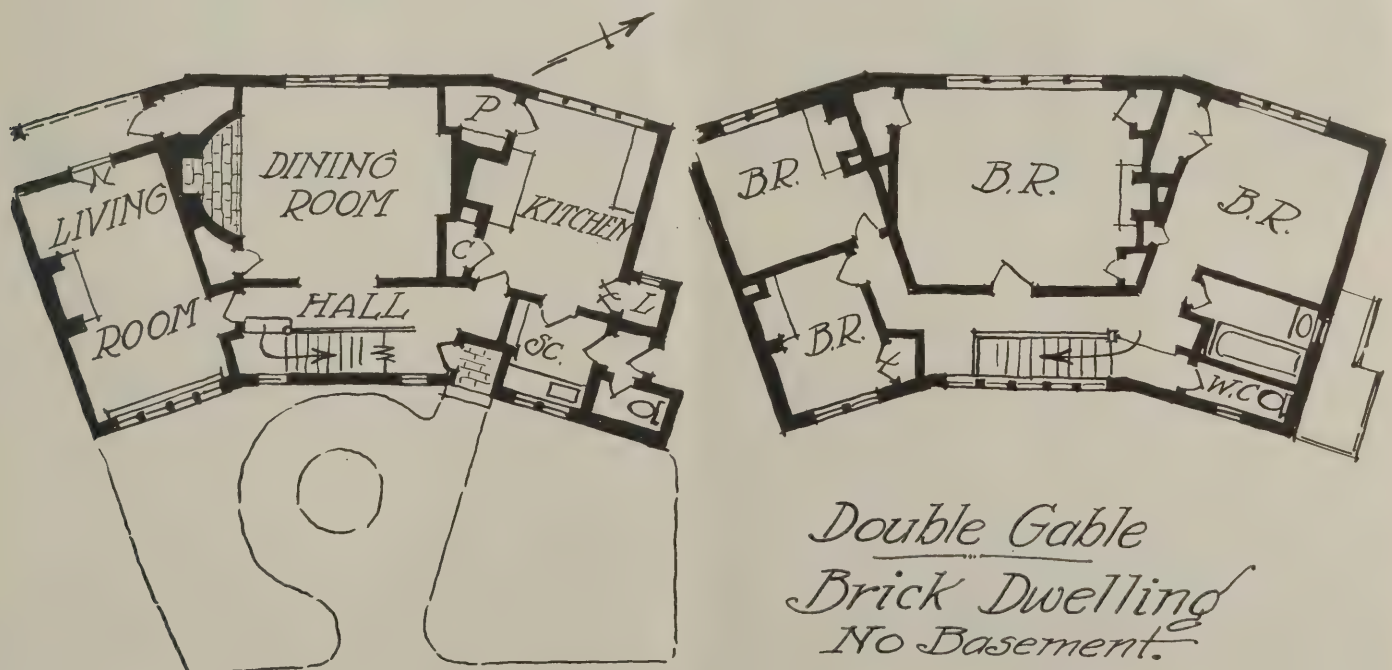


Fig. 7

An Illinois Barn Raising

Various Steps in the Erection of a Modern Barn With the Help of Volunteer Labor

A BARN RAISING is not the social event it used to be in the days before prohibition—at least not in the German colonies in the Central West. Consequently, the barn contractor probably has to pay more attention to laying out his work, so as to accomplish results with the smallest avail-

able crew and in the least possible time. With a noon-day feast in place of an all-day flowing bowl, to hold the crowd, a 100 per cent afternoon crew is not to be counted on.

The views herewith in numbered order tell the story of a recent barn raising in

Naperville, Ill. The contractor was John Schifferle. With his own crew of 14 men and a volunteer force of farmers of about the same number, he erected the six bents of an 80x36-ft. barn in one hour and thirty-five minutes. The last bent was erected and secured in place in plenty of time for



Trusses laid out on barn floor preliminary to raising



Braced corner post for holding end truss



Raising the first bent



Preliminary plumbing of first bent



Raising last bent



Bents all erected and all ties and struts placed

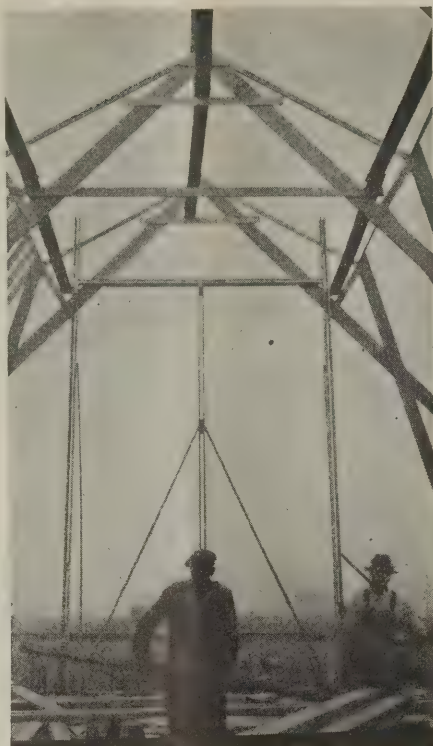
the noon feast of roast goose and other good things, such as only the farmers of such communities know how to prepare.

Details of Design

The barn was designed by Mr. Schifferle, following in general the well-known James ideas, but introducing a number of original



Placing longitudinal struts and ties



End framing



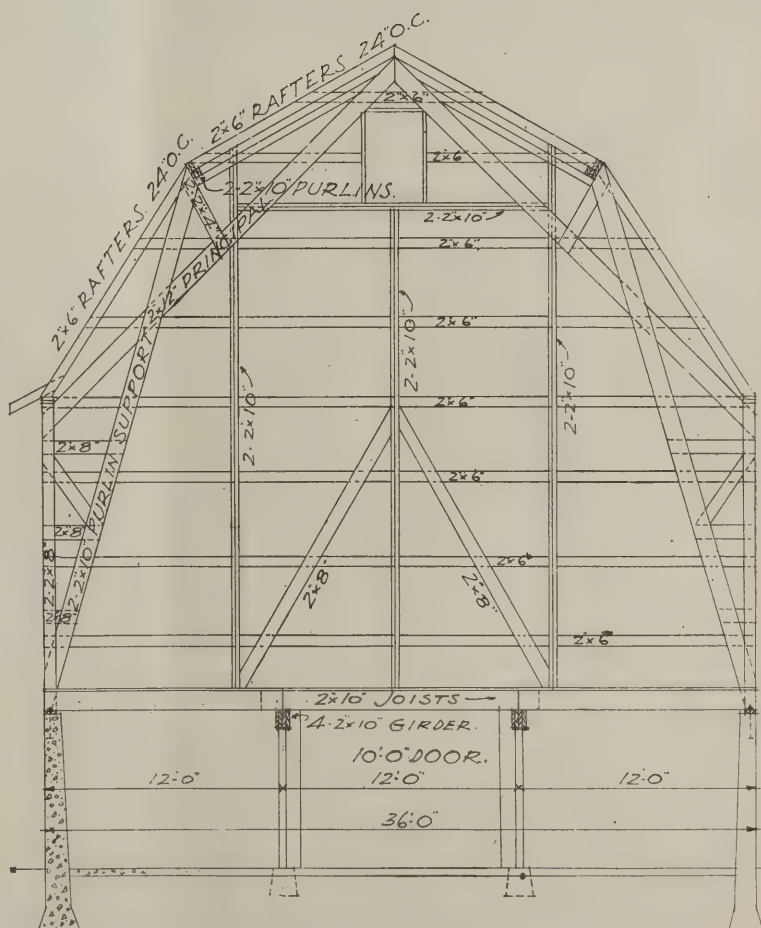
Framing and rafters complete



Bundles of shingles made into columns to support end bent before raising

features, particularly in the peak and end framing details. The accompanying sketch shows one of the bents in detail as well as the floor framing.

The vertical posts of 2x8-in. plank are 16 ft. long. The purlin supports and principals were all single sticks of clear grained long-leaf yellow pine, especially ordered for



CROSS SECTION
SHOWING END FRAMING



Basement view during construction



Main entrance to barn floor showing concrete retaining walls for fill and back of wet-feed vault



Provision for ventilation in concrete foundation walls



Interior opening for ventilation in concrete foundation walls



Post and floor construction in Naperville barn and entrance to vault under driveway



John Schifferle and his barn construction crew

the job. The sill plates were painted with a creosote preparation. The foundation walls are cast concrete as are the basement post foundations.

The basement of the barn, which is a stable for both cattle and horses, is well provided with windows and with ventilation ducts cast in the concrete walls. A special feature of the basement is a solid-walled concrete vault under the driveway; it is intended for wet-feed storage.

Raising Program

All the bent, or truss, members were cut and framed to templates. Their locations

on the sills were carefully measured and marked. The bents were then assembled on the barn floor, with the ends of the posts opposite the marks on the sills, where they were to rest. At the far end of the barn, where there was no floor to assemble the bents on, posts made of bundles of shingles were placed, so that the bents rested horizontally on these. Planks between the shingle piles provided walkways. At the corners where posts of the first bent was to rest, temporary posts, properly braced, were erected to hold the bent posts during the raising.

All these preparations were made on the

day previous to the one set for the raising.

On that day little remained to be done but to assemble the raising tools and attach the blocks and tackles.

Lines attached to the two curbs (middle points of the hipped rafters) were carried to four posts (two at each end) erected about 100 ft. from each end of barn. A block and line was also attached on the inside of each bent, to be used in raising the next bent. These lines were not used for raising the bent, but to steady and plumb them during and after erection. One man, of course, was required at each post to take in and pay out the line as directed.

The raising was done by sixteen or eighteen men with pikes of various lengths. The boss, overlooking the whole operation from the rear, made sure that the raising was done as uniformly as possible to prevent undue strains in the truss.

As soon as the No. 1 bent was approximately vertical, it was plumbed and trued into a true vertical plane by means of levels and by sighting along the truss. The bottoms of the truss posts were spiked, the lines made fast to the outside posts, and the erection of the second bent proceeded.

The lines from the curbs of the No. 1 truss to the posts on the near end of the

barn of course remained in place to carry the load on the truing lines attached to No. 2 truss. The lines from the curb of the No. 1 truss extending back to the posts at the far end of the barn were released and attached to the curbs of the No. 2 truss.

The No. 2 truss was raised in the same manner as the first, except that the truing or steadying lines on one side were passed through a block attached to the curbs of the No. 1 truss instead of to the outside posts.

As soon as the No. 2 truss was erected, men climbed to the wall plate level of each

bent and nailed the plate in position, it having been previously cut and framed to the proper length. As soon as this was done the men climbed to the curb and placed the 2x10 purlins in place. The block and lines were then shifted to the No. 2 bent and the work preceded without a hitch. To keep the bottoms of the bent posts from slipping on the sill during the raising, two men with pry bars were required at each post, but no blocks were nailed to the sills. From the time the first bent was raised to the time the last nail was driven home in the last purlin was less than one hour and three-quarters.

Financing Home Building

SOME errors occurred in the article on page 29 of the November NATIONAL BUILDER describing the scheme of operation of the Union Home Builders, Washington, D. C., which it is desired to correct at once. The plan of this organization is much more liberal to its shareholders than the original article made it appear. Claude Rothery, president of the Union Home Builders has expressed a desire to be of assistance to contractors who are aiding their clients to finance home building. He has sent NATIONAL BUILDER the following statement describing the scheme, which it will be seen differs in one prime essential from the account published in the November issue.

Scheme Explained in Detail

"If a person desires to take advantage of the plan to secure a loan with which to buy or build a home he simply makes application on the regular form, which is dated showing the hour and minute, which determines the exact order in which he will be entitled to secure a loan in the series to which the contract belongs. With the application he begins making monthly payments of 1% of the amount he desires to borrow.

"Upon receipt and acceptance, by the Union Home Builders, of the application, accompanied by the initial payment, a contract is executed. The contract is a specific agreement in which all the terms and conditions are fully and plainly recited. Nothing is left to the arbitrary determination of the Trustees of the Union Home Builders. All questions are settled by reference to the terms and conditions of the contract.

"Contracts are placed in series aggregating substantially \$500,000 face value each. Each series operates independently, the contract holders thereof creating their own fund. As soon as the accumulation in the Loan Fund, from its monthly contributors, monthly repayments on loans and other sources of accumulation has reached the amount desired by the borrower, he is so notified, and will be entitled to receive a loan equal to the amount of the face value of his contract. (This period runs from 20 to 25 months.)

"All loans are secured by first mortgages on real estate and are repaid at the rate of \$7.00 a month per \$1,000, face value of the contract, with interest at the rate of 4% on the yearly unpaid balance. Thus in approximately 12 years' time the borrower owns his home, and has never paid out any more, any month, than the initial payment, or, what would ordinarily be the rent for such a home. As each year goes by the payments become less and less. (The previous article stated \$10 per month from start to finish.)

"There are four essential features of a highly desirable loan, namely, a long-time, easy repayment plan; an extremely low rate of interest; six months' grace in case of sickness or misfortune and the privilege of paying off the entire amount as much sooner as desired without extra charge.

Investment Feature

"In order to explain the investment feature of the plan let us assume that when a contract matures for a loan the signer of the contract has changed his mind and decided not to buy or build, in other words, does not care for a loan. He has acquired a very valuable borrowing privilege which has a market value and is saleable. He simply notifies the Union Home Builders, who maintain a Brokerage Department, and they will sell that borrowing privilege to the highest bidder. The sale of these borrowing privileges usually brings a bonus of from \$100 to \$150 per \$1,000.

"The Union Home Builders were organized in 1912 and have made remarkable progress, owing to the fact that they are offering an exceptional service to the prospective home owner or investor, for which there exists a great demand at the present time.

"The officers of the organization have taken every precaution to safeguard the funds of the contract-holders. The loans are all secured by first mortgages on real estate; their bank account is insured against insolvency; the trustees and agents are bonded by a reliable bonding company; and the organization is under proper supervi-

sion, as required by law of other financial institutions in the District of Columbia.

"The Union Home Builders Organization is spreading its activities quite rapidly, and builders and contractors in various localities can get in touch with any local agencies by writing to the home office, at 1342 G Street, Washington, D. C."

Concrete Silo Construction

J. S., of Pickert, North Dakota, sends us this query: "I should like a little information in regard to cement silos. What causes the inside walls to peel? Is it the acid in the silage that eats the cement, as claimed by some, or is it the frost that does it? What is best to use to prevent it?" W. G. Kaiser, agricultural engineer of the Cement Products Bureau of the Portland Cement Association, 111 West Washington St., Chicago, advises as follows: "We are very much surprised to learn that you are experiencing any trouble along this line, because concrete silos, when properly built, are about as durable a kind of construction as can be obtained. I believe that there was something wrong with the materials used in making the concrete mixture, or else the workman was not careful to do a first-class job. The acids found in the silage are of such a weak character that they have no effect whatever on well made concrete. Concrete silos built more than 20 years ago and which have been in constant use, show no effects whatever of deteriorating on account of acids or for any other reason. From your description I am led to believe that the concrete must be very porous. If such is the case, the best remedy is to clean the inside thoroughly and then apply two coats of cement and sand mortar plaster. Just before applying the plaster coats the wall surface should be wet down. For your interest we are mailing you under separate cover a copy of our booklet, "Concrete Silos—Monolithic and Block," which gives complete instructions for building these structures. When you have read this booklet through you will no doubt be able to tell what the trouble is with your silos."

It sometimes happens that more material has been delivered to a particular job than is required to construct it, in which case the excess is either transferred to another job or to stock. Where such material is taken from one job to another, or is delivered from stock lots to jobs, a Material Transfer Report (Fig. 5) should be made out. This provides a means of properly charging each job with all the material used, and of crediting other jobs or stock with the quantity so delivered.

At the end of the month the columns headed "Balances" are used. The total quantity disbursed is subtracted from the total quantity received, to arrive at the balance quantity. The total value disbursed is, likewise, deducted from the total value received, to determine the balance value. The balance quantity divided into the balance value will give the average price to be used for the subsequent month in costing out material delivered to jobs.

To obtain construction costs properly, material must be charged against jobs as it is shipped and received. The practice of many building contractors is to enter material only when it is paid for, the entry

RESA
E ORDER
F FIRM
RESS

DUPLICATE

DATE 192

OUR ORDER

REQUISITION NO.

FOR DEPARTMENT.

CHARGE ACCT. NO.

For example, if a quantity of brick were received, it would not suffice to have one

[illegible]

FIGURE 4
DAILY REPORT OF MATERIAL
NAME OF FIRM

[illegible]

being made through the cash book. This is wrong in principle as well as in practice, inasmuch as⁸ the contractor's books do not reflect the true state of his business, nor does it permit of the material not entered to be taken into consideration when billing the owner as the work progresses. The equity, which should appear in every financial statement, is also incorrect, and the contractor is likely to form a false idea as to the profits being realized.

Another factor that affects this matter is that if material is not charged against the jobs as deliveries are made, and any disputes should arise, and litigation ensue, the bills might be held up for months and even years before they are finally entered in the investment. There is no way of determining the investment in a building where this extremely unsatisfactory method is practiced, and this is a point which the average contractor should bear in mind.

Hence, all purchase invoices of whatever kind, except those paid from the petty cash fund (explained in a later article), all pay rolls and all petty cash summaries are to be entered in the Purchase Analysis.

The face value of each invoice is to be separately entered to the credit of accounts payable in the columns headed "Accounts Payable—General" and "Accounts Payable

—Sub-Contractors," the day of entry and the date and number of invoices to be shown in the columns so headed. The corresponding debit will be entered in the particular column to which it applies; as, for instance, an invoice covering purchase of

material for stock would be entered in the columns headed "Material" under the general heading "Debits," while an invoice covering material, or sub-contractors' services, purchased for some particular job would be entered in the columns headed "Direct Charges," the name of the job, the account number, the quantity and the amount of the invoice being shown.

The same procedure is followed for material transferred from stock to a particular job, or from one job to another. As the material transfers come into the office, they are priced and extended and are then carried through the Purchase Analysis in the same manner as a purchase invoice, except that the credit entry would not be made to the "Accounts Payable" columns, but to the "General Ledger—Credit" column.

The column headed "Paid by Check No.," under the general heading "Credits," is to be used to set in the number of the check

FIGURE 5
MATERIAL TRANSFER REPORT
NAME OF FIRM

[illegible]

—Sub-Contractors," the day of entry and the date and number of invoices to be shown in the columns so headed. The corresponding debit will be entered in the particular column to which it applies; as, for instance, an invoice covering purchase of

given in payment. Where this is done, it will be found unnecessary to maintain a Purchase Ledger, because the open items in the Purchase Analysis will always give the details as to any one and all unpaid bills, and the total of such open items will

FIGURE 6
STORES RECORD
NAME OF FIRM.

[illegible]

[illegible]

When purchase invoices are received, they should be certified as to receipt of

[illegible]

(To be continued)

FIGURE 8

INVOICE NO. _____

REC. REP. NO. _____

DATE RECD. _____

PRICES O.K. _____

EXTENSIONS O.K. _____

ENTERED A/C PAY _____

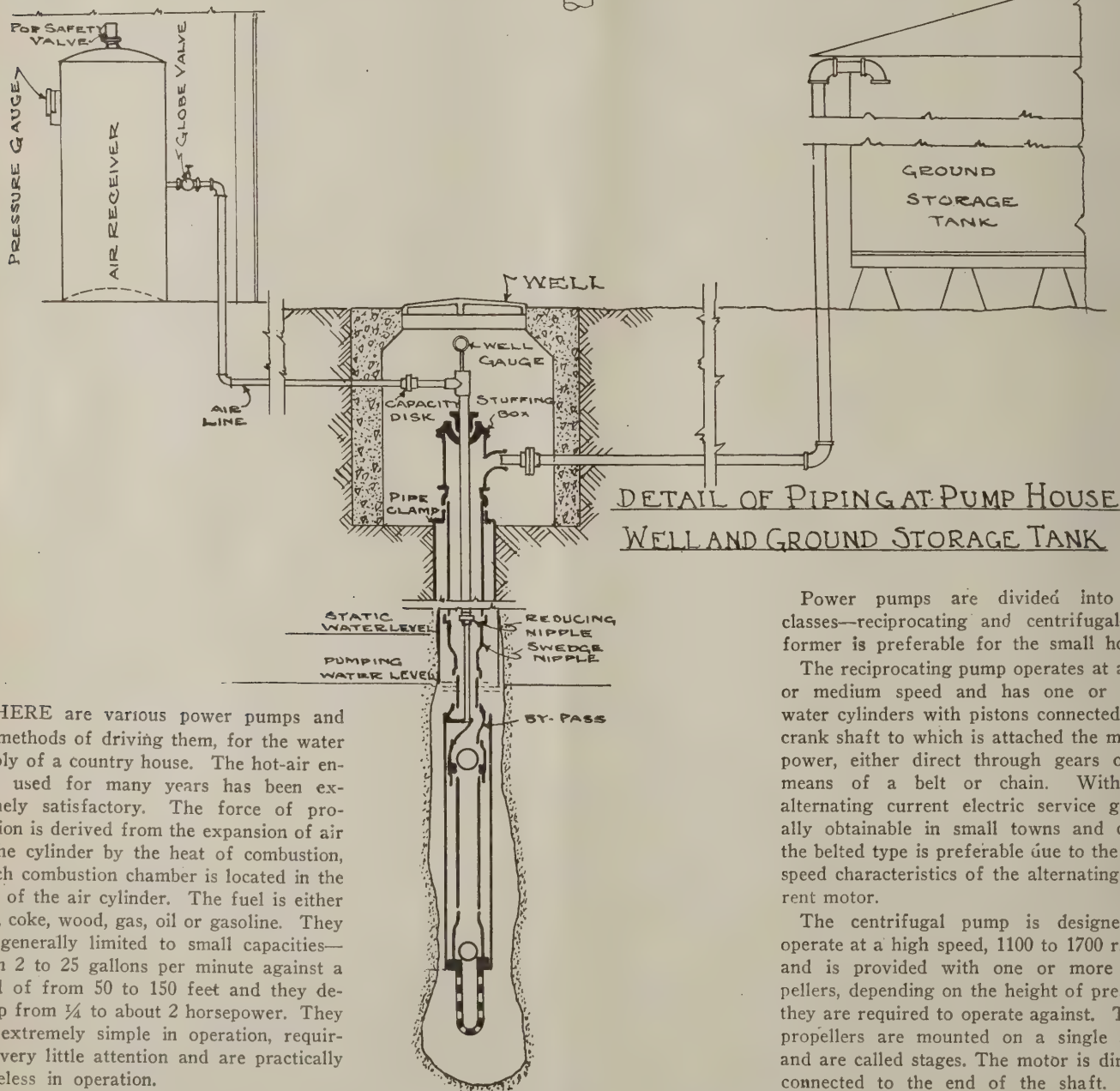
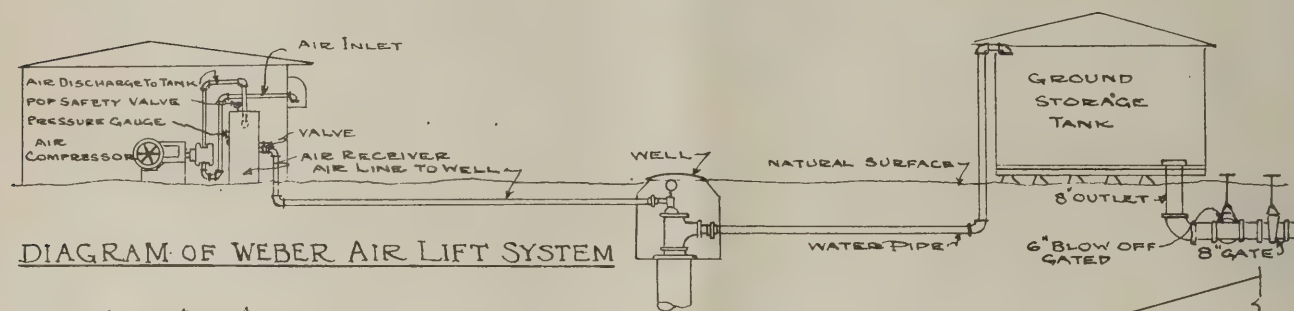
ENTERED STOCK REC. _____

CHARGE TO	
ACCOUNT NO.	AMOUNT

W. B. of Cleveland, Ohio, writes: "Would like to know how to figure cement work in material and labor to the square yard or foot." We have suggested some standard estimating books to W. B., but shall be glad to hear from subscribers who have some pet method they would like to tell about. "Help one another."

Sanitation, Heating and Lighting for a Suburban or Country House

No. 3—By Edward E. Ashley, Engineer Starrett and Van Vleck, Architects,
New York City

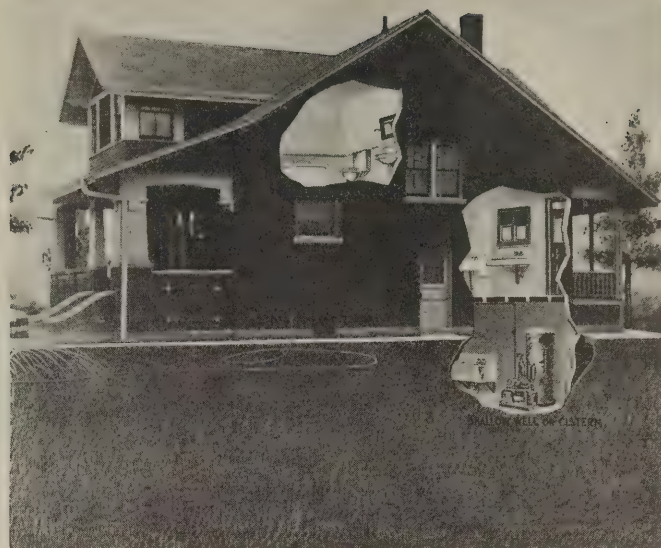


THERE are various power pumps and methods of driving them, for the water supply of a country house. The hot-air engine used for many years has been extremely satisfactory. The force of propulsion is derived from the expansion of air in the cylinder by the heat of combustion, which combustion chamber is located in the base of the air cylinder. The fuel is either coal, coke, wood, gas, oil or gasoline. They are generally limited to small capacities—from 2 to 25 gallons per minute against a head of from 50 to 150 feet and they develop from $\frac{1}{4}$ to about 2 horsepower. They are extremely simple in operation, requiring very little attention and are practically noiseless in operation.

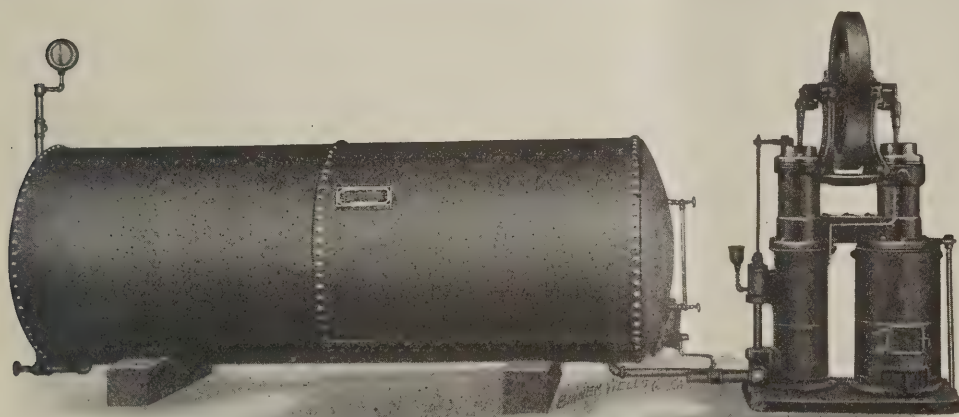
Power pumps are divided into two classes—reciprocating and centrifugal—the former is preferable for the small home.

The reciprocating pump operates at a low or medium speed and has one or more water cylinders with pistons connected to a crank shaft to which is attached the motive power, either direct through gears or by means of a belt or chain. With the alternating current electric service generally obtainable in small towns and cities, the belted type is preferable due to the high speed characteristics of the alternating current motor.

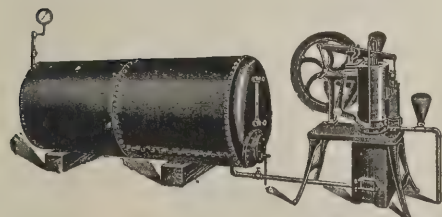
The centrifugal pump is designed to operate at a high speed, 1100 to 1700 r.p.m., and is provided with one or more propellers, depending on the height of pressure they are required to operate against. These propellers are mounted on a single shaft and are called stages. The motor is directly connected to the end of the shaft. The



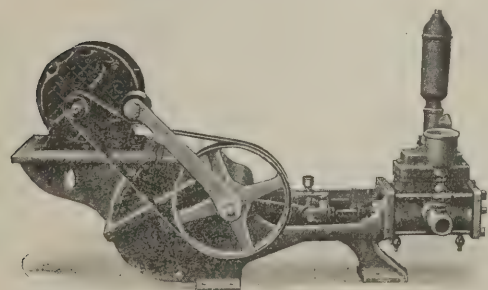
The illustration at the left shows a shallow well or cistern system, pumping to a lift of 25 feet. The illustration to the right shows a deep well system pumping to a lift of 100 feet below pump. Fort Wayne Engineering and Manufacturing Co., Fort Wayne, Ind.



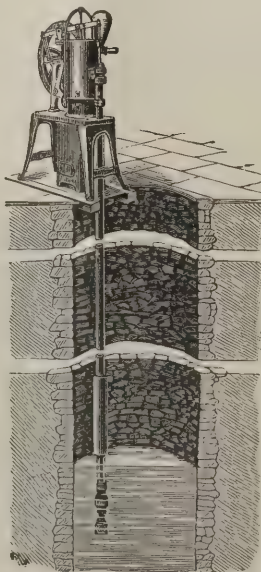
Type of hot-air engine with rolling valve pump and furnace for gas, kerosene or coal. The Rider-Ericsson Engine Co., Walden, N. Y.



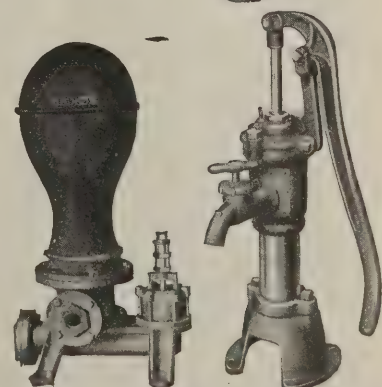
Electric pumping unit connected with horizontal hydro-pneumatic tank. The Rider-Ericsson Co.



Horizontal double-acting electric pumping unit. The Rider-Ericsson Co.



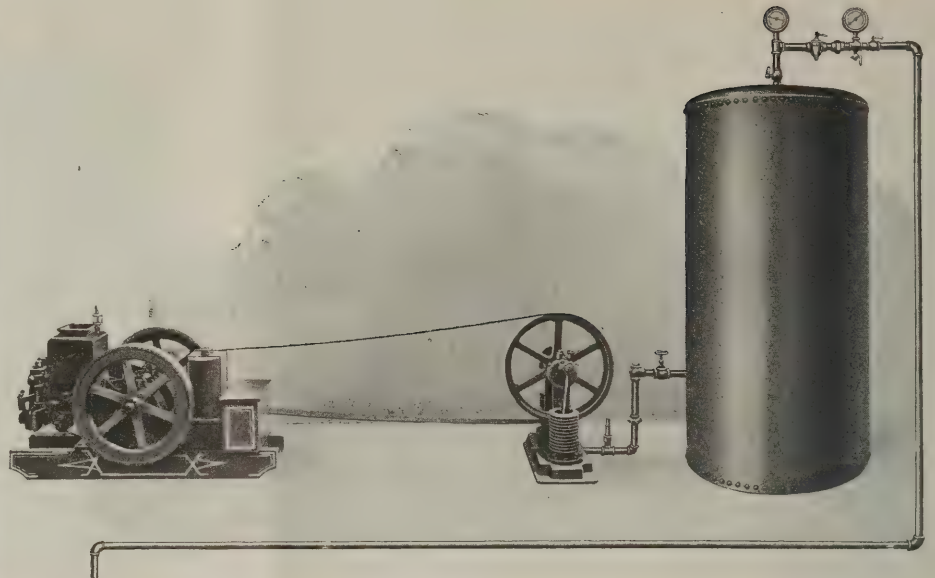
Engine pumping from a deep well. The Rider-Ericsson Co.



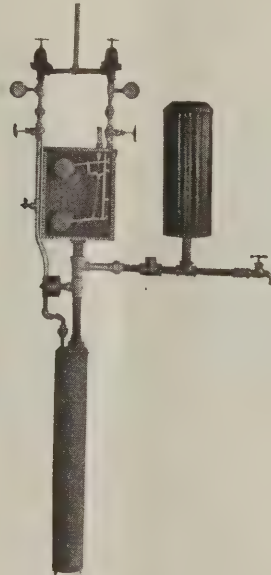
Three types of pumps. The Goulds Mfg. Co., Seneca Falls, N. Y.



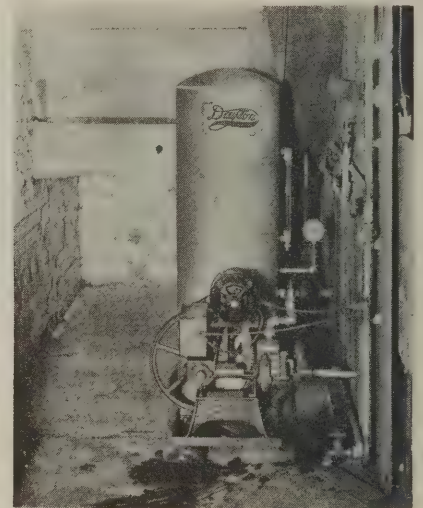
Type of shallow well electric pump and pressure tank. The Duro Pump and Mfg. Co., Dayton, Ohio



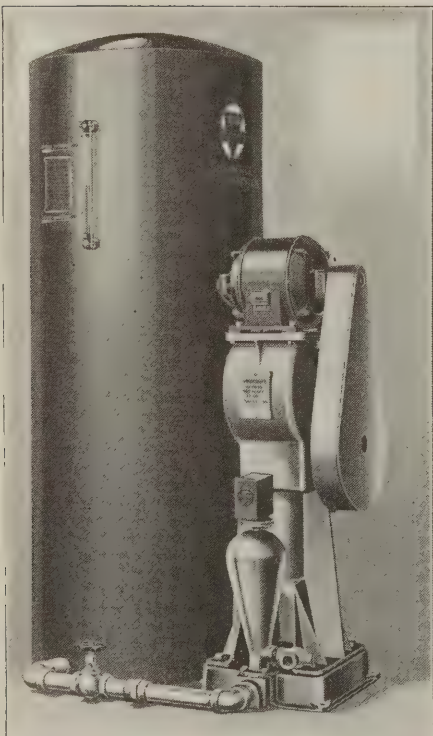
A direct-from-well system. Gasoline engine, pump and air-tank connection. The tank is for air only, the pressure from it actuating the pump let down in the well. A circuit breaker stops the air-pump at the pressure required. When the pressure gets low the engine is manually started. The Milwaukee Air-Power Pump Co., Milwaukee, Wis.



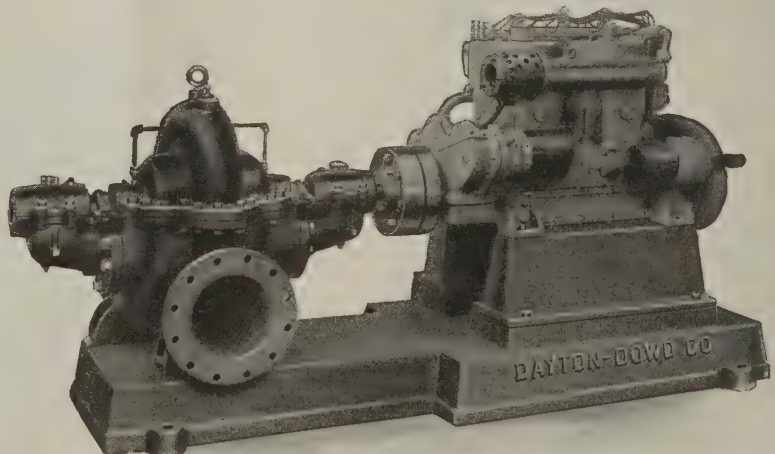
Sectional view of a newly invented "top of the well" pump. The Swanstrom Water System Co., Hammond, Ind.



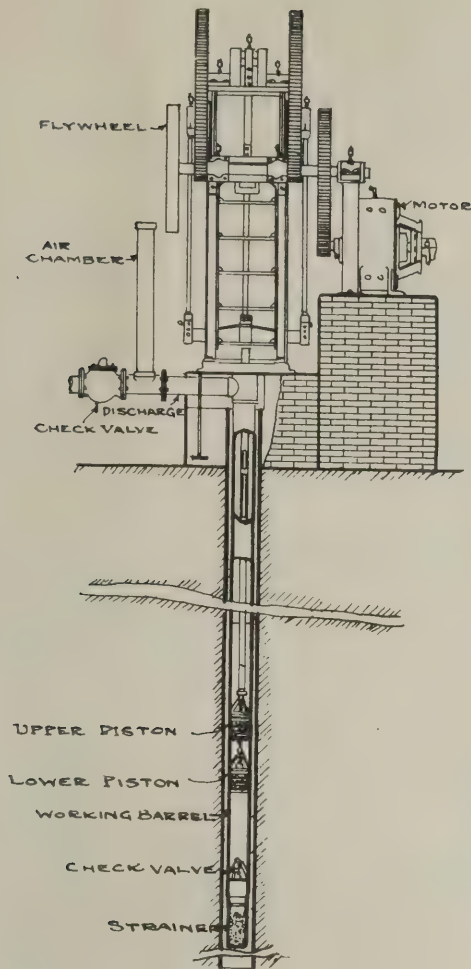
A typically compact electric driven pump and tank installation. The Dayton Pump and Mfg. Co., Dayton, Ohio



Type of deep well electric pump and tank. The Duro Pump and Mfg. Co., Dayton, Ohio



Type of centrifugal pump. The Dayton-Dowd Company, Quincy, Ill.



Double stroke geared head installation
direct-connected to electric motor

ous types of gas engines and their characteristics. These are commonly used for driving pumps in country houses.

Water Requirements of a Country Place

The pump should be of sufficient capacity to furnish the maximum amount of water required with one hour's pumping per day.

For the small house one of the most satisfactory pumping outfits is the automatic pressure tank and reciprocating pump, which has a small pressure tank and pump mounted on a cast iron base. It operates automatically, maintaining a constant pressure on the water system continuously. It can conveniently be located in the cellar and the suction line run underground to the well. It requires very little attention, save occasionally a little oiling and about once a year new cup washers on the plunger.

From available data it is found that the ordinary shallow well will yield from 2 to 10 gallons of water per minute; that under modern sanitary conditions 50 gallons of water per day of 24 hours is the requirement of the average adult; that the usual minimum demand at any one time will not exceed 20 gallons.

The consumption of water for plumbing fixtures will be about as follows:

Lavatories—3 gallons.

Baths—15 gallons

Showers—6 to 8 gallons per minute.

Water closets—4 to 8 gallons, depending on type of flushing device.

Sinks—10 gallons.

Laundry trays—25 gallons.

Dish washers—15 gallons.

age about as follows:

Horse—10 gallons.

Cows—12 gallons.

Hogs—2 gallons.

Sheep—1 gallon.

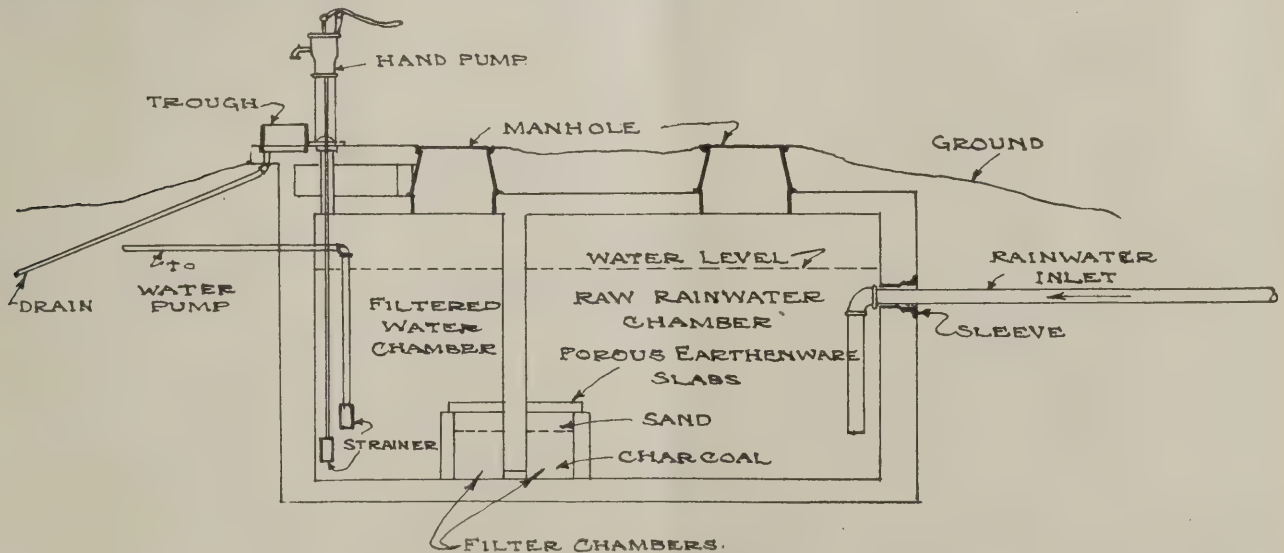
Poultry—4 gallons per hundred.

With the above, the size of pumping outfit required may be determined bearing in mind that where the yield is low the amount of water shortage must be increased; for example, assume a family of five requiring 250 gallons of water per day; garden requiring 100 gallons of water per day; poultry, etc., requiring 70 gallons of water per day—total of 420 gallons. If pumping for sixty minutes must deliver seven gallons per minute.

If the well had a yield of only 3.5 gallons, then a small pump should be used and the pumping time would have to be increased or an increase in storage capacity of tank in order to allow longer resting period for well.

Rain-Water Cistern

Where a rain-water cistern is desired it should be constructed of concrete or wood, according to location, and divided into two compartments with openings in partition wall. On either side of this partition wall at a distance of about 12 inches, dwarf walls 16 inches high should be built and the space between these walls filled with a layer of charcoal 12 inches deep and covered with a 4-inch bed of sand. The filtered water compartment is about one-third of the area of the raw water compartment and the top should be covered and provided with a man-hole in each compartment.



Rainwater cistern underground

centrifugal pump is not suitable to conditions requiring a high lift on the suction, generally restricted to about 20 feet.

Either of the above types may be used for deep well work by placing the cylinders or propellers down in the wells and extending the shafts to top of well, there connecting to the motor power.

Most persons are familiar with the vari-

Laundry washers—30 to 75 gallons.

Lawn sprinkler—3 gallons per minute at 30 pounds.

Lawns require about 8 to 16 gallons per 100 square feet, depending on conditions; garden hose—5 to 8 gallons per minute at 30 pounds; automobile—15 to 30 gallons.

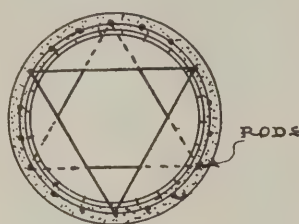
Live stock consumption of water varies with their condition and age, but will aver-

ment; an overflow should also be provided. The contents of cistern should be about one-half cubic foot per square foot of roof area.

Well Construction

All wells should have water-tight curbs in addition to impervious casings to prevent pollution. It is also desirable to prevent drip from the pump.

The casing or lining should extend above the ground at least 6 inches and a concrete curbing over the top with a slope away from the well. This cover should extend beyond well about 2 feet if a dug well, and about 4 feet if a driven well. This cover should be arranged to drain into a tight drain away some distance from well to prevent any chance of pollution.



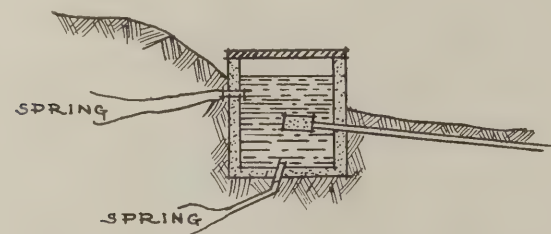
Method employed in lining dug wells with concrete

Some engineers advocate excavation to a depth of about 4 feet and the exterior of well casing to be waterproofed, and at the bottom a shoulder provided to prevent seepage into the well.

There are several methods of lining a shallow or dug well by use of field stone, brick or concrete, any of which are satisfactory providing the work is well done and the walls are not cracked. They will protect the well from pollution except at the bottom and will prevent the entrance of sediment and do not impair the taste of the water.

Concrete walls have been used and have been proven to be extremely satisfactory; they are practically impervious to water and will prevent pollution except at the bottom.

Dug wells are generally 6 feet in diameter and the concrete walls need not be over 5 or 6 inches in thickness with vertical reinforcing steel 3/8-inch diameter on 16-inch centres and horizontal circular reinforcing of 1/4-inch spaced on 12-inch centres; the two sets of steel are wired together with the circular reinforcing inside the vertical. The



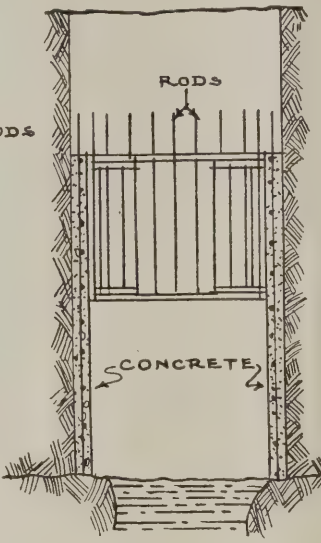
METHOD OF WALLING IN SPRINGS

cement, sand and stone mixture should be 1-2-4, using clean gravel or crushed stone and well mixed, a collapsible form about 5 feet high and about 12 inches less in diameter than the excavation. The form can be constructed of 2 x 6-inch strips tacked to ten sets of cross braces, which have been cut to the proper diameter; this form is put in place, braced and the first section of concrete poured and allowed to

set, then form is lifted and the operation continued until the well is complete.

Springs used for water supply should be protected, carefully guarded with a concrete or similar basin and fenced in to prevent stock from polluting them.

Gravity System of Water Supply
In a gravity system the water is elevated



into a tank or reservoir located in the attic or in a tower, which should be as high above the highest fixture as possible, for account must be taken of the function in piping, elbows, valves, etc., in order to assure an ample flow at fixture.

Water weighs 62.5 pounds or 8.4 pounds per gallon and for each foot elevated exerts a pressure of 0.434 pounds. Consideration must be taken of the weight of the water in the tank in the design of the structural supports to uphold it.

When the tank is located in attic it is

Steel tanks may be used for tower work, they should be galvanized and of heavy construction and kept thoroughly painted to prevent rusting.

The following is the capacity of a few round tanks:

3' 0" diameter	2' 0" high	106 gal.
4' 0" diameter	2' 0" high	189 gal.
4' 0" diameter	3' 0" high	283 gal.
4' 0" diameter	4' 0" high	379 gal.
4' 0" diameter	5' 0" high	470 gal.
4' 0" diameter	6' 0" high	567 gal.
4' 0" diameter	8' 0" high	756 gal.
5' 0" diameter	2' 0" high	299 gal.
5' 0" diameter	3' 0" high	440 gal.
5' 0" diameter	4' 0" high	588 gal.
5' 0" diameter	5' 0" high	735 gal.
5' 0" diameter	6' 0" high	880 gal.
5' 6" diameter	8' 0" high	1400 gal.
6' 0" diameter	2' 0" high	423 gal.
6' 0" diameter	3' 0" high	635 gal.
6' 0" diameter	4' 0" high	864 gal.
6' 0" diameter	5' 0" high	1058 gal.

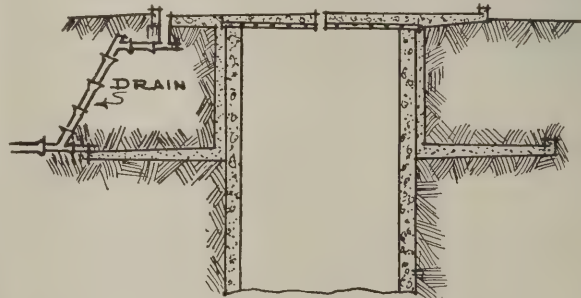
Rectangular tanks may be calculated by obtaining cubical contents and multiplying by 7.48, which is the number of gallons per cubic foot.

(To be continued)

Ohio Wood Shingle Controversy Settled

A SATISFACTORY settlement of the controversy between the shingle interests and the Ohio State fire marshal's office is at hand, although the final agreement has not been arrived at. This controversy has been prolonged for some time, being backed by the wood shingle interests from Cleveland, as exemplified through the Cleveland Board of Lumber Dealers.

According to the terms of the tentative agreement each municipality in Ohio will be permitted to enact its own ordinance governing the use of wood shingles. State Fire Marshal Henry A. Dykeman is now preparing an ordinance to be submitted to the city councils of the smaller cities of the



A COMBINATION OF PROTECTIVE ARRANGEMENTS

State restricting the use of wood shingles in business and congested areas of these municipalities.

In that way the question will be considered as a local problem and each municipality, allowed to work it out as the local conditions warrant. Fire Marshal Dykeman, however, reserves the right to continue to fight the use of wood shingles as a fire hazard.

Bricklaying in Freezing Weather

By William Carver, Architect

THAT there is a most appalling amount of waste in the building industry, everybody connected with it will concede—waste of material, of energy and, most serious waste of all, loss of working time, due to the fact that building is largely a seasonal occupation. In normal years, architects' offices begin to show signs of activity soon after the Christmas and New Year holidays. Sketches are prepared and conferences held

ing costs, to the benefit not only of owners but of the building industry.

Every possible influence, therefore, should be directed by the building industry toward inducing owners to let contracts not only in spring but at other seasons of the year, for many jobs could be started in the fall and even in the winter that are now held over until the usual rush period. Among the trades which would thus benefit is that

necessary for carrying on a brick job. This is partly due to the fact that there is but little water in the body of the wall. Brickwork is built of dry units joined together with mortar which contains a less amount of water than, for instance, is contained in concrete floor slabs, which latter should, in cold weather, be supported by forms for several weeks after they are poured, while a brick wall will sustain a considerable load in a few hours.

Most books on building construction list salamanders, sand heaters, water heaters, etc., as being necessary for winter work but many practical contractors who have built of brick in winter months are quite satisfied if the mortar can be laid in the wall before it is frozen.

Impervious brick are hard to handle in very cold weather and more porous brick should be chosen. The brick should not have any ice or snow upon them when laid and brick piles should be covered with tarpaulins or other protection to prevent this. For the same reason, the brick should not be wet when laid, as is necessary in warm weather. Sand should be as dry as possible when delivered to the job, for sand frozen into lumps will give trouble when the thaw comes.

Portland cement mortar should invariably be used containing the least amount of lime necessary to make it workable. It should



Looking up at a winter scaffold where bricklaying is going on as usual

with clients. By March or April contractors are preparing estimates and here and there commencing work and from then on everybody is fairly busy until the architects' offices begin, in the early fall to enter the slack period, which lasts to the opening months of the following year. The great bulk of work done by general contractors is accomplished between May and October, inclusive, a period of five months only.

It is an obvious fact that the time thus lost must be paid for by the public. Men must live whether they are working or not and the compensation to all must, therefore, be such that the whole vast building industry can be carried over the slack periods.

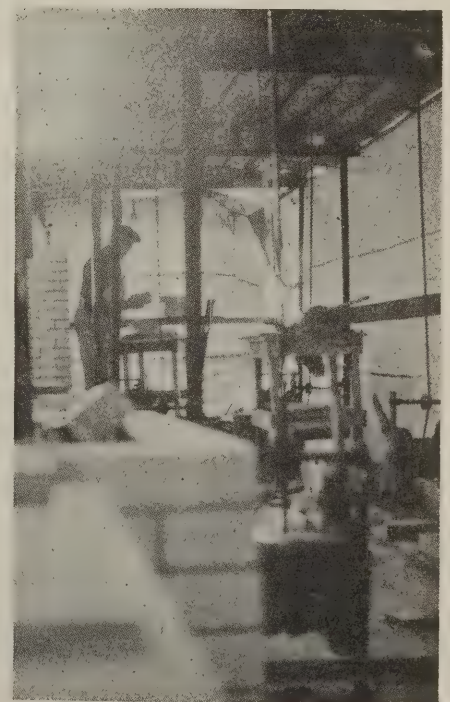
It is certain that if labor's effective working time per year could be lengthened, wages could be lowered and the individual still receive more money per year; and, what is of more importance, steadier employment would make him far more contented; while contractors' overhead expenses, which continue every day of the year, would be materially lessened for each job done. In these and in many other ways, a more equal distribution of work throughout the year would operate toward a lessening of build-

ing costs, to the benefit not only of owners but of the building industry.

There is still a certain amount of unfounded prejudice against laying brick in freezing weather. As a matter of fact, brickwork can be constructed without particular difficulty in cold weather and, where the few necessary but simple precautions are taken, invariably proves satisfactory. The writer recalls the brick walls of a warehouse being taken down with great difficulty in Winnipeg, Canada, some years ago, built, it was said, during a particularly hard winter when the brick were laid with the temperature hovering in the neighborhood of 30 degrees below zero. Every reader of this magazine will undoubtedly recall many brick jobs successfully built during winter.

The truth of the matter is that brickwork can be constructed during cold weather with less difficulty than other types of masonry construction, and this is most important, for on a small job especially the cost of the building might be unduly increased if its construction during winter demanded expensive apparatus and special work.

Under ordinary conditions in a moderate winter, no special apparatus or equipment is



Bricklayer working in freezing weather

be remembered that lime delays the set of portland cement mortar.

On a job put through without special protection, have the sand shoveled into a long heap as it is delivered. The top surface will, of course, freeze and the sand supply should be tunnelled from the ends, which are kept covered. A wood fire may be built near the mortar box and mortar should be made in small batches. If conditions are such that no protection is needed for materials, the bricklayers can also generally work without protection. Theirs is an active job and they soon get used to working in the cold, bricklayer foremen say. In weather which is very severe or on larger work, it may be necessary to provide special apparatus to heat the mortar materials and sometimes the brick also. For heating material, a corrugated sheet metal culvert or

3. Use as little lime in the mortar as possible.
 4. Don't use frozen sand.
 5. Don't wet the brick.
 6. See that mortar doesn't freeze before placed in wall.
- Don't be afraid of starting a brick job

late in the year. Don't shut down. Overhead goes on just the same whether the force is working or not. By carrying on work in winter, inducements can be offered to the very best men to join the organization, which can more easily be kept together, and the balance sheet will look much better at the end of the season.

A "Winter" Builder and His Work

WHOEVER has been in the northwestern part of New York State in winter, or has been through there in blizzard times, knows that they have real winters. An en-

done before it gets *real* cold, but this work can be done in zero weather by heating the sand on a "fire tube," and using freshly slaked lime and hot water. The wall is covered as soon as it is laid with burlap or cement bags and straw.

"We also use salamanders in addition when it is necessary to keep the mortar from freezing, until it has set for a few hours, then we let it freeze and do not try to thaw it again. We just let the frost come out of its own accord.

"As soon as the building is enclosed we get a heating plant temporarily installed, before starting the plastering for two-coat work, because two-coat plaster must not be allowed to freeze or it will scale off.

"All our work can be done in winter. Of course we have to pick our days for some parts of the job in order to get the best results. On very cold days we figure on inside work if possible. We have laid brick in zero weather, but do not try to construct concrete walls for they will scale off on the outside. Carpentry can be done in very cold weather. We have laid shingles in zero weather, but it is not advisable.

"We have no trouble in keeping men at work—have cut most of them 10 to 15 cents per hour, and they seem to work better than they have for some time."

Typical houses built by Mr. Hall in winter weather are shown on opposite page.



Winter scaffold on 21-story building in Cleveland, Ohio

other round iron section 20 in. in diameter may be used with a fire kept going at one end. The material is piled on top. Water may be heated by forming a coil connected with the city supply with a fire placed in the center. Water should not be heated to over 165 degrees or it will injure the mortar.

Bricklayer screens may be formed of tarpaulins or light wooden supports forming an enclosure over the wall being built. Salamanders may be used to heat the enclosure if deemed necessary and these should always be fired with coke.

Do not use "clipped" bond or metal wall ties. Bond the wall together with real headers or trouble may be experienced. Headers should occur at least every sixth course. Keep the walls even all around. Don't run up one part much higher than another. Walls must, of course, be kept covered during the night.

If these precautions are observed, little trouble will be encountered. The important points may be summarized as follows:

1. Don't use impervious brick.
2. Bond with real headers not less than every sixth course.

terprising Syracuse contractor and builder, Francis N. Hall, admits that winter building is "somewhat of a problem" but he keeps going just the same. He says:

"We can't afford to lay off for the cold season. We usually try to get all masonry



Francis N. Hall's crew of "winter workers"



Houses built in winter weather in the State of New York

Salamanders

MANY different conditions assist or retard building construction in the winter and some of these items are quite often overlooked.

This is true of the insignificant looking salamander which to a person not acquainted with its value has no importance, but after a contractor has invested possibly several hundred thousands of dollars in a very extensive concrete construction undertaking and during a sudden change in the weather has probably lost more over night than he will make in the next few years, he realizes how important it is to make every effort to be reinforced on all sides against losses of this kind. This is where the salamander is really of inestimable value, and when the cost is considered and the work it will do, it seems amazing that every contractor does not have a large supply on hand for use in emergencies. These salamanders while cheaply constructed are very durable. It is not necessary that they be connected with any particular outlet; they will burn almost anything and give out a large radius of heat. Their construction is practically fool proof; anyone can assemble one of these salamanders and keep it going day and night if necessary without any special instruction.

One of the main reasons for the use of the salamander is to have these located between floors where concrete pouring is going on in the winter. After the men have left, these salamanders are fired up for the night and the local watchmen can take care of them at stated intervals. The salamander maintains a certain heat throughout the night so that the action of weather will not cause any disaster and in the morning everything is all set for further construction.

Where the work is carried on in three shifts of eight hours each, the salamanders also are used extensively and not only keep the atmosphere at the proper temperature to prevent freezing of material, but also keep the men warm and comfortable, at

least as comfortable as is necessary for men who are receiving a certain amount of exercise.

The salamander is of heavy steel construction, cast iron grate with bar iron legs.



Type of salamander

It will burn coke, coal, wood and scraps of all sorts. It can be set up or taken down in a jiffy. They will nest ten to a bundle and crate, and are equipped with hood over top. Remember that a salamander is a most necessary article to all contractor outfits and remembering that there are several on the market, it is well to select carefully the type you are going to use, and when you order be sure that you will be able to get your requirements at once.

Strength of Floor Joists

A KANSAS reader asks as follows: "Please tell me the strength of floor joists 2x12 in., 16 in., o. c., 24-ft. span. I have a job of this kind for automobile stor-

age. This is second story, and if this is not safe we will have to reinforce." *Answer—* According to all tables, a 2x12-inch joist spaced 16 inches center to center on a 24-ft. span would be anywhere near safe to carry a floor for second story of a garage or automobile storage. The floor loads specified for garages are generally set by city ordinances, and in case your town has no such ordinance figure as follows: 150 pounds per square foot for the live load would be a conservative estimate; adding 50 pounds per square foot for the weight of the beams and the floor makes a total load of 200 pounds per square foot. With 16-inch spacing of floor joists this amounts to $24 \times 1\frac{1}{3} \times 200$, or 6,400 pounds for the load of each beam. According to the Southern Pine Manual published by the Southern Pine Association, New Orleans, Louisiana, the safe load on a 24-foot span for a 2x12-inch beam is less than 2,000 pounds, and the deflection under this load would be considerably more than an inch. The same tables call for a floor joist on this span of at least $2\frac{1}{2} \times 18$ inches. Even a 3x16-inch on a 24-foot span is good for only 5,500 pounds. Of course, these beams will carry twice or four times these safe loads without breaking under ordinary conditions, but it would not be considered good practice and it would be against the city ordinance of a good many cities to load them beyond the safe loads as given in the tables. Would suggest that you send to the Southern Pine Association and get a copy of their Manual, which can be had for \$1.00.

Lightning Rods

INTERVIEWED on the occasion of the annual convention of the Lightning Rod Manufacturers Association, held in Chicago early in December, D. S. Bowman, secretary of the association, said: "Federal and state officials now advise farmers to rod their buildings as the best possible fire prevention. Farmers, fire insurance companies and fire-prevention societies now regard lightning rod manufacturing as an essential industry."

A Two Car Garage

By Ivan D. Wood

A GARAGE 20x20 ft. will house two large cars nicely. A side wall of 8 in. 6 ft. will provide plenty of height. Other features which must receive attention are, permanency, warmth, good drainage, a good roof, and last but not least, good external appearance. Let us consider how the garage problem was solved for a man who owned an eight-room brick and stucco house in the suburbs.

Mr. Brokaw knew that his brick and

construction 5 in. thick drained to the center as shown. The mud traps around the drain are a good feature and should always be included.

The roof is particularly well made and so braced as to admit of the space beneath the rafters being used for storage room. It is planned that the entire ceiling will be covered with matched flooring. A hinged ladder will be suspended between two stringers and raised by a rope working over a

frame construction for lightness. The studding used are 2x4-in. sheathed on both sides and stuccoed on lath. The sheathing is nailed on in a diagonal fashion to secure an arching effect, made to relieve the lintel of as much weight as possible.

Doors are always a problem. There are many kinds, each having some good and some bad points. The sliding type was chosen, the kind that shoves around inside of the building on a track and are safe from

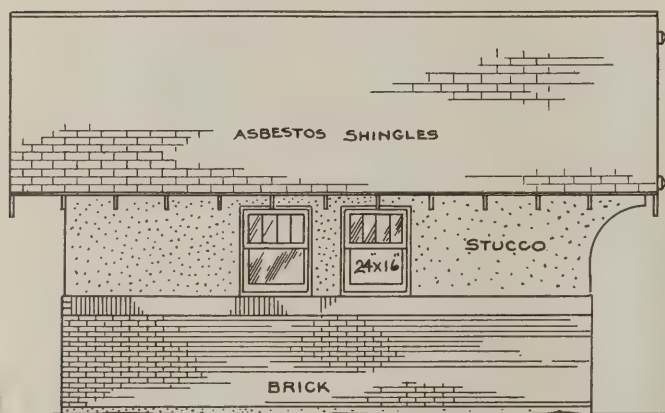


Fig. 1—Side elevation



Fig. 2—Front elevation

stucco house was well designed. He also knew that a cheap garage would cheapen his whole property so his problem was to choose one which would fit his pocketbook and also harmonize with the house. Then there was the matter of size to decide. He decided upon a two-car size, for two of his neighbors expressed a desire to rent one side. Then there was always the possibility of one keeping an old car for hard trips and bad weather. A brick and stucco face on clay tile was chosen as a building material, since the house was of similar material. Figures 1 and 2 give an idea of the arrangement of these materials. An asbestos shingle was used exactly matching those on the bungalow.

Figure 3 shows a section. Notice the wall construction, six courses of 5x8x12-in. clay tile on edge and faced with dark red, matt brick, the top course set in soldier fashion. Matt brick is always pleasing when set with a fairly wide brushed joint. Above the brick work the blocks are laid flatways for nine courses, making an 8-in. wall. To the outer surface, the stucco coats are applied. The wall is capped by a plate made from two 2x8-in. timbers, bolted into the masonry every 5 ft. with 5-16x14-in. bolts.

No skimping was done on the foundation. It was made 14 in. wide at the base and 2 ft. 6 in. deep. The floor is one course

pulley hung to a rafter. The rafters are 2x6-in. by 14 ft., spaced 24 in. on centers. They are notched at the ends to match those used on the house. Figure 2 shows the brackets supporting the 2x8-in. verge board and the treatment of the gable. In Figure 3 is shown a partial section through the gable and main door lintel. It will be noticed that the front gable overhangs the doors by an extension of 9 in. This front gable is of

the wracking effect of the wind when open. Good locks were provided as a safety measure. It is well to remember, however, that no lock on a garage is stronger than the hasp and staple. Be sure they are well secured. A 2-ft. 6-in. 6-ft. 8-in. door was provided to allow one to enter without opening the large doors each time.

The drive from the street is of the divided pattern, consisting of two 18-in. con-



Nearing completion

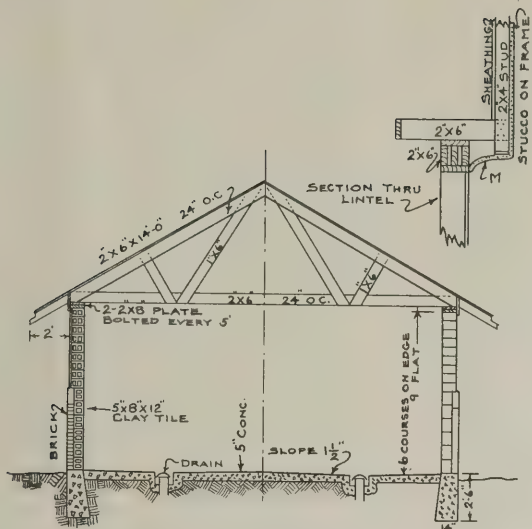


Fig. 3—Cross section of two-car garage

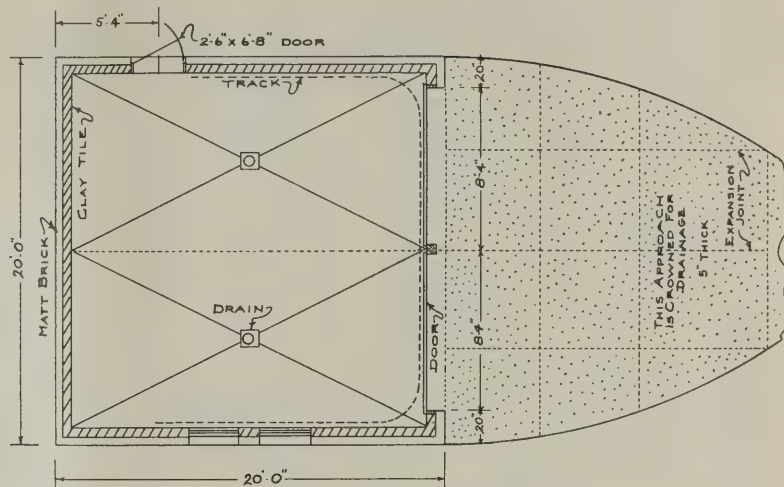


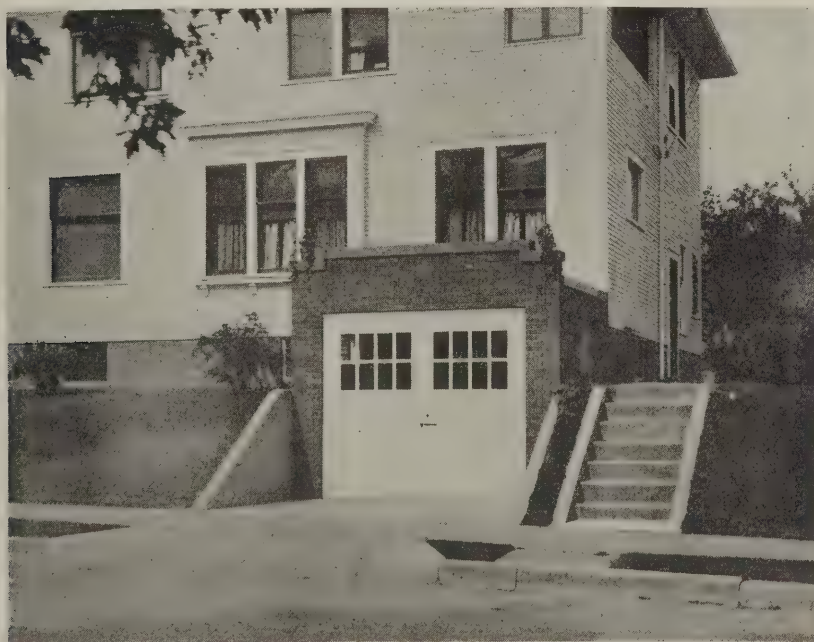
Fig. 4—Floor plan of two-car garage

crete tracks, one for each wheel. The concrete platform is large enough to permit of washing a car upon it easily. Some expansion joints must be used to prevent cracking.

The cost of such a building as is here described seems high. Yet, all prices are high now and permanent construction is always expensive. Constructed on the cost plus ten basis this garage and drive cost about \$1500.00. It never pays to build a cheap, ugly garage adjacent to a well designed house. It will detract from the value of the property enough to have done a good job in the first place.

A Garage Connected with the House Basement

TAKING advantage of the "lie of the land" a builder in Sheboygan, Wis., has built a private garage to connect with the basement of the house with considerable success. The illustrations herewith suffi-



ciently explain themselves, and are indicative of one of the many ways in which the private garage may be planned in a sightly and attractive way.

Cut in Prices of Prepared Roofing

REDUCTIONS of 10 per cent in the prices of prepared roofing and asphalt shingles are announced by the manufacturers. They declare the cut is made to "stimulate residential building and to increase employment during the winter."

A telegram to Secretary Hoover explained the purpose of the manufacturers:

"This reduction represents a cut from the 1920 prices of 40 per cent and a reduction of 10 per cent from immediately preceding prices. The manufacturers argue they confidently hope this will stimulate home building and employment; and state they prefer to operate for the next three months at little or no profit rather than close down their plants."

A \$1,250 Cottage in Los Angeles

THIS four-room cottage in Los Angeles was designed and is being built by T. C. Singleton, a deafmute carpenter-contractor of that city, who has had his entire

where water might stand and seep in in rainy weather.

In the kitchen there is the sink casing and drainboard, all in one piece of mag-

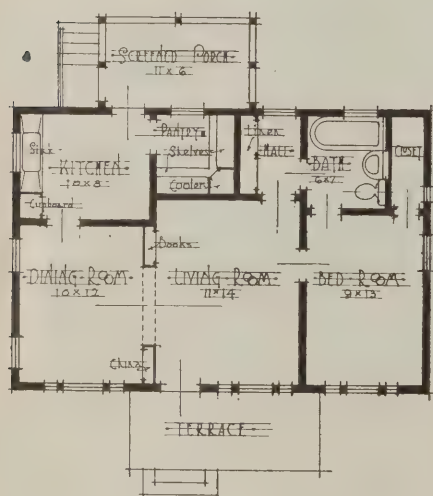
rolling edges so as to leave no crannies where dust could hide from the daily run-around of the yacht mop. This, when properly laid, is like a mat finish tile, only with a resiliency and smoothness somewhat like soapstone and not easily cracked or loosened.

The built-in bookcase in living room is shown both in its initial and almost completed stages, also the squared pillar above it. There is a similar pillar at the other end of arch, and also a bookcase that opens into the dining room. A built-in buffet will extend across the entire side of dining room between and under the small windows, and kitchen and screen porch cupboards and cabinets be provided. An old-fashioned pantry was insisted upon by the lady of the house, and when completed will have the built-in cooler in corner, the beginnings of which are seen. This California contrivance, screened at the floor and ceiling lines, is a cool air refrigerator, through which passes upward a continual current of cool air that is undiminished in the basement in a climate that has all-around cool nights.

An additional room is planned for rear



The four-room cottage



nesite composition, smoothly troweled into place, and the same composition was used



Additional views of the four-room cottage

training in California. A more favorable view of the building is shut off by the high wire fence and the trees in yard and parking, nevertheless we show the available pictures as giving some practical western ideas.

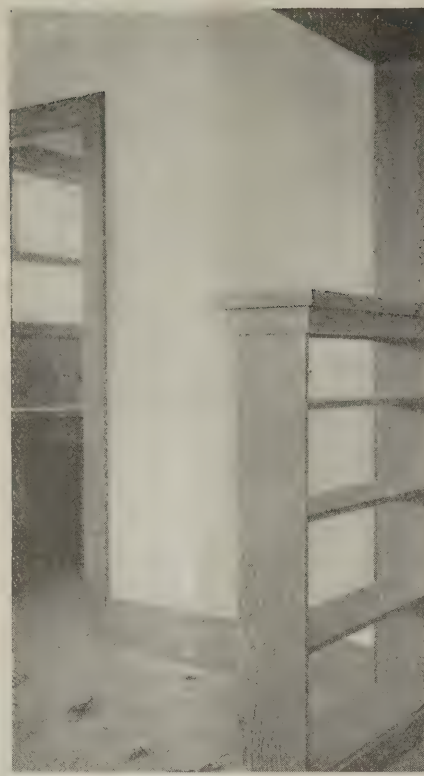
The three fixed windows in front, each have the narrow subsidiary casements on either side, opening inward and screened outside, convenient of manipulation and admitting fresh air day or night without danger of intrusion on the ground floor. The parliament hinge, as used on such casements and which gives the necessary clearance to allow the window to swing back easily against the inside wall, is here shown, also Mr. Singleton's method of mitering out a groove in the bottom of window sash at outer line of stop to eliminate place

in laying a one-piece bathroom floor and bathtub casing—with rounded corners and

of house next year, on return of daughter from boarding school, when the hall, now



The window before being screened



The beginning of the bookcase. Note the swinging door leading to the kitchen



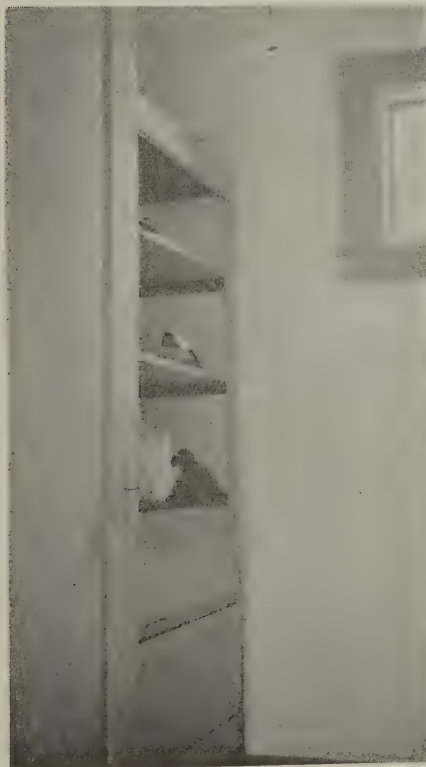
Bookcase almost finished. Note square pillar above

used as a closet, will become a passageway and the house be complete.

The foundation, which is of portland cement, is 20x30 ft., the walls extending 6 in. above and 6 in. below the ground line, and being 12 in. thick at bottom and 8 in. at

top. The mudsills are of 2x6 redwood, and the plate of 2x4 Oregon pine, with 7-in. underpinnings of 2x4 Oregon pine. The flooring is of 3½-in. tongue and groove vertical grain Oregon pine, laid over 2x6 floor joists. The bearing timbers or girders over the cement piers are of 4x4 redwood. Studding in outside walls 2x4, and inner walls 2x3, ceiling joists 2x4 and rafters 2x3 Oregon pine. The shingles are of redwood, stained dark green, and the 6-in. shiplap siding is painted white; in fact, except the

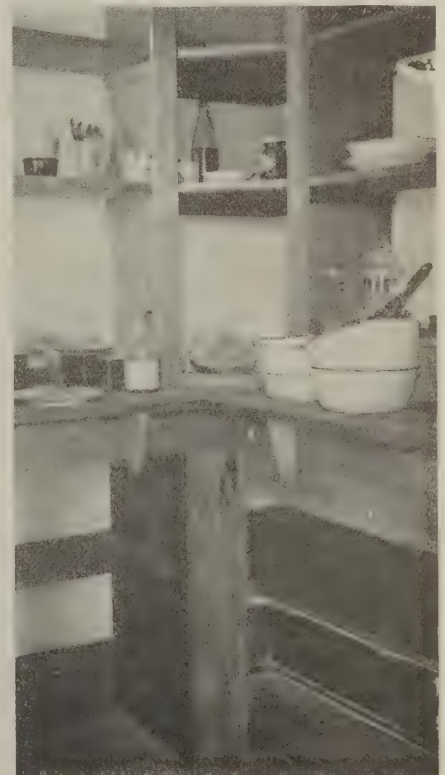
roof and the frames of window screens, which are also painted green, the exterior color motif is all white—even to the front door screen frame. The screens are considered an integral part of the house in this part of the world, and are usually painted to



Hallway, with beginnings of linen cabinet



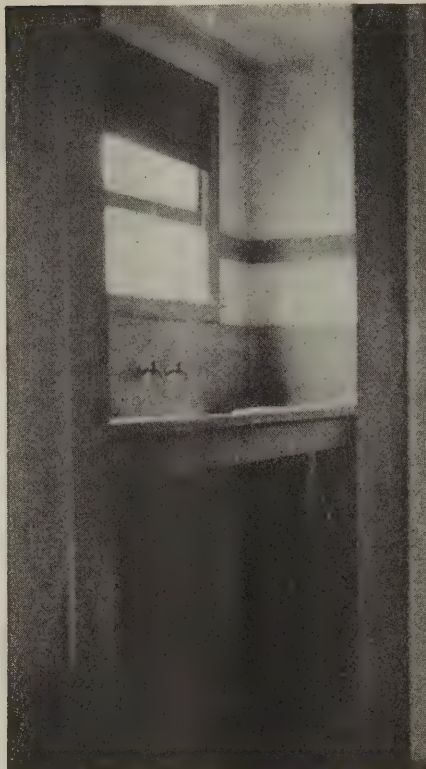
Showing method of bridging used in porch hood



Pantry. Note beginnings of cooler in corner



Bathroom. The floor, wainscoting, and the tub casing are all in one piece; magnesite composition



Kitchen sink after the drain-board and casing was laid

harmonize perfectly with the exterior trim.

The house is equipped with an automatic hot-water heater in combination with the

range-boiler, and the sink, bathtub, stool and lavatory are of porcelain ware. Hard-wall plaster is used in the interior of the house over wood lath.

Cement Blocks and Moisture

S. F. M., of Homestead, Fla., writes as follows: "Am interested in cement block work (stone face or finish). I want to build a house of the same, but am told that such blocks take up moisture and need to be furred in order to be plastered. I help make them, and know that they are porous, but have heard that there is a preparation on the market now, to put on the inside before plastering, which admits of plastering right on the walls. Can you tell me anything about this? Don't care about warmth for this climate, but *do* want dry walls, if possible without an extra inside wall of brick or wood."

The Cement Products Bureau of the Portland Cement Association, to which we referred this inquiry for expert advice, reply as follows: "We are sending you a copy of our booklet, 'Concrete Building Block and Brick,' and our 'Tentative Recommended Practice for the Manufacture of Concrete Building Block, Brick and Tile.' On page 15 of the former you will find a copy of the American Concrete Institute's specifications, regulating the manufacture and use of concrete building units. We would urge the necessity of making concrete block which meets the 10 per cent

absorption requirement of the American Concrete Institute. It is not necessary to send your block to the laboratory in order to determine the absorption on it. If you will take three of the block and dry them thoroughly and weigh them and then immerse them in water for 48 hours and then weigh them again you can figure your percentage of absorption in that way. If the block absorbs more than 10 per cent of water they are not properly made. The 'Tentative Recommended Practice' which we are sending you points out those methods which have been tried and found to be thoroughly reliable for manufacturing block which meets the standard requirements of the American Concrete Institute. If your aggregate is properly graded, and clean, and you are using a mix not leaner than 1:2-1:4, and are using enough water to thoroughly hydrate your cement, it is a very simple matter to reduce your absorption below 5 per cent. Ordinary brick will have an absorption much higher than this. If blocks are poured, they are not good unless they are covered on the outside with Portland cement stucco. If you have buildings already erected that are damp, we would suggest that the best thing to do is to cover

the exterior with Portland Cement stucco. Even though your temperatures do not run low, all masonry walls should be furred unless the houses remain open night and day the year 'round. We would call your attention to the mortar joints in your concrete block walls. A number of failures of concrete block residences due to dampness have been investigated and we find that in a large percentage of them the block have been laid up with $\frac{1}{2}$ or $\frac{3}{4}$ inch mortar joints, using a lime mortar which is very porous. In a driving rain, the water is naturally forced through this mortar joint. If the wall is covered with stucco, of course, this trouble is all eliminated. We would suggest that you send three of your concrete block to either your state University or the Pittsburgh Testing Laboratory at Birmingham, Alabama, and have compression and absorption tests made on them so that you know definitely just what the quality of your block is. The Testing Laboratory, in examining the block, will be able to make some very valuable suggestions regarding the quality of concrete which they find in your block. This series of tests will not be expensive, but it will do more than anything else to clear up in your mind just the point that you are interested in. We stand ready at any time to assist you in every way possible."

A Solution to Building Difficulties in Montana

E. B. K., of Bainville, Montana, voices the building difficulties met with in his section of the country as follows: "As lumber is still quite high and brick and tile still higher in proportion, I am trying to find some way of erecting buildings that will give satisfactory results at less cost. I have read some about hollow concrete wall, but it is mostly advertisement, so I am anxious to get some advice on this kind of building before investing in equipment or advocating its use. We have an unlimited supply of excellent sand nearby, but cement costs \$6 per barrel in small lots." *Answer*—This request for advice was referred to the Portland Cement Association, whose reply to E. B. K. was in part as follows: "Attached you will find a letter recently received from G. D. Jay of the Studebaker Corporation, in which he points out that it was possible for them to construct houses of stucco on light weight building tile at a cost equal to frame construction using the same floor plans. Under separate cover we are sending the following publications: 'Concrete Building Block and Brick'; 'Tentative Recommended Practice for the Manufacture of Concrete Block, Brick and Tile'; 'Markets for Cement Products.' In the former you will find a list of the manufacturers of concrete block and tile machinery, any of which will be glad to supply you with descriptive material and prices of their equipment."

An Example in Co-operation

By V. L. Sherman

Research in Concrete and Concrete Materials

WITH the approach of the new year we form our new resolutions and revamp the old ones. With the passing of the old year, particularly this old year, one good resolution would be to suspend judgment on all concerned in the building trade. Everyone is "in bad," and such suspension of judgment would help toward mental recuperation. Another good resolution would be to "go the second mile," as Mr. Babson would have us, in any agreement, or compromise, or goodness knows what.

Judge Landis rendered his opinions after

lengthy testimony and evidence due, and no finer arbiter could have been found. Yet when we are at last to have unstinted building that authority that authority, Mr. Lewis Carroll, arises to say:

"It was so kind of you to come!
And you were very nice!"
The Carpenter said nothing but,
"Cut us another slice:
I wish you were not quite so deaf—
I've had to ask you twice!"

Building resumes in a convalescent style, but a citizens' committee sits in judgment and, according to the press: "Work on every big building job will stop entirely if

necessary until the working men accede to the Landis award. . . ."

Presently a legislative committee sits in judgment on various restrictions, conspiracies, agreements and what not.

The minister at home opines that the golden lure in business replaces the golden rule and, misconstruing our statistician, Mr. Babson, puts a dour appearance on liveliness. Opinions are making more judges of us than there are generals in the army of Haiti.

However, there are a great number who

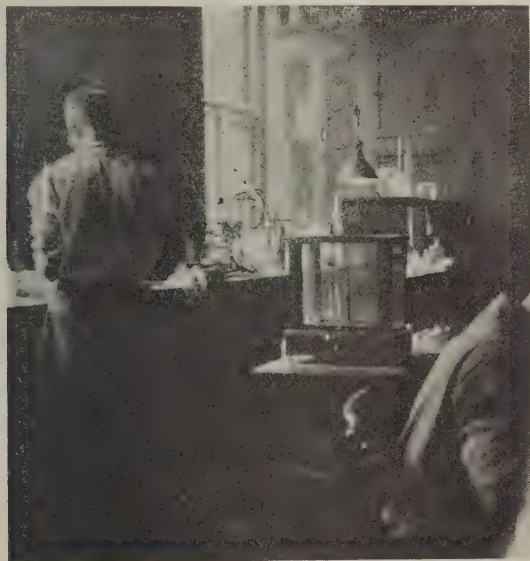
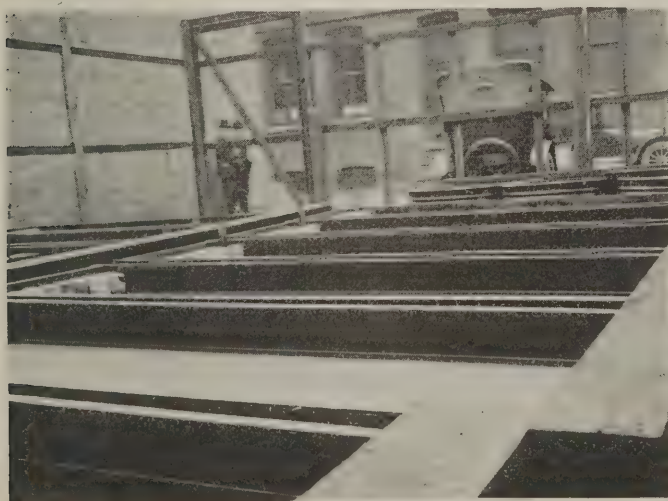


Fig. 1—Corner of special chemical laboratory for structural research. Fig. 2—Weighing a sample of concrete aggregate preparatory to making the Deval abrasion test. This test gives a measure of the hardness and toughness of aggregate



Wooden tanks containing various alkaline solutions in which specimens are stored to study the action of alkali on concrete. Analyses of the solutions are made every seven days to determine necessary corrections in strength of solutions.



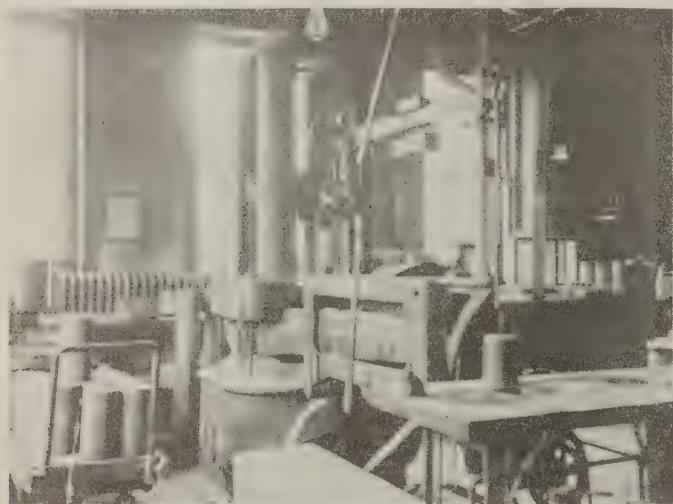
One of two large rooms in which concrete test pieces are made, showing Smith "Mascot" (left), and Blystone concrete mixers, and the sound-proof room containing Talbot-Jones rattle for abrasion test of concrete blocks. Road surfaces.



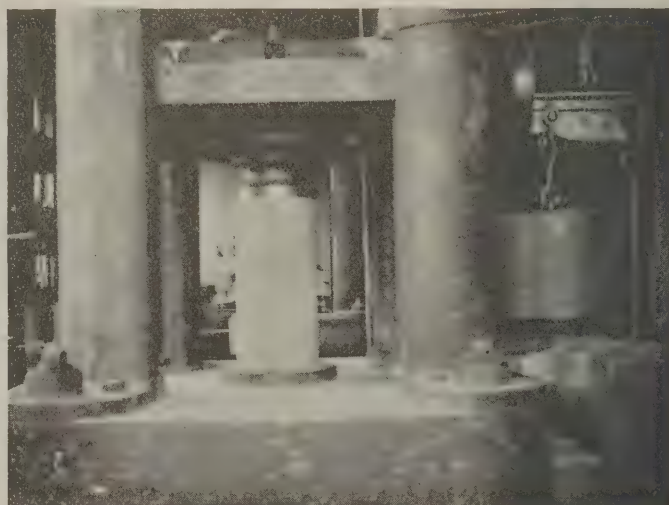
Storage tanks in which mortar test pieces are cured in water.



Capping bearing surfaces of compression specimen with gypsum to insure even distribution of load.



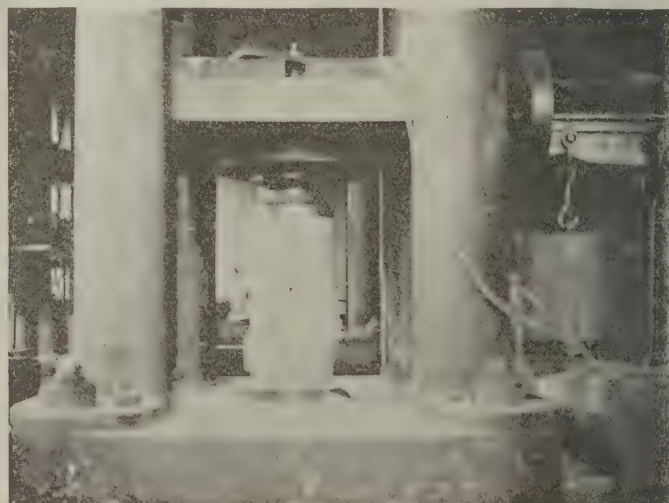
The 200,000-pound Olsen universal testing machine and truck of 6x12-in. concrete compression cylinders ready for testing. Strength testing equipment includes two 200,000-pound machines, one 300,000-pound machine, one 40,000-pound machine, and two 1,000-pound machines for tensile strength tests.



A 6x12-in. concrete compression specimen ready for test in 200,000-pound Olsen testing machine.



Typical failure of concrete specimen of good quality. This cylinder failed at a load of 6,500 pounds per square inch.



Typical failure of 6x12-in. concrete cylinder of low strength under compression test.

have calmly overlooked the fact that 1921 adds to thirteen, and have taken literally: "And whosoever shall compel thee to go one mile, go with him two." Putting aside

emotion, religion, in fact everything but sound business sense, they have proved it faultless advice. That second mile, Service, is shown very well in the work of the

Structural Materials Research Laboratory as carried on through the co-operation of the Lewis Institute and the Portland Cement Association.

Just off the floor of the Strength of Materials Laboratory in the Lewis Institute there is an office in which you will sometimes find Mr. Duff A. Abrams, professor in charge. Mr. Abrams has shown such sufficient reason for accumulating floor space that, while his own office remains inconspicuous, the work-rooms of his laboratories now cover the equivalent of two floors in the engineering building. If he keeps at it the institute may have an argument on their hands to keep him out of their new garage and the new forge shop.

The policy of the laboratory is vested in an advisory committee consisting of representatives of the Lewis Institute and the Cement Association. The staff carrying on the research work in concrete and concrete materials comprises nearly forty engineers, chemists and assistants who give their entire time to the work. Results of the investigations are published in the form of papers before engineering and technical societies, and in circulars and bulletins issued by the laboratory. The equipment, which is too lengthy to list, is most complete as you will note from the photographs. The research workers have access to all of the engineering departments of the Institute.

Now mark: "While these experimental studies are being carried on through the co-operation of the cement manufacturers, it should be noted that none of this work has been directed toward the solution of strictly manufacturing problems or with a view to economics in the operation of cement mills. The aim has been to render every assistance in the development of improvements in the quality of concrete, and to adapting concrete to meet the demand for structural material in new fields. *This broad-minded policy on the part of the manufacturers is a reflection of the most advanced ideas of business ethics which finds expression in the theory that the obligation of the manufacturer does not end in the production and sale of a first-class product, but extends as well to rendering every service in his power to assist his client to a proper use of the product to the end that it may serve its purpose in the most economical manner.*" There is your second mile.

Further, Mr. Abrams says: "These researches will undoubtedly exert an important influence in rationalizing concrete and reinforced concrete construction, to the end that better and more permanent work will be secured at a lower cost. Such benefits as may be derived from these will come to the general public."

While experimental studies carried out in this country and in Europe have developed sufficient information to enable the engineer to design reinforced concrete structures with nearly as much sense of security as in other structural materials, the knowledge of the properties of concrete and concrete materials has not kept pace. This is due to a "lack of complete analysis of the principles of concrete mixtures and has led to rule-of-thumb methods of selecting ma-

terials and proportioning." The Laboratory points out that the problems which generally confront the engineer in designing and estimating the cost of concrete structures are:

1. What quality of concrete is most economical?
2. Are the aggregates near at hand suitable?
3. Of several aggregates, all of good grade, which is the best for the purpose?
4. What tests shall be made to determine the suitability of aggregates?
5. How shall the materials be proportioned, mixed and placed in order that concrete of the highest quality may be produced at lowest cost?
6. What is the effect of certain changes in the proportions of the materials?
7. What is the effect of exposures or service conditions on the permanency of the concrete.

And they add that "since the aggregate constitutes 75 to 90 per cent of the material in concrete it is important that aggregates which are found near at hand be used if they can be shown to be suitable."

Not so long ago, to be precise, May 2, 1918, the *Engineering News-Record* published one of the laboratory reports written by Mr. Abrams which they entitled "Revolutionary Results Obtained by Proportioning Water in Concrete Mixes." So far as I know this was the first break from the old ideas of strength in concrete, and the findings in the report were due directly to novelty in attacking the subject, to methods

"without precedent" as the editor said. To quote the opening paragraph of the report: "Concrete, it is commonly stated, is composed of a mixture of cement, sand and pebbles or crushed stone. This conception overlooks one essential element of the mixture—water. An exact statement of the ingredients of concrete would be: Cement, aggregate and water. The last-named material has not yet received proper consideration in tests of concrete or in specifications for concrete work."

We remarked a while ago that you will sometimes find Mr. Abrams in his office. On the other hand you might be told that he is "out of town." "Out of town" might mean that he is in Colorado or South Dakota or Saskatoon carrying on tests with concrete blocks in soils and waters at the different stations. Not long ago he returned from Cuba with reports and a coat of tan. As a matter of fact the Cement Association and the research work carried on covers practically all of the territory on this continent.

In the field tests the Laboratory is receiving co-operation from the United States Reclamation Service, the Bureau of Standards, the Bureau of Public Roads, and the Engineering Institute of Canada.

And it does not take a statistician to prove that the willingness of the cement association to go a second mile unasked will assure their future as a vital part in building industry. The good "two milers" like the really good fighters seldom require the services of a referee.

Cement Quality Guaranteed

MANKATO, Kan., Dec. 3, 1921.

To the Editors:

Here is a problem for you. I put a plain concrete wall with footings under a school building I am erecting. All according to plans and specifications. But the concrete was and is not up to what I consider grade, either in appearance or set. So I sent sample to Read Testing Laboratory at Manhattan. Result: Per cent retained in 200-mesh sieve, 17.7; steam test, sound; initial set, 4½ hours; final set, O.K.; tensile strength (1:3 Ottawa sand), 7 days, average 195 lbs. This is cement manufactured by Bought through I am taking this up with the Highway Commission in this state and Nebraska. Also with the cement associations. You may publish this if you wish.

Very respectfully,

JOHN F. BLISS.

This letter is indicative of more or less infrequent complaint regarding cement, and is here reproduced as representative of the reasons for the following:

Cement Association Bases Membership on Quality of Product

At the final session of the annual meeting of the Portland Cement Association, which

was held in December at the Biltmore Hotel, New York, the association's constitution and by-laws were amended so as to make membership in the association "Contingent upon member's product meeting the Standard Specifications for Portland Cement adopted by the United States Government and the American Society for Testing Materials."

President L. T. Sunderland of Kansas City, Mo., who was re-elected at the annual meeting, in commenting upon this amendment, says "This only serves as a further protection to the cement buying public. Portland cement always has been a highly standardized product, but as varying degrees of skill have been displayed in so-called tests of cement made by people not thoroughly grounded in testing practice through lack of long and competent laboratory training, misleading results have often been announced. The public can now feel assured that if the cement is produced by a member of the Portland Cement Association, that fact is an added endorsement of quality and actual assurance that it will measure up to the accepted engineering standards, since otherwise membership in the association would be thereby jeopardized."

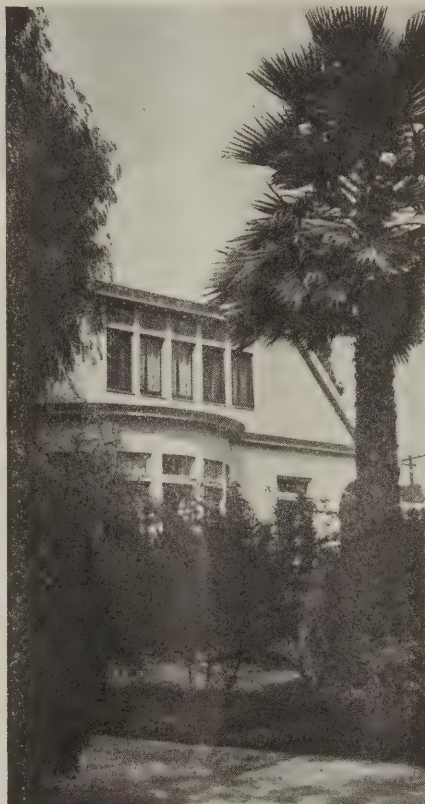
Magnesite Cement as Used in Southern California

By G. E. McDonald

OF the four kinds of cement—portland, gypsum, lime and magnesite, the first three are mixed with water to set them up, while magnesite is set up by the use of magnesium chloride—this magnesium chloride being the peculiar sticky liquid left from sea water after most of the salt and water is extracted from it.

Magnesite, which is found in comparatively few countries, and of which the only extensive U. S. deposits are located in California, is, in its natural state, a kind of rock, usually of white appearance. When calcined, kiln burned, it loses about 51% of its weight and becomes magnesium oxide (MgO), and it is then ground to a fine powder. Then, by mixing with this powder a certain amount of filler or bulk, such as silica (sand), asbestos or sawdust, and adding the liquid magnesia chloride as binder, you get a plastic cement material that sets very hard and strong, does not expand or contract, and is fireproof, resilient and non-cracking, providing always the ingredients are of maximum purity and mixed in right proportions.

It is much slower setting than lime or hard plaster, also a little higher priced, so is not used for structural work, but is specially adapted for interior sanitary finish and costs about 40% less than tile in the finished job. For ordinary work it is laid on with a floating trowel in a one-coat monolithic sheet, to a depth of $\frac{3}{8}$ to $\frac{1}{2}$ in., without grooves or scoring, over concrete or over rough lumber base reinforced with $1\frac{1}{2}$



A magnesite roof which was built six years ago in Los Angeles

or 2-in. mesh wire as bond or clincher for the cement. It is laid on solid surface, not on open lathing.

An all-mineral composition (sand and asbestos as filler) is allowed to stand over night after troweling, when it is treated with waterproof filler, smoothed off with sandpaper and waxed, and the following day can go into service and will need no further surfacing or attention perhaps for years, as it will have taken on a glassy mat-finish glaze and will continue setting up for an indefinite time.

When sawdust is used as a filler in the composition it is much slower setting, taking four to five days, this being a vegetable element somewhat incompatible with the magnesium chloride (salt bitter). Even when set, it does not take on a glaze but requires to be rubbed down with oil, sanded, and waxed or preferably treated with an impervious surfacing like Velspar. It has a soapstone feel, and if kept oiled, or dressed with a special protecting preparation, may give long service but the wood filling is bound to rot in time, in a top coat, when the salt will wash out and the board become porous and unsightly. Its use therefore has been more or less abandoned except for under coats in two-ply floors, where its light weight, resilient and insulating qualities make it valuable.

In California and on the coast, where magnesite composition is in general use, the contractors who specialize in this work have copyrighted names covering their individual installations, such as Plastone, Woodstone, Keystone, Asbestone, etc., and each firm jealously guards its own recipe for pro-



Lunch counters of all-magnesite composition laid in solid colors.



This is one-coat work troweled on rough framework

portioning and mixing the ingredients, but the base of all is magnesium oxide and magnesium chloride with appropriate fillers. Many persons have rushed into the business without informing themselves of the nature of the materials, or how to properly mix and work them, and have failed, one of the disadvantages being that magnesite is not yet standardized like portland cement. The content of a carload from an unknown source may vary, and if it has for instance a lime content of more than $2\frac{1}{2}\%$ it is injurious to the permanency of the finished cement.

Its successful setting up depends first upon the purity and proper proportioning of the magnesium oxide and its binder magnesium chloride, and depends also upon the nature of the filler used. An all-mineral mix, with the silica in three grades of fineness to allow of dense packing of the aggregate, is almost imperishable in ordinary use and takes on a mat-finish glaze without firing, and is waterproof, fireproof, and can be laid down in vast monolithic sheets without cracking, providing always the sub-floor or base is properly nailed and secure. The natural colors of the composition are gray and buff, and there are some contractors who maintain that colors cannot be mixed in the plastic cement, as indeed practically impossible in the case of wood filling and magnesium chloride binder, but it has now been proved out that the fine grades of color pigment can be used with perfect success and striking effect in a properly proportioned all-mineral magnesite composition.

An all-mineral composition will weigh from three to four pounds to the sq. ft. when laid $\frac{3}{8}$ in. thick. The composition



Fig. 4—Magnesite composition floor, waxed; brown or buff finish

trowel or store fronts, lunch counters, or for fine flooring or interior sanitary finish, etc., costs about 40% less than tile.

of fineness that enables it to pack well, and with some asbestos) it is now coming into satisfactory use in exterior work, not for structural purposes, but for ornamental store fronts, deck flooring (non-slipping tread), house terraces, porches, etc. A magnesite roof that has been in use some six years is shown in Fig. 1. It was erected as an experiment by Architect Irving J. Gill of Los Angeles, a specialist in magnesite work of all kinds, and so far this roof remains unaffected by weather conditions. It is two-ply, over wire reinforcing nailed firmly over an old roof after removing shingles, and is painted pure white to correspond with balance of outdoor trim.

Lunch Counters and Stands

The lunch counters and stands, Figs. 2 and 3, located on one of the pleasure piers at Venice, California, are of all-mineral magnesite composition (silica and asbestos as filler), and are laid in solid colors—the pair to the right showing an effective combination of buff and green, while the other is deep maroon contrasted with the natural gray tint of the all-mineral magnesite cement. This is one-coat work, troweled on to a depth of approximately one-half inch over a frame of rough lumber, reinforced with $1\frac{1}{2}$ -in. mesh wire. After setting, the surface was treated next day with waterproof filler, sandpapered and waxed, and will need no further attention. The design is obtained by laying a strip and troweling up to it with one color, then removing the strip and laying on the next color. Conventional figures of fruit, birds, flowers, are worked out in the same way on store fronts, etc., in endless variety and striking color



Fig. 5—A two-ply magnesite composition floor in a school



Fig. 6—Stairway in a Los Angeles school

with sawdust filling will weigh from $1\frac{3}{4}$ lbs. to $2\frac{1}{4}$ lbs. to the sq. ft. for the same thickness, depending upon the amount of sawdust used. Sawdust is about \$5 a ton in Los Angeles, and ground asbestos \$80, and the magnesite runs from \$12 to \$30 a ton. The silica laid down in Los Angeles costs about the same as the magnesite.

When magnesite composition is made into tile for mantels, etc., it costs when installed about the same as cheaper grades of tile, and when laid in monolithic sheets with

Appended are descriptions of some of the uses to which California builders are applying magnesite cement.

Magnesite in Exterior Work

Magnesite composition has been but little used for exterior work in this California district, influenced perhaps by the action of fog and weather on the magnesium chloride (salt bittern) binder and the wood filler of the earlier mixes.

With mineral fillers (silica in three grades

effects—this of course, in the all-mineral mix only, as with wood filler (fermentable and porous vegetable element) conjoined with magnesium chloride (salt bittern) binder, it is practically impossible I am told to get any satisfactory color permanency aside from the natural gray and buff of the light and dark wood fillers. The designs shown on the face of these stands are also used for floors, particularly in offices.

Magnesite Flooring

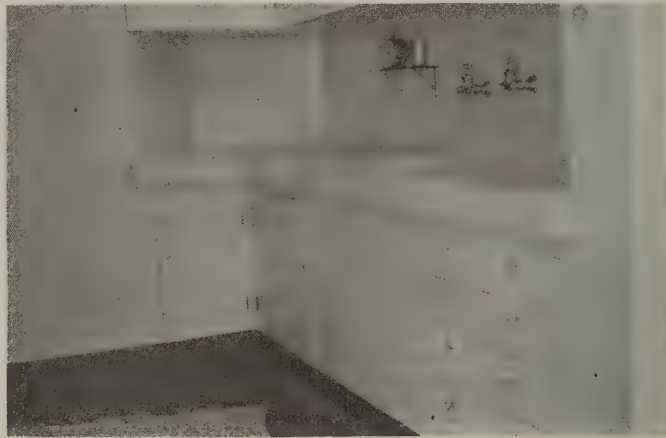
Magnesite composition flooring (see Fig. 4) is being used in many of the best houses in Los Angeles. It is laid down in any combination of color and design desired, and is easy to keep clean and little trouble to keep up. It is applied over cement or over an ordinary wood sub-floor that has 1½ or 2-in. mesh wire reinforcing firmly nailed over it. The second day it can be smoothed down, given a coat of filler as you would a wood floor and touched up with sandpaper, then waxed, and on the third day is ready to go into use, though it will continue to keep setting up and

mixed in exactly the proper proportions, each contractor in this line of work determining for himself what is proper. The floor can be laid in one monolithic sheet, with no joints, grooves or scoring, and is usually extended up onto the baseboard, and the corners and the angles rounded so as to be sanitary, properly balanced to the eye, easily cleaned and leaving no crevice for the lurking of moths or dust. In every case where such flooring was investigated by the writer, the housekeeper spoke of the nice feel of the floor under foot, its satisfactory appearance and the ease with which it was kept clean.

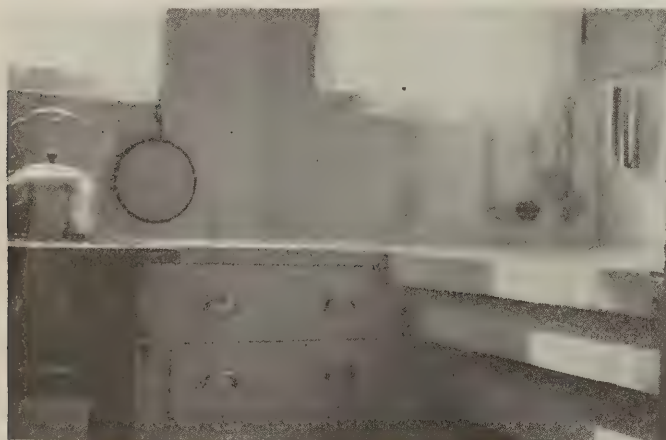
its resilient and insulating properties, and the coat laid to a depth of ¾ in. The following day, a ¾-in. surface coat of all-mineral magnesite composition (silica) in three different grades of fineness for proper packing and density used as a filler along with some asbestos) was applied. The following day this was given an application of waterproofing or filler, sandpapered wherever it needed smoothing and was then waxed and polished. The floor is impervious, resilient, non-slipping under foot, is fireproof and practically noiseless, and will keep setting up and toughening as time goes on.



Fig. 7—Magnesite composition floor; light gray color. California Lutheran Hospital



Drainboard and sink backing



Built-in kitchen table with slabbed top



"Rolled top" bathtub

hardening for a considerable time to come.

Where there is a large area to be covered, such as in a store or hall, and in many cases in living rooms and kitchens, two coats of the composition are applied, each ¾ in. thick, the sub-layer being composed of a resilient, sound-deadening material (obtained by using sawdust as a filler) and that acts as an insulator. This makes a floor that is virtually noiseless under foot, warm and fireproof, and with no dust or abrasion to contend with. It can be laid as thin as ¾ in. without danger of cracking, providing the composition is rightly mixed and applied and the base well nailed and proper reinforcing used. The ingredients of the composition must be of maximum purity, and

Fig. 5 shows a two-ply magnesite composition floor in the upper hall of the Micheltorena School of Los Angeles, Dohrman & Walker, specialists in this line of work, being the contractors. The floor is laid in one monolithic sheet, with the sides brought up six inches onto the wall to form baseboard, its angles and corners being carefully rounded and smoothed so as to allow no crevices or lodgment for dirt or dust; 1½-in. wire mesh was used as reinforcing, and nailed firmly over the rough lumber sub-floor. The nails were partially driven, then turned or hooked over, making an extra bond for the material to grip. In mixing the composition for the first coat, sawdust was used as filler for the sake of

A School Stairway

This magnesite composition stairway shown in Fig. 6 was installed by contractors Dohrman & Walker in the Hamel street school, Los Angeles. The base of the stairs is unsurfaced lumber, over which 1½-in. mesh wire reinforcing was securely nailed. Buff coloring matter was mixed in the plastic composition, silica employed as a filler—being as required in several different finenesses to allow the proper packing of the aggregate, and the troweling was carefully done by a master worker. It will be noted that the corners and angles are slightly rounded and the step is not as high or deep as an ordinary stair as this is for the use of young children. To the eye the stairs

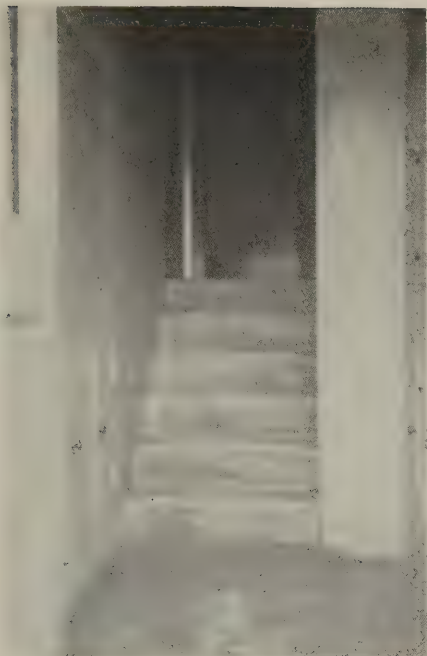


Fig. 8—Service stairs

have soft mat-finish glaze, and to the touch of the hand have a soapstone feel. They were given an application of waterproofing and were wax polished the day after being laid, and the contractors state they can be kept in shape thereafter either by the use of an oil mop or soap and water. These stairs are non-slipping and allow of firm tread and foothold.

Repairing Old Floors

Magnesite composition flooring is used to a considerable extent by practically all the hospitals in Los Angeles, being set over old floors as the latter need replacing. The floor shown in Fig. 7 is in one of the private rooms of the California Hospital. It is $\frac{1}{2}$ -in. thick, one-ply in the natural light gray color of the all-mineral composition and has an impervious mat-finish glaze that is proof against stains and contagion and easy to keep clean. It will be noted that the floor extends upwards several inches on all sides to meet the six-inch baseboard, the angles rounded so as to allow absolutely no cracks for the lodgment of germs or dust. The casters on the furniture make no impression whatever on the floor, which also seems to be noiseless like linoleum.

Service Stairs

The two-ply magnesite composition service stairs (Fig. 8) at the rear entrance of a Los Angeles apartment house have had five years' steady usage and are even better set up now than on the start. The under coat was reinforced by 2-in. mesh wire over a rough lumber sub-structure, and the buff color applied with brush after the cement had set. The surface was then waxed and polished, being treated like a hardwood job in that respect, and has since had no refinishing but only the daily ministrations of the janitor's "dustless dust mop."

Stair with Rounded Corners and Angles

A near-up view (Fig. 9) of the rounded corners and angles of a magnesite composition job is shown by this section of stairway that has been in use now some six years in a Los Angeles apartment house. These stairs are two-ply, each coat about $\frac{3}{8}$ in. thick, set over an old wooden stairway reinforced with 2-in. mesh wire. In this case both stairs and floor were treated with an acid stain (buff color) after laying, then waxed, and are today in even better shape than when first erected. No chipping or cracks were noticed, and the superintendent of the building mentioned that the magnesite installations gave him no trouble at all from one year to another, but that if any accidental smash did occur such damage was easily and quickly repaired.

Built-in Kitchen Table With Magnesite Slabbed Top

The bay window kitchenette was installed

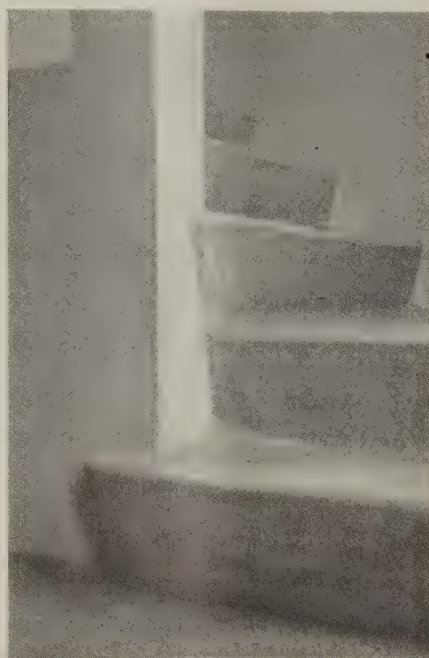


Fig. 9—Close-up of stair with rounded corners and angles

in a remodeled ancient 14-room house that formerly always stood vacant, but that now, remodeled into seven or eight one-two-and-three-room apartments with modern built-in features, brings in a steady rental of seven and eight hundred dollars a month. The picture shows built-in hotpoint electric stove, located under the center light of the old bay window, all the lights being raised, and a one-piece magnesite composition table top and wainscoting extending on either side of stove and merging with the drainboard, sink table and sink backing to the right. This monolithic piece of magnesite work is one-ply, $\frac{1}{2}$ in. thick, troweled over a common wood sub-structure reinforced with 2-in. mesh wire, and is waterproof, fireproof, impervious to cracks or checks, and is therefore absolutely sanitary and

wholesome, as well as wonderfully convenient. There are cupboards underneath, a built-in ice box to the left and cupboards on the side walls. Behind are swinging buffet doors, and a wall of cupboards five feet high, all enameled white, and on the "dining room" side of this wall of cupboards are built-in china cupboard and small buffet as well as drawers for linen, etc., the abundant light from the high-placed three windows of the old bay lighting the dining room as perfectly as if the wall of cupboards were not in the way. The dining room is furnished with pretty wicker table and chairs painted gray green. The floors throughout the house are of magnesite composition, finished in buff and brown, and waxed, and it is said that one tenant from abroad selected an apartment here because these handsome floors showed off his priceless collection of rugs faultlessly.

Drainboard and Sink Backing

The magnesite drainboard and sink backing was made in a single waterproof sheet, under overhanging cupboards. Silica was used as the filler, making an all-mineral mix, which, after it set, was treated with flat white in two coats and enameled to correspond with balance of room. The magnesite floor, which was laid over a solid earth fill (adobe), with some five or six inches of sand between to overcome danger of cracking from the expansion and contraction of earth fill, is in one unbroken sheet, laid on with trowel, then colored dark red and waxed.

These built-in features, minimizing labor, time and strength, add immensely to the popularity of houses.

"Rolled Top" Bath Tub

The "rolled top" bath tub on the preceding page was one of the first magnesite jobs un-



Magnesite slabbed door

dertaken by a contractor who has since attained to distinction in the work. The tub is set in desired position on floor, or partly sunk below the floor level. It is then walled in with unsurfaced lumber, over which 1½ or 2-in. mesh wire reinforcing is firmly nailed. The magnesite composition is then applied with floating trowel, care being taken to have all rounded corners and to bring the composition sufficiently over top of tub to allow of drainage into tub. If the bathroom is small the casing at bottom of tub may be extended a little so as to give flat surface for low, comfortable seat for the lady while investigating her corns after the bath. In this connection, would call attention to the fact that the magnesite all-mineral cement being resilient, non-cracking and with a natural glazed surface is waterproof and has more the feel of soapstone or linoleum than the chill of portland cement. The room is in blue and white, the magnesite casing of tub also being enameled in white, and a blue band laid on with brush to baseboard height, and extended to and around the door, then back to and around the floor on other sides of the room.

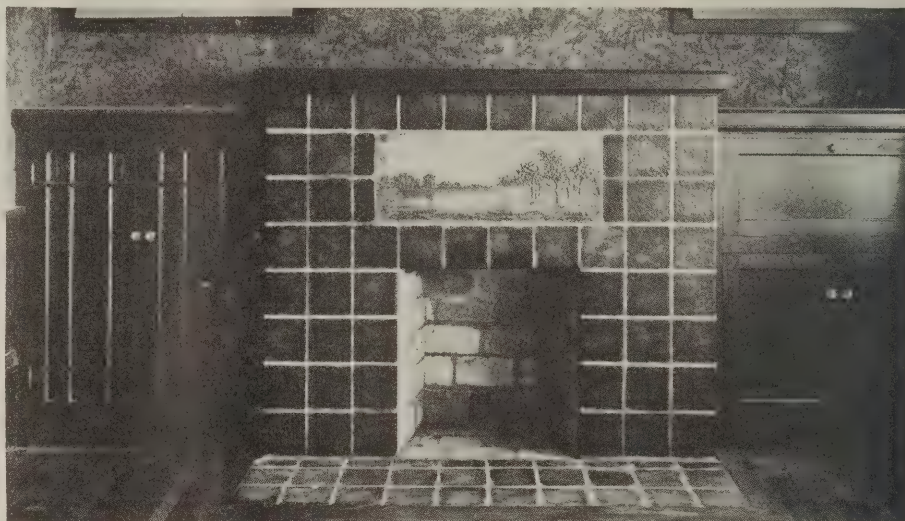
Magnesite Slabbed Doors

The cut shows one of the magnesite slabbed doors in a solid cement house in Los Angeles, built by contractor J. F. White on North Vine Street. The result was accomplished by using ordinary five-panel doors as a base, the panels being hacked and roughened slightly and rows of nails being driven partly in as clinchers or bond for the composition. In some cases, two-inch mesh wire was nailed into the panels. The magnesite composition, an all-mineral mix, was then carefully applied with a flat trowel, and leveled off by a straight-edge board being drawn up and down over the door. After setting, the whole was sand-papered, oiled and treated with several coats of flat white, and enameled, coming out a perfect slab. Such a door weighs about a hundred pounds and must be hung absolutely true. It hangs on the same butt that an ordinary wood door hangs on. In this house there is one door on which the magnesite composition expanded slightly, due to improper proportioning of the ingredients in the first mix, and the trouble showed up almost immediately—the upper panels being slightly sprung—just enough to show they are there but not enough to make the door bind. The door jams were set in the house before the concrete walls were poured, and a reinforcing material of about ¼-in. mesh wire was tacked firmly on around the wood sides of it, so that when the concrete was poured it tied the jamb right into the solid wall. No door frames are needed or used in this house, only the ordinary stops set on the jamb, but for appearance sake a band of color was laid on with brush at the line where the frame and where the baseboard usually come. Note the magnesite floors, which are one of the fine features of this house.

New Mantel Tile with Concrete Base, in Artistic Finishes

A NEW kind of tile for mantels, vestibules, fireplaces, etc., consists of a cast concrete back or base, to which a glaze-like surface of any desired color is added by a special process. The new product is made in Berkeley, Calif., and has been tried out extensively in that city, where it is said to have proven exceedingly satisfactory. Low cost, ease of manufacture and durability, plus the great variety of effects that can be produced are the features which the manufacturers emphasize. The new process is carried on by a tile manufacturing com-

patents 1,366,754, serial No. 357,991 relates to the simulation of leather, ivory and the like for interior decorations such as have been incorporated in representative buildings abroad in the shape of panels, and which the action of time and the elements has mellowed and wrinkled into contrasting and decorative designs. Mr. Torno imitates these conditions by taking a suitable panel or board such as in 1 on Fig. 1 and covering it with a plastic layer such as 2 in Fig. 1. This may be applied with a trowel or brush. The proportions of the plastic substance are



A stock fireplace made with the new tile, a concrete tile having a face of any desired color, resembling a baked glaze

pany, and L. Torno is the inventor and patentee.

The concern manufactures plain tile in many different hues and colors and also produces decorative panels in which various colors are used. This surface treatment

varied to make it hard, soft or more elastic as the work may require. For bending around corners a heavy-cardboard or the like is used for the back panel. The composition will adhere permanently to glass,



Fig. 1

is adaptable to reproducing landscape bits in detail as shown in the panel in the accompanying mantel illustration. The details of such a picture are emphasized by modeling the larger objects to give them an embossed appearance.

No special machinery is required for the manufacture of these tile but the method of applying the surface composition, which is made up according to a special formula, is one that can be learned by practice under the instruction of the company which is now contracting with a limited number of concerns in different parts of the West, giving them the privilege of manufacturing this type and a short ten-day course in its manufacture.

Mr. Torno's process as described in the

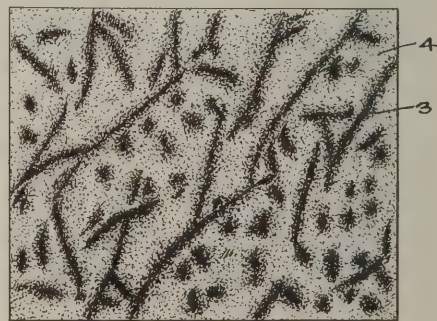


Fig. 2—Typical fabric imprint on plastic material

metal or other substance free from grease.

The invention comprehends a method of treating plastic surfaces by applying a loose wrinkled fabric to the surface, applying pressure, removing the fabric and rubbing coloring matter into the surface.

Building Half Timber Houses

By John Y. Dunlop

HOUSES which were built of timber framing were very usual in the various cities all over England, but many of those picturesque groups of town fronts are rapidly disappearing from our midst in those busy thoroughfares.

In London the Staple Inn Holborn still remains and is a fine example of this picturesque style of building.

The tendency of architects today, however, is to leave all types of timber framed houses back in town and city severely alone,

upper story to project past the line of the lower wall. These are cantilevered over the main face of the framing below and are frequently aided by curved brackets which support a plate carrying their ends, the face of the upper wall being carried vertically up from the outermost edge of the plate or beam. The method of constructing the outer walls of these half timber houses have to be carefully considered and the space between carefully dealt with.

There are four methods of filling in the

extending up two floors and supporting a stucco gable. In the construction the bulk of the fabric of this house is in brick. Solid timbers are used in the front only, giving this small house a look of solidity sometimes wanting in modern examples. In building the window of this house the four main posts extend from the top to the ground floor. A sketch is given showing the lower part of the window with a timber plate built in at the floor level to receive the posts. The posts are notched



House in Hampshire. Timber framing with brick work filled into the panels

although in country districts and in garden suburbs the timber framed house is very popular and it must be said that a very quaint and picturesque effect is obtained with this combination of timber and stucco or timber and brick walls.

Oak, of course, is employed where possible as solid framing, but where it is impossible it is often used as a thin facing to fir posts and rails behind. The general framing of such buildings is composed in modern work of upright posts and rails $4\frac{1}{2}$ in. by $4\frac{1}{2}$ in. or 6 in. by 6 in. mortised and twined into each other with necessary oak pins. Curved braces are inserted not only to strengthen the framing but also as an aid to producing a more elaborate and artistic effect.

A quaint and picturesque effect is obtained by allowing the floor timbers of the

space in those walls: The first plan is to frame the timbers closely and have the outside lathed in panels to receive the stucco; the inside is then covered with felt and is lathed over to receive the plaster inside the room. Another way very much in use is to frame the house and fill in the spaces with a third-grade brick stuccoed on the outside and plastered on the inside. The third method is to fill in between the framing with a good make of brick carefully jointed and leave the brickwork exposed, and the fourth method is to have the timber framing filled in between with concrete.

These methods are in every day use both on large and small work, as shown in the illustrations.

A very simple and effective partly framed timber front is shown with a bay window

slightly on the face to allow them to be set forward on a line with the brickwork of the base. The sills and window heads are tenoned into the posts. At the top end the posts are tenoned into the beam which extends across to receive the gable. Above the beam the brickwork is $4\frac{1}{2}$ in. thick and its built with warpings ($\frac{1}{2}$ in. strips of wood built into the horizontal joints) to allow the timber facings of the stucco gable to be easily fixed. A section is shown of the lower part of the gable at B, and section is also given higher up at A, with the timber work and stucco in position.

Another very effective small front is shown in the timber framed and stucco filled front. This is an example where the architect has had to deal with a narrow front and has made the most of it by



Timber framed bay window with brick filling and stucco gable



Timber framed and stucco filling for a small house
The window in the front projects about 18 inches

using timber framing in the projecting window. In a design of this type the foundation walls would require to follow round the line of the timber framed window to receive the horizontal plate shown in the front and side elevation. The window is then framed on to the six posts, the two at the wall and the four forming the front of the window. The middle part of the upper windows is recessed back to the line of the main wall and this is covered with a much-inclined lean-to roof.

A very important feature in building a front of this type is the arranging of the upper floor joists. Too much weight should not be put on the front window framing, which means that none of the main joists should extend across as far as the window front. What is usually done with projecting windows set across at right angles to the floor joists is to set a beam across the window opening in line with the main wall and on to this the floor joists are set. Filling in joists are then put in between the beam and the window to complete the support for the floor covering.

In the example of a town timber framed house the foundation and base course are built of stone and from this the timber work is raised. The sill piece and the corner posts are 6 in. by 6 in. and the other timbers are 4½ in. square. Every member is cut solid and the curved edges of the braces are shaped through the full thickness. The framing in this house is filled with concrete, which means that in being

shuttered on the outside the boarding was cut to fit between the framing, after which it was taken down and the two-coat stucco

is set it is covered with 2 in. by 1½ in. battens at 16 in. centers to carry the lath for the plastering of the apartment while



Timber framed and stucco wall of upper floor. Note how the timber framing projects over the bay window of the ground floor

work filled in flush with the framing. The inner side of the framing is boarded permanently so that in the first place it is concrete boarding, but after the concrete

the space between the boarding and the lath is filled in with slag-wood—mineral wool. Thus it will be observed that this type of half timber wall besides having a

concrete filling has an inner compartment of slag-wool.

Half timber work in a great number of cases has the upper floor projecting. The

with a few details of the arrangements of half timber walls.

The double house of five apartments each shows the lower part of the fabric in stone,

class of house put up for the industrial classes in the suburbs.

The English architect in some districts is very fond of building his houses of many materials. In many cases he has stone dressing stucco walls and brick chimneys. But in the half-tone illustration of a pair of houses the house shows the composition mentioned to the right and in addition a good part of the front wall is timber framed. The general appearance of the house is very good and the dark marking of the timber framing with the stucco filling is in marked contrast to the ponderous chimney stack with its multitude of joints.

Another type of timber framed house is represented in those arranged with balconies. One of those examples is shown in the stone house with a timber framed second story, while another picturesque design is that of the country house. In the latter example we have a very interesting design of timber framing and the general construction is similar to that already described. In building the right hand gable in this house the brickwork was raised on the framed beam which is set apart to receive the molding above the veranda. Along with the bricks are built sufficient wood bricks and wood runners to insure a proper fixing for the timber framing, which is afterwards to be built on. The lower drawing shows the gable in the rough with the wood bricks and wood runners shaded with hues. The middle drawing shows the same gable and the shaded strips are the parts of the woodwork built in the gable which project past the edges of the vertical and horizontal members of the timber framed gable. The top sketch showed the angle blocks fixed on and the stucco panels filled in.

The illustration of a house in Hampshire



Timber framed house with stucco infilling. This is an example of a town house in a business center

reason for this arrangement is that it was sometimes found to be an easy way of increasing the floor space in the upper apartment. Of course that is not always so, but it was no doubt brought about in that way and there was discovered in it a very pleasing and picturesque effect which many architects are copying.

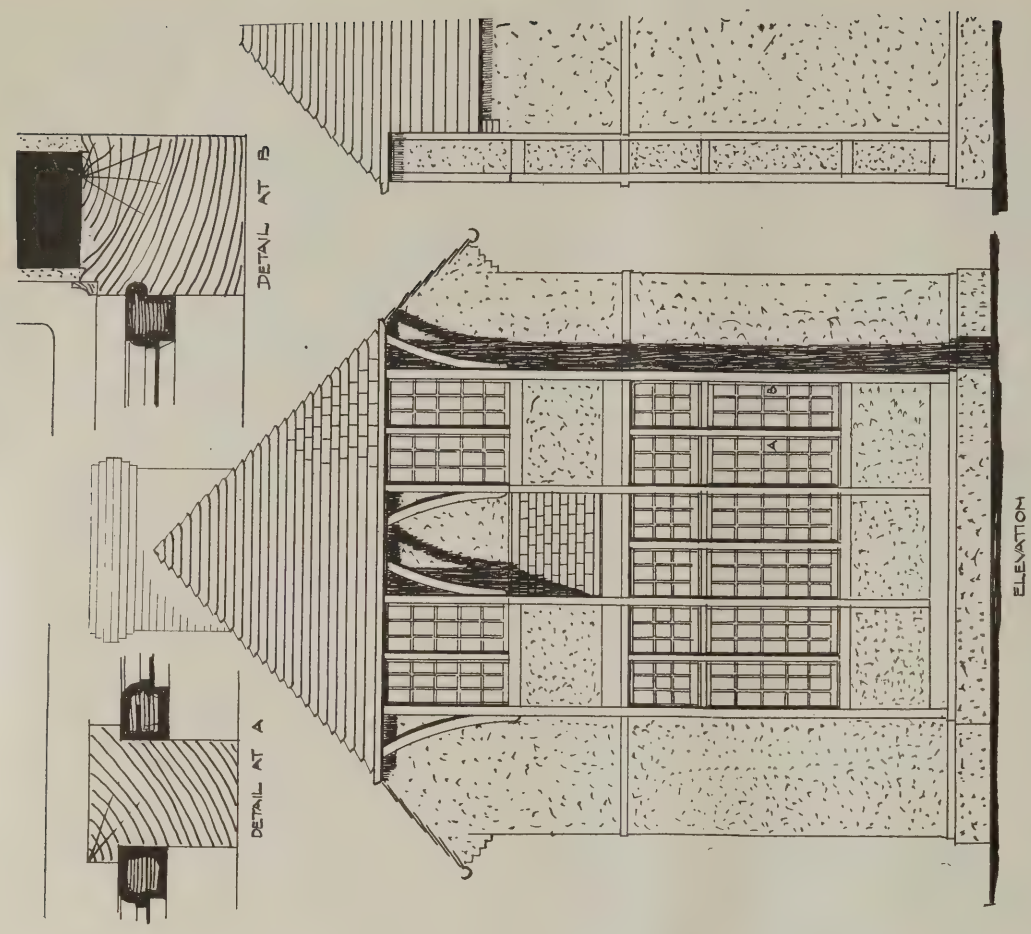
An example is shown how in a small house the whole upper front projects over and receives the oriel windows underneath. Another arrangement of the projecting upper story is shown in the two family house. Here a heavy framed bracket is fixed up at either gable so that the main beam over the projecting window rests on them. The face of this beam is the line of the upper wall.

All half timber houses are not built with projecting floors, as many architects just depend on the endless variety which can be obtained in framing and pegging the timbers together for effect. A very pleasing front with the fabric built in the one line is shown in the small house for one family. The two gables are slightly different in arrangement, while the left hand part of the roof extends over the entrance porch. A drawing of this gable is shown

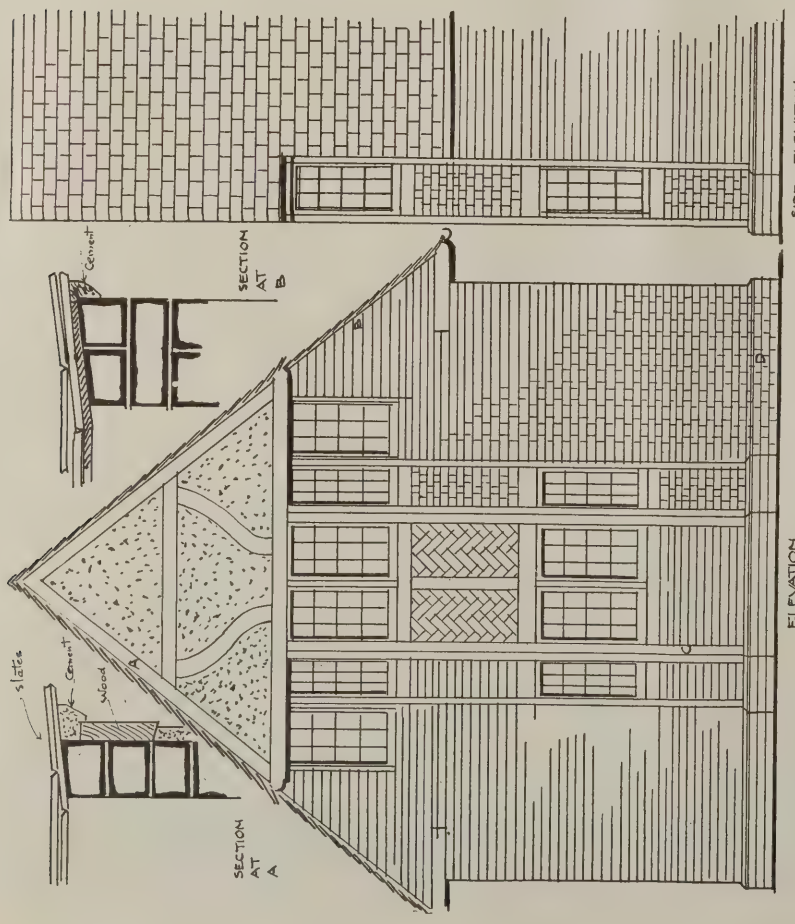
while the upper apartment are timber framed. This is a typical example of the



Timber framed and stucco wall of an upper story

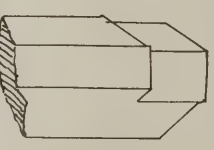


TIMBER FRAMED
AND STUCCO
FILLED FRONT
FOR A
SMALL
HOUSE.



SIDE ELEVATION

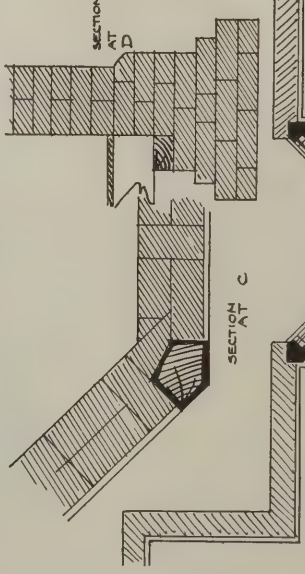
ELEVATION



BOTTOM OF
WINDOW POSTS

PLATE TO
RELIEVE POSTS

WALL AT
LOWER
PART
OF WINDOW

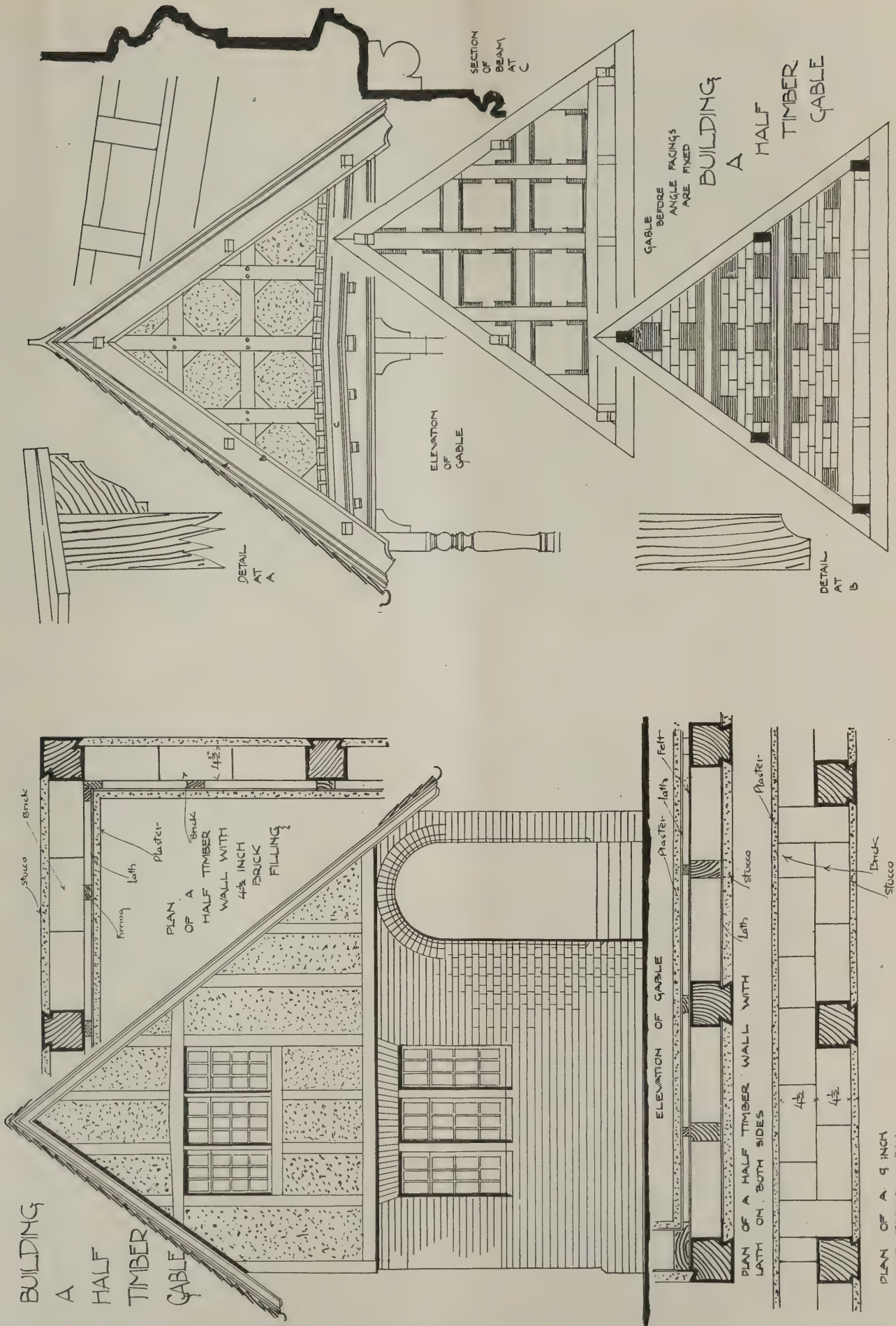


SECTION
AT D

SECTION
AT C

PLAN OF
WINDOW

TIMBER FRAMED BAY -
WINDOW WITH BRICK
FILLING & STUCCO CABLE





A two-family house built of timber framing and stucco



A pair of houses, the most prominent of which is built partly of a timber framed and stucco fabric



Timber framing and stucco fabric of a small house for one family



Timber framing and stucco filling for a double house, each of five apartments

is given as an example showing projecting floors and the timber framing with curved braces, which are inserted as stiffening pieces, an arrangement in this case, which is very effective.



Timber framed and stucco fabric of a country house

Onus of Being a Factor in High Construction Costs Is Laid to Arbitrary Union Rules

EVIDENCE deduced at the resumption of hearings by the New York Joint Legislative Committee on Housing, Monday, December 12, showed that out of approximately 20,000 electricians in New York City, less than 4,000 were in the unions and that the unions collected from the non-members for "permits to work" \$2.50 a week from journeymen and \$1 a week from helpers.

C. G. Norman, chairman of the board of governors of the Building Trades Employers' Association, appeared as a witness before the committee on December 13. According to the *Record and Guide*, of New York, he gave the results of some of the organization's investigation into abuses growing out of arbitrary union rules, as follows:

"A general abuse is that a foreman is required to be a member of the union and is subject to trial and discipline by the union, with the result that he does not dare to give the workers orders for fear of being called up on charges of pushing his men and 'slave driving.' The foreman is supposed to be the employer's man, but is powerless to serve the employer's interest.

"In the bricklayers and carpenters' union the employer is permitted to have his own

foreman, who need not be a union man.

"The cement masons' union compels the employer to have a foreman on every job even if but one man is doing the work. He then becomes foreman at an advance of \$1

a day over his pay as a journeyman.

"Although the architects and owners of new buildings may be satisfied with the artistic appearance of panels or mantels supplied to members of the Plasterers' Union for setting on ceilings or walls, the union men refuse to put up the panels if they have been bought ready made after having been cast in an outside shop. The men claim the right to 'run' all panels themselves on the ground that it gives their men more work. . . .

"By putting a scoop of plaster of paris in the ingredients for mantels, four could be made in a day. The union forbade the practice, and so only one mantel can be made in a day.

"Take the bricklayers. In one case a gang of men were complimented for laying 1,000 bricks a day. The next day, after the delegate spoke to them, they laid 800, and 700 the third day. The employer then told them they could not have their pay unless they returned to 1,000 a day. The next day the gang laid 1,000. Before the war they laid 1,200 and 1,400 and even 1,800.

"The slacking and inefficiency is due to the fact that there is more work than can be done by the men on hand. The result is that you can find bricklayers smoking cigars on the job. The employer does not dare sack them.

"A general complaint is that the unions close their books and limit the number of apprentices. A man cannot become an apprentice plasterer after the age of 19. That is as bad a restriction as I know in any industry. The shop stewards make marks

on the windows and say the men may do so much work a day.

"The bricklayers do not allow the employer to engage laborers to wash down buildings. They say that is their work. There is a difference of \$3 a day in the wages of a bricklayer and a laborer.

"The contractor who put up the building for the *Pictorial Review* on Seventh Avenue put paving blocks in the floor. Pavers got \$2 or \$3 a day less than bricklayers, but the bricklayers insisted on getting the job, although the blocks are wooden blocks. They got the job, but no builder in New York has put in paving blocks since then.

"I am a believer in trade unionism, but I say that the destruction of unionism in this country will come if the unions continue to bar out men and at the same time insist on the employer hiring none but union men. If the doors are thrown open to membership the situation will right itself.

"The hoisting engineers have closed their books for some time to new applicants. All their members are over 50 years of age and no attempt is made to get new members.

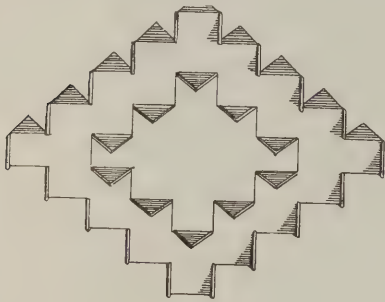
"When the alterations to a building are to cost more than \$5,000 an engineer is required to run the house elevator. That is unnecessary and expensive."

Comparative Pressure on Concrete Forms

A NORTH DAKOTA subscriber propounds the following problem which, he says, has been the subject of many arguments on the job. "Of two concrete forms, both being of the same length and height, one built for a 6-inch wall and the other for a 12-inch wall, on which form is the greatest pressure per square foot when the concrete is poured (in liquid form)? Every man on the job, even the contractor, claims the pressure is increased in the 12-inch form, while I claim the pressure remains the same." *Answer*—You win. The pressure would be the same in both. This is based on the theory that the wet concrete is a perfect fluid and the pressure would be the same in all directions. For example, in the case of water the pressure would be identically the same whether the width between the form was 1-inch or 100 inches. As a matter of fact, in the case of wet concrete the sand and aggregate with it keep it from being a perfect fluid and probably there is actually more pressure in the case of the 12-inch form than the 6-inch one. This is because a larger quantity of the material is pressing against the form and in this case the laws of fluid pressure do not apply; you have simply the weight of the triangular mass of the material slipping on the material below and pressing against the form. However, we judge that according to all rules you win the bet, as in figuring concrete forms it is ordinarily assumed that the material is fluid.

Device to Save Mortising, Dowels, Wedges, Keys, and Drift Pins

THE "Midwest Bulldog" is the name chosen by the Midwest Steel & Supply Co., Inc., 522 Fifth Avenue, New York, N. Y., for a new device for use in timber and wooden construction of all kinds, and of which the illustrations herewith showing its application are explanatory. The Bulldog



The "Bulldog"

is a steel plate provided with teeth on both sides so that when placed between two wooden members and the joint drawn up with the bolt going through the square hole

of the plate it provides great rigidity and strength. The device is made of steel of high tensile strength and protected against rust by a specially prepared coating. The Bulldog is designed to save weakening of timbers by mortising and to do away with dowels, wedges, keys and drift pins.

Lime Plaster Failure Explained

A SERIES of lime-plaster failures in Cleveland, Ohio, has been investigated by the Bureau of Standards. The prime cause has been found to be due to premature painting—the paint providing a skin that prevented the necessary chemical reactions to ripen and harden the plaster. A typical failure was in the Mt. Sinai hospital. Director S. W. Stratton, director of the Bureau of Standards, has submitted the following report in that regard to the Associated General Contractors of America:

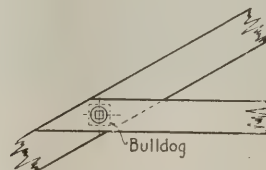
Bureau of Standards Report

"1. The information contained in your letters of November 2 and 5 enables us to form an opinion as to the cause of the failure of plaster on the Mt. Sinai hospital in Cleveland. This opinion must be regarded as tentative, however, pending completion of the examination of the plaster in our laboratory.

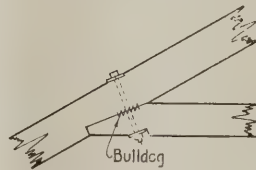
"2. The type of hydrated lime used on this building is a kind which is generally recognized as being excellent for plastering purposes. It contains a large percentage of magnesium oxide. Under ordinary circumstances this magnesia is not harmful. Either it is attacked directly by the carbon dioxide of the air being converted into magnesium carbonate, or if it is attacked by water first, the magnesium hydroxide is quickly converted into carbonate, so that under ordinary circumstances there is little or no magnesium hydroxide to be found in plaster. The rapidity with which magnesium oxide undergoes chemical change depends primarily upon the temperature at which it was burned in the lime kiln. Usually the reaction is pretty well completed in about a year.

"3. The change from magnesium oxide to magnesium carbonate is not accompanied by any noticeable effect upon the volume of the plaster. The change from magnesium oxide to hydroxide, however, is accompanied by a very decided expansion. If the plaster on the Mt. Sinai hospital had not been painted it is probable that the magnesium oxide would have been converted into carbonate in the usual way and no trouble would have occurred. The paint was applied before this carbonation had been completed and thus some free magnesium oxide was sealed in the plaster. This combined with water, which was either present in the plaster or wall at the time the paint was applied, or which came in through the walls afterwards. The resultant formation hydroxide would account for the noted expansion, bulging and loosening of the plaster. The fact that no failure occurred where this plaster was applied to metal lath indicates that under these circumstances the back of the plaster provided an inlet for carbon dioxide and an outlet for the water. If this explanation is correct we would expect to find the plaster to contain a noticeable proportion of magnesium hydroxide.

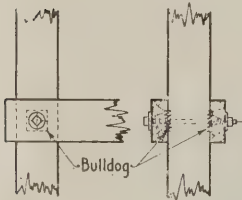
"4. We will communicate with you further on this subject when our laboratory tests have been completed. Inasmuch as this type of lime is of recognized excellence, we do not feel that any blame should be placed upon it. Further trouble can be avoided, if you insist upon the carrying out of the general rule that no plaster shall be painted until after it is a year old. This will give the magnesia plenty of time to carbonate and the wall to dry out, and under these conditions the paint may be applied without danger."



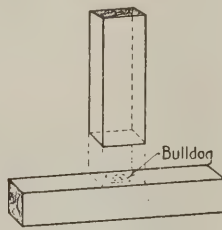
BRACE JOINT



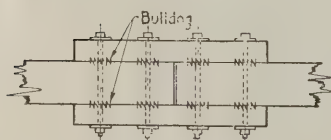
DAPPED JOINT



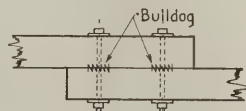
TIE JOINT



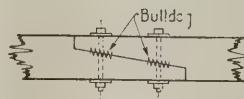
POST CONNECTION



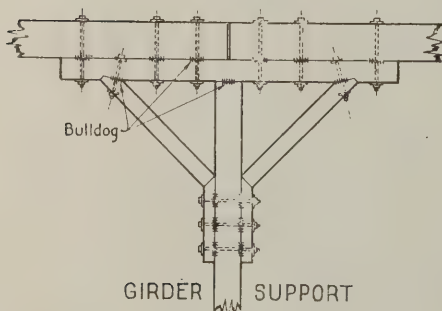
FISH PLATE JOINT



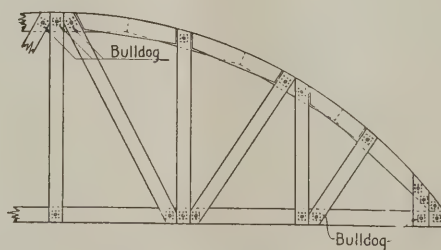
LAP JOINT



SCARF JOINT



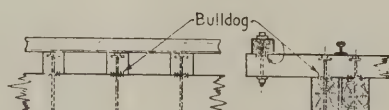
GIRDER SUPPORT



ARCH CENTERING



COMPOUND BEAM



BRIDGE STRINGERS & TIES

Adjustable Shoring for Concrete Forms

A CINCINNATI builder, W. F. Agness, vice-president of the W. F. MacConnell Construction Co., has devised and patented a very simple adjustable shore for concrete building work. These have been much used in his own work and have proved considerable money savers.

and raises the pipe extension to the desired height. When at this height the shore immediately locks itself, and the labor operation is completed.

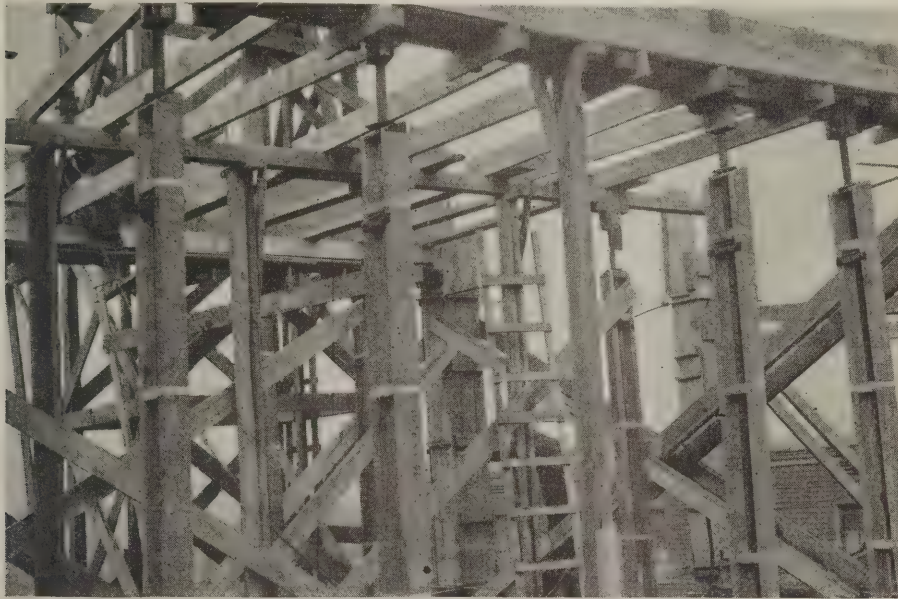
All the shores can be tie-braced to each other before sliding the pipe extension of the shore into position. It is not necessary to disturb this tie bracing any further until everything is ready to wreck the form work.

To lift the sliding pipe to the desired

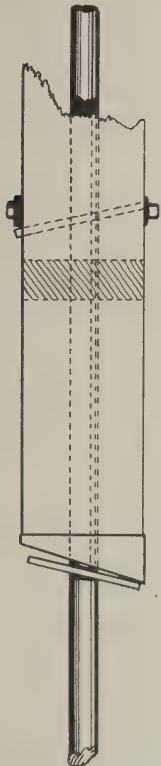
The hold on the pipe part of the post is caused by its wedging between the top and bottom plates, or clamps, which are sloped in opposite directions. To unlock the post it is merely necessary to force the lock plates up with a wedge or hammer.

Four of these shores have been tested at the University of Cincinnati under a load of 21,000 lbs., or $2\frac{1}{2}$ tons per shore, without slipping of the locks or buckling of the post. This is a safe loading of 800 lbs. per sq. ft.

This shore has been put on the market by the Agness Adjustable Shore Co., 307 Builders' Exchange, Cincinnati, Ohio. They sell for \$4.75 each.



Agness shoring in use on a Cincinnati building



Illustrating principle of operation



Operating shore with special jack



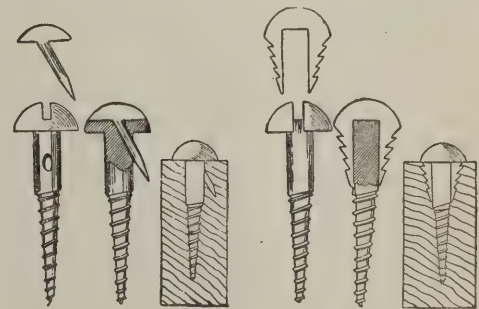
Operating with 2x4 lever and fulcrum

Boice Pony Bench Machine

CONVENIENCE, economy and adaptability appear to be combined in a new compact and serviceable little machine for working in wood and soft metals, doing the work of grinder, polisher, buffer, sander, drill and saw, stands but 10 in. in height and weighs only 31 lb. This precision machine is said to be easily driven by a $\frac{1}{4}$ h.p. motor and fits in economically for all light work, in shops and laboratories, schools, patternmaking, repairing, etc. W. B. & J. C. Boice, 114 Twenty-third Street, Toledo, Ohio, are the manufacturers.

Wood Screws That Can't Work Loose

A SCREW-LOCK and slot filler has been patented by Fred Schumann, New York City, which has obvious advantages in all wood construction where screws are used subject to more or less vibration or straining, such as chairs, porch and garden furniture, aeroplanes, etc. The device is made in two forms, as shown in the illustration. In model A the screw head is perforated diagonally at right angles to the slot, and a metal peg which just fills the slot and projects at an angle into the wood is driven in after the screw has been driven home. This fastens the screw permanently, but it can be unscrewed by extracting the peg, which can be done by inserting a brad-



Model A lock-screw Model B lock-screw

The illustrations herewith show the details and the method of using this shore. It is so light that one man can carry it to the point desired. He then sets it in place

height a special jack, which clamps to the post, may be used, as one of the views shows, or a 2x4 lever and another stick for a fulcrum may be used.

awl under one end and lifting it out. In model B a peg is driven in which fills the slot and places a saw-toothed wedge in the wood on each side of the screw.

Announcements and Publications

Trico Art Metal Radiator Covers. Illustrated and descriptive catalogs issued by the Art Metal Radiator Cover Co., Chicago, showing the various styles, patterns and colors in which these combined radiator covers and humidifiers are applied to match any color scheme or woodwork, together with various types of grills for concealed radiators.

Enameled Iron Ware—The Cahill Iron Works, Chattanooga, Tenn., manufacturers of enameled iron bathtubs, lavatories, kitchen sinks, drinking fountains, laundry trays, etc., give in their Catalogue *H* recently issued a complete and well arranged presentation of their "Southern Beauty" enameled ware. There are 236 pages, 11¼x8¾, of cuts, with dimensions and price lists indicated.

"Small French Buildings," by Lewis A. Coffin, Jr., Henry M. Polhemus and Addison F. Worthington; 275 pp., 8½x11½, cloth, \$10; Charles Scribner's Sons, 597 Fifth Avenue, New York City. The authors of this fine book tramped and cycled through the less frequented and fertile inland valleys of France, where the native architecture is as yet untouched by foreign influence, and in this volume present to the architects and designers of America their findings. The contents is divided broadly into five parts: Cottages, Churches and Chapels, Town Houses, Chateaux, Manor Houses and Farm Groups. The final pages from 235 on are given over to the study of details. The book is made up largely of photographs, mostly full page, and the greater part of which the authors made themselves. There are comprehensive introductory notes before each group, and the titles are instructive, so that the idea back of the compilation is kept well before the reader. "It is astonishing," write the authors, "that these small buildings have received so little attention as compared with similar types of other countries. . . . We are hopeful of the utility and of the pleasant savor of this material to any lover of good building—for its very freshness and playful originality if for nothing else. There are many suggestions of value in these old types, most important perhaps in the roof shapes; the compositions of masses, and the fitness of house for setting . . . the thick stone walls, dry, buttered, or stuccoed, the placing of chimneys and dormers, the fenestration, and the use of casements." Floor plans have not been included, since the average French house has little to offer in the way of modern interior arrangement.

"Practical Electricity for Beginners," George A. Willoughby, 104 pp., 5½x8, in-

dexed, \$1; published by the Manual Arts Press, Peoria, Ill. As the title indicates, this is an elementary textbook, for use in junior and small high schools, continuation schools, and so on. While at first glance it would seem too elementary to be of interest to our readers, there is much valuable information in it, such information as everyone should possess. It deals particularly with matters electrical about the house. The following chapter heads indicate pretty well the nature of the ground covered: *IV.* Electrical Circuits—Connecting Bell Circuits—Troubles in Bell Circuits—Repairs. *V.* Battery-Lightning Circuits—Effect of Operating a Lamp on too High Voltage—How Lamps Are Dimmed. *VII.* Fuses and Their Purpose—Testing a Fuse—Replacing a Fuse. *XII.* Dangers Involved in Using Electricity—How to Avoid Them.

"Art and Education in Wood-Turning," William W. Klenke, 110 pp., 6x9, indexed, cloth, \$1.40; published by the Manual Arts Press, Peoria, Ill. This book was written primarily for the use of students in normal schools, high schools, colleges, etc., but it cannot fail to be of interest to the carpenter or craftsman who is looking for small wood-working jobs to fill in the stormy or off-days of winter. For the amateur, there is an enumeration of shop needs in the way of tools and equipment, with photographs and sketches illustrating the methods of holding and using the same. For the more experienced wood-turner, there are detail drawings, made to scale, of bathroom stools, teapot stands, boxes and wooden jars with turned tops, candlesticks, smoking stands, cheese and cracker sets, nut sets, small clock cases, croquet sets, floor lamps and four-poster beds. While there is nothing particularly original about the problems presented, the designs are excellent for beauty of line and proportion showing that they are the work of not only a master craftsman but an artist.

"American Homes," 160 pp., 7½x10¾, paper, \$1; American Architectural Service, 219 Fifth Street, South, Minneapolis. This is an exceedingly well-printed book, with clear illustrations reproduced on a good quality of paper. Besides the usual photographs and sketch-plans, the book contains some good general advice to prospective builders on plumbing, methods of lighting, location of the house, etc. Designs for two-story houses, cottages, bungalows, duplex houses, four-family flat buildings, one- and two-car garages, and a few photographs of modern barns are presented. Working drawings are obtainable for the designs shown, consisting of floor plans for all stories, drawn to ¼-inch scale, with all nec-

essary notes and figure dimensions plainly marked on each plan, four elevations and sections showing the method of construction, size of timbers, as well as all necessary interior and exterior details, with full explanations of same; also original set of type-written specifications, embracing all materials and labor required for the completion of building, masonry, carpenter work, plumbing, heating, painting, wiring, etc. Plans should be ordered from the supervising architect, Dale C. Swain, Plymouth Building, Minneapolis.

"A Course in Mechanical Drawing," Louis Rouillion, 92 pp., 7¾x6½, \$1.50; published by the Norman P. Henley Publishing Co., 2 West 45th Street, New York City. This course was originally issued in blue print form, supplemented by type-written notes, and as such was used at Pratt Institute and other schools. It comes as a result of years of work with evening classes, and is designed to cover a period of two school years of about twenty-four weeks each, working two or three evenings a week. There are thirty-two problems in all, logically graded, and with clear, brief directions. To the man who is interested in taking up mechanical drawing as a home study, this book would be most valuable.

"Bungalow Homes," 143 pp., 6¾x10¼, paper, \$1.50. To quote the editors of this book, it contains "actual photos and reduced blueprint floor plans critically selected from thousands of houses we have inspected in more than ten states." The bungalows are simply designed, compact, with especial attention paid to ventilation and window lighting. They all have full cemented basements, and open-air sleeping porches. Built-in features are part of the designs. There are a number of four-room styles shown, though the preference seems to be for five-room types; and there are numerous two-story designs of simple and dignified appearance. In fact, as the preface states, there are designs of simple and dignified appearance. Approximate costs will be given upon request, and full blue print working drawings may be obtained, consisting of four elevations, basement and floor plans, all drawn to the scale of ¼ inch to the foot, with details of cabinets, buffets, mantels, book-cases, etc. A sectional drawing and roof plan are supplied where any intricacy of construction would seem to warrant it. The specifications are made to cover every step from the excavation to the completion of the building. Changes in plans will be made at a nominal cost. Both book and plans are to be obtained from L. F. Garlinghouse, Topeka, Kans.

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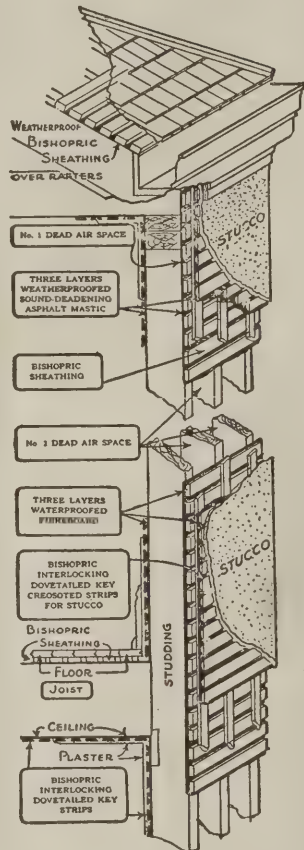
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BISHOPRIC

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This beautiful court built by Mr. Claude E. Neil, who has gained distinction as a home builder. Bishopric Stucco Base used in all construction.

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Builder of Better Homes
Beacon Bldg.
WICHITA, KANSAS

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October 10, 1921.

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I became interested in your Bishopric Base several years ago and was much more interested when I learned that it had been successfully used in Topeka, Kansas, for more than seven years, withstanding the terrible winds we have in this section without cracking the stucco.

Personally I have used Bishopric Base for about three years and am absolutely converted to its use for all stucco work, and you may be sure that I will continue to use it whenever I have an opportunity. You may use this letter in any way you see fit.

Yours very truly,
CLAUDE E. NEIL.

A house built of Bishopric means:

- (a) Least Cost for Labor
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NATIONAL BUILDER

Volume 65

Chicago, February, 1922

Number 2

The Situation

JANUARY is the month of "annual conventions," and probably January, 1922, was the banner month in all history for these "talk fests." The result is that such a conglomeration of papers, ideas, opinions and prophecies are before the editors that the prospect of digesting them is truly paralyzing. Nevertheless, one thing stands out pre-eminently; that is optimism for the outlook of the construction industry for the next four or five years.

There is, also, as is to be expected, a tendency in each case to ascribe as virtues in themselves what they condemn as vices in others. The Associated General Contractors of America in session at Cleveland, Ohio, were inclined to blame the material producers and dealers; the material producers quite generally blame the railways as the cause of all their ills, while the railways blame the labor unions, and the labor unions evidently believe every one else is taking advantage of *them*. And so the industrial world continues to revolve like a puppy chasing its tail; but also like our sun and its planets—the universe—it has a larger and progressive movement, which all the various units may not yet fully comprehend.

We are evidently approaching a system of representative government based on industrial groups rather than social strata. The much advertised "agricultural bloc" at Washington is only one evidence of the tremendous system of organized "influence" by which our country is actually governed. Eventually these various groups must come to realize that they are all working toward the same goal, and gradually they will evolve a more "enlightened selfishness" than most of them now exhibit.

Construction Outlook and Prices

There is an obvious tendency on the part of those directly interested in construction to estimate the pent-up demand for structures of all kinds and to reason therefrom that we are on the verge of tremendous activity in construction. Thus at the recent convention of the Associated General Contractors, Col. Leonard P. Ayres, who was chief statistical officer of the A. E. F. and who is now vice-president of the Cleveland Trust Co., expressed the belief that prices will continue to fall, intermittently, for ten or twenty years more, but conveyed assurance that the construction

industry will be immune to many of the embarrassments of the coming period, because it supplies a market in which there is a latent demand equal to $2\frac{3}{4}$ years normal production of building. "In other words," said Colonel Ayres, "construction can go along for nine years at 25 per cent

Herbert Hoover to American Contractors

DUE to some small minority of the members of the building trades, contractors, material and labor men, the whole of this great and vital branch of American industry is under a great cloud and the moral ethics of the business are challenged daily throughout the entire country.

You are aware of the successful efforts made by other professional associations—the law, the engineers, bankers, doctors—by which in their own associations they have over many years raised the ethics of their own professions to high standards by drastic actions toward members who have not held up the standards of American life.

I am convinced that these things can never be cured by legislation or by jails. They can be cured by the resolute action of the vast majority of honest men who form these professions, and it has now become vital in the country's interests that this should be undertaken in the branch of which you comprise so large a part.

above normal and only fill the normal demand by the end of that time."

While such statements sound good to an assembly of contractors and fill them with good cheer, they also give comfort and assurance to building material producers and union labor, so the net result is often discouragement to promoters, business men in other lines and farmers, who insist that declines in construction prices have not kept pace with declines in commodities generally.

There seems no reason to change the opinion expressed in the January issue of

NATIONAL BUILDER that the normal course for material prices and labor wages in 1922 will be a slowly receding one, with probable spurts upward to find possible higher levels, only to come down again when it is realized that we have a long way to go yet to reach "normalcy."

This idea is expressed by Frederick L. Cranford, one of the most prominent general contractors of the country, who with the president, general manager and some other members of the Associated General Contractors, toured the entire United States in the late fall and early winter in the interests of Secretary Hoover's committee on unemployment. The purpose of this trip was to drive home the contention that construction work was the key to national prosperity. Mr. Cranford reported at the recent meeting of the Associated General Contractors as follows:

Material Man's Responsibility

"Following our 20,000 mile trip around the country, a trip in which we tried to arrive at the true situation with regard to the construction outlook, we had a talk with Herbert Hoover and reported our findings.

"We told him that, with two exceptions, every locality reported that construction labor is practically back at pre-war efficiency, but 98 per cent of the constructors interviewed had been frank in their opinion that the prices of materials had not come down sufficiently to justify a resumption of building.

"It was the general opinion that the prevailing level of prices at that time was not the result of ordinary economic considerations, but of co-operation between material manufacturers and dealers. We expressed the fear that material men and possibly labor organizations would take the first opportunity to restore the abusive conditions of 1919-20.

"There is no doubt that the public believes materials are too high and that this belief is the basic fact in building stagnation—the real difficulty in getting construction started. Business men owe it to themselves to correct abuses in their own industries, otherwise we will have a deluge this winter of regulatory and repressive legislation, which as we know by past experience never brings any constructive results.

"The belief of the public with regard to material prices is quite as effective in barring resumption as any facts should be and, as we have reason to think, the belief accords pretty well with the facts. It is noteworthy that the materials of which the price is most abusively high are the materials which are controlled by national associations, particularly by national associations that meet behind closed doors, thus creating doubt as to their motives.

"To whom does the public turn when it wants an expert opinion as to the correctness of building prices? To you gentlemen as a rule. Hence, in effect it has been the contractor who has been holding up construction by saying frankly, 'This is not the time to build.' Now it is essential that you should know, by statistical inquiry or otherwise, just what prices are right, so that you can say just when and at what prices construction should proceed.

"We have heard a lot of talk about dangerous conditions that will be brought about by radicals, the I. W. W. and the socialists. I want to tell you that these men are comparatively harmless. If we do have a national crisis, it will not be a result of radicalism, but of collusive price fixing. Unless we can restore normal competition, we do, indeed, face a serious situation."

The Railways' Responsibility

The building-material producers' and dealers' alibi is high freight rates. In the case of bulky materials like brick, cement, lime, plaster, stone, sand and gravel, it has been proved beyond a doubt that a very large share of the delivered price is often made up of freight charges. Architects, builders and contractors often overlook this fact; but the freight charges on the finished commodity are only one factor which increases prices to the consumer.

Coal delivered to cement plants, brick kilns and lime plants frequently costs three times as much as it did in pre-war days. Frequently there are also increased freight charges to be paid on clay, shale, limestone and other raw materials. Moreover, the radical changes in freight rates have disarranged the distributing territories of many producers and thus reduced their production to 50 or 60 per cent of the normal capacity of their plants. Production at half capacity is uneconomical and costly, for all of which the consumer must ultimately pay.

As a general rule, producers of building material have been able to lower their costs only in so far as labor is concerned, by lower wages and increased efficiency. Probably many of them have gone the limit under existing conditions in these economies. But lower freight rates and a resulting lowering of costs all around are inevitable and will probably have a stimulating effect on all building construction by mid-season, 1922.

Railway freight-rate reductions can only come, however, when it is clearly demon-

strated that the railways will make up in volume of business what they lose by reduction of rates. In certain instances, such as the recent reduction of rates on West Coast lumber, this has been proved to them, not by argument, but by demonstration. For unless the rates were reduced the lumber would have moved via the Panama Canal and the railways would have lost all revenue from this source. There are thousands of other instances where it can be demonstrated that they have lost business to motor trucks and water transport by prohibitive rates. Building producers have been and still are active in proving such instances.

Labor's Responsibility

The railway's labor problem is somewhat different from other industries' because an increase in efficiency does not result in the same measure of increased production. Trainmen's work is the same whether their pay is a dollar or two dollars an hour. Most economies that can come from increased efficiency must come from the management; and much has been done in this direction during the past year.

Since the railways are scheduled to need \$5,000,000,000 worth of work in the way of construction and maintenance—work that they will not and cannot undertake until justified by earnings—it behooves all business men and the construction industry in particular to have some regard for the railways' side of the problem. With their experience with organized labor in the construction industries, contractors have some realization of the difficulty of the railways' position.

In the building industries the labor unions in one city after another are yielding to lower wage scales. A few cities, notably Chicago, are still isolated examples of the failure of the various units of the construction industry to come to a realization of the trend of the times. In Chicago the controversy over the acceptance of the Landis award constantly grows more bitter. The union bricklayers, electricians and ornamental iron workers have accepted the reduced wages and new working agreements and are employed with non-union tradesmen under open-shop conditions. The other building trades, led by the carpenters, have elected William Curran, of the plumbers' union, as president of the Building Trades Council. This man represents the radical and worst elements in the already notorious Chicago building trades controversies. He succeeds Thomas S. Kearney. It is said that real management of the Building Trades Council is now in the hands of "Big Tim" Murphy, recently convicted before Judge Landis of conspiracy to rob the United States mails.

Meantime, the Citizens' Committee is active in attempting to force the open-shop throughout the city in defiance of strikes called by the radical union elements. The Citizens' Committee, comprised of men whose fortunes are tied up in Chicago in-

dustries, or whose fortunes will be built upon the growth of Chicago, clearly sees the effect of the present attitude of labor, and the unclean condition of the construction industry generally, upon the future of the city. Indeed, proof is plentiful that industries not only are not coming to Chicago, but are actually being moved elsewhere, because conditions make it impossible for them to build here, as compared with other cities.

What holds for Chicago holds equally for Plunktown, N. D., or any other place, in some degree. The local building material dealer, the local labor union, or the local contractor who demands excessive returns, in times when the producers of such essentials as food have to be satisfied with abnormally low returns, is inviting ultimate disaster not alone to himself but to his community.

New Kind of Building Promotion Organization

PORTLAND, Ore., business men have started the Building and Construction Association of Oregon. Any person, firm or corporation interested directly or indirectly in building and construction may become a member of the organization.

To Encourage Craftsmen

Primarily the object of the association is educational. It plans to provide educational facilities for members of the organization, to organize and conduct a guild of building handicrafts and other organizations which will tend to elevate the standard of craftsmanship and to obtain recognition of the skilled mechanic. Classes will be organized with university extension lectures and other competent instructors in charge for craftsmen so they may become more efficient in their work.

To Make Surveys

The organization also will engage in research work and make surveys pertaining to building and construction. Results of these will be published and distributed to members of the organization. In this connection it is planned to conduct surveys into the possibilities of developing Oregon's raw products which can be utilized for building material, and by this method encourage new industries to be established in the state.

The organization also will have its social side, as frequent meetings will be held at which all members are welcome. At these meetings a craftsman will have equal opportunity with the architect or the building contractor to express his views on any subject under consideration.

Labor Issues Taboo

One thing with which the organization will have nothing to do is the closed or the open shop issues. It is also written in the constitution that the association shall never pass resolutions or orders of a mandatory character carrying conditions pertaining to inter-relationships of organization or units

of those engaged in building and construction.

The association will have as its governing body a board of 20 directors, 14 members of which shall be chosen from 14 classifications and six at large. The 14 classifications which shall have representatives on the board are architects, engineers, general contractors, electrical contractors, painting contractors, plumbing and heating contractors, roofing and sheet metal contractors, plaster contractors, mason contractors, manufacturers, distributors, mechanics or craftsmen, building, investment, and the general public.

Window Glass Prices Cut

COMPETITION of foreign-made window glass in Eastern markets is beginning to be seriously felt, according to the Dow Service Building Reports. Owing to the huge volume of small house construction during the last year, and the narrow margins that building investors have been forced to operate on, some of the better grade of speculatively built homes have been forced to buy the foreign product and the reaction has become so great upon American producers that it has been decided to meet the lower price and at the same time give the consumer the quality he sought to put into his building.

General price cuts were announced during the week closing January 21 by the American Window Glass Co., manufacturing practically one-third of the country's output of window glass. The reduction aggregated 22 per cent and doubtless will remain operative until a protective tariff schedule can be worked out to give adequate protection to American glass industries.

The price reduction on very small sizes of single strength window glass, averaging 25 united inches, upon which competition was keenest, was approximately 31 per cent. On sizes a little larger on which competition was not quite so keen, the reduction worked out to about 23½ per cent. On the larger sizes where competition up to the present time has not been so great a factor, the cut was made at 20 per cent. The average reduction was about 22 per cent.

These price reductions resulted in an immediate change in discounts on jobbers' lists here when the new discounts on single strength A quality window glass became 84 to 87 per cent, depending upon sizes, and on single strength B quality, 85 to 88 per cent. The new discounts off jobbers' lists on double strength A quality window glass is 85 per cent and on B quality 87 per cent.

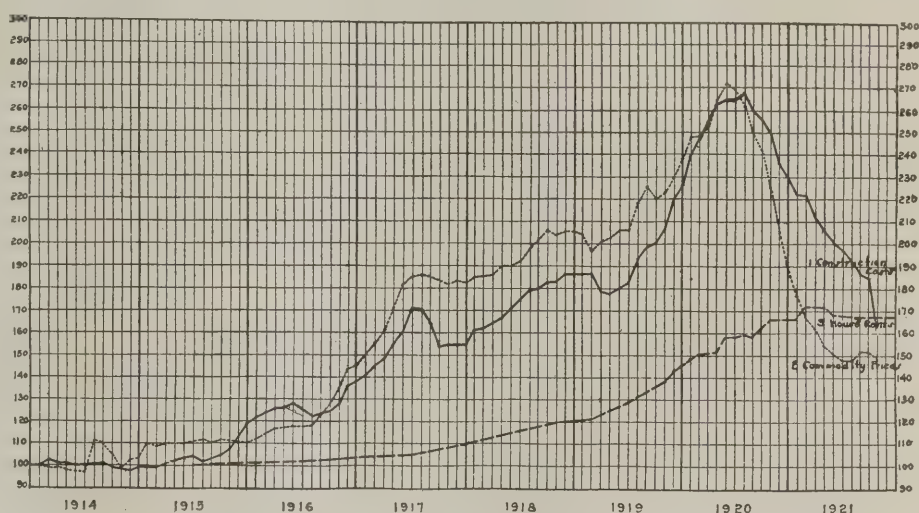
The reduction does not affect plate glass.

Manufacturers having taken this step are not thought likely to return to the former price level so that consumers of window glass may consider the cut permanent, at least as far as the first half of the year is concerned.

Relation Between Rents and Building Costs

IN a recent public utterance Mr. Morton C. Tuttle, general manager of the Aberthaw Construction Co., Boston, Mass., says that it is hardly probable that the next two years will show as favorable building costs as can be obtained in the next few months. This opinion is based on a preceding analysis of the relation between rents and building costs. No one, says Mr. Tuttle, has failed to observe the large number of building operations now going on. There are among these operations not only the public and

It is perilous at any time to reason that because a commodity is theoretically cheap it will be bought. The past two years have proven that the buyer has a great deal to say about costs, at least over a short period. It is obvious that building costs, like all other costs, have taken a tremendous drop from their peak, that they have reached at the present time about the general level of commodity prices, that in order to further reduce building costs it will either be necessary for the men to accept longer hours



Comparative Trend of Construction Costs, Commodity Prices and House Rents

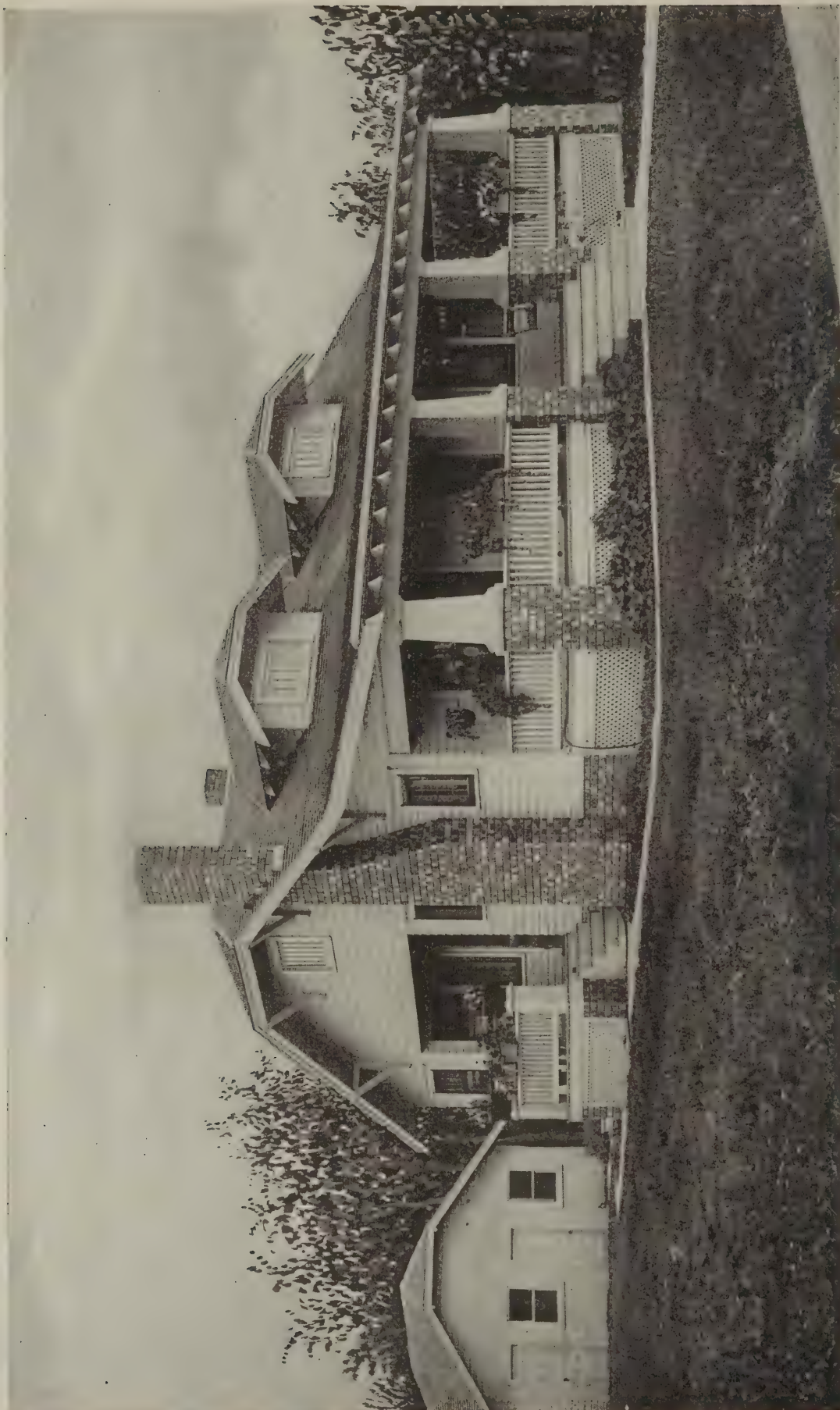
1. Construction Costs—Composite of a weighted average of the wholesale prices of 15 principal building materials and a weighted average of wage rates in the principal building trades. The prices used are those in effect on the first day of each month. (Solid line.)
2. Commodity Prices—Based on U. S. Department of Labor's compilation of wholesale prices of all commodities. The prices used are those in effect on the first day of each month. (Dotted line.)
3. House Rents—Based on statistics of approximate changes in rents of houses of wage earners' families in cities throughout the country, as compiled by the National Industrial Conference Board. Figures used for rents in effect on the 15th day of each month. (Broken line.)

semi-public buildings, such as churches, school houses and municipal buildings of one sort and another, but more conspicuous than all of them is the large number of housing operations. The reason for this becomes clear when it is understood that in August of last year rents had risen and the cost of buildings had dropped until the relation of rents and building costs was re-established on the 1915 ratio. Assuming that there was a proper relationship between rents and building costs in 1915, then the same condition had been re-established in August of this year, and there should be a fair return for investment in real estate. The re-establishment of this relation has apparently resulted in the large amount of home building for ownership and for rent, and it is reasonable to expect an active resumption of speculative building if rents remain at their present levels and building costs stay where they now are.

or else necessary for them to take a sharp decline in their living standards. Dependent upon one's belief as to whether either of these courses is likely, will be that individual's conclusion as to whether building costs are going much lower than at present. It does not appear that building labor is profiteering so far as rate of wages is concerned.

It seems reasonable to predict that any drop in wages and prices of material sufficient to stimulate building activity will be promptly followed by a loss in efficiency of labor and a rise in the prices of material that will make today's costs look low.

The accompanying chart, reproduced from *The Constructor*, the official organ of the Associated General Contractors of America, showing the relation of rent to construction and living costs, forms an interesting corollary to Mr. Tuttle's analysis.



A Popular Kansas Bungalow

L. T. GARLINGHOUSE, DESIGNER AND BUILDER. SEE WORKING DRAWINGS AND DETAILS IN DETACHABLE INSERT IN THIS ISSUE

Popular Type of Kansas Bungalow

Developed by L. F. Garlinghouse, Contractor and Builder of Topeka, Who Combines Local Building Business With National Plan and Specification Service

HOUSE PLANS usually have two sources of origin—one source represents what the education, experience and artistic instincts of an architect lead him to believe is what people of taste should have; and the other source is what practical builders of houses in wholesale quantities find that people actually like well enough to buy. Sometimes these two kinds of houses are far apart, measured by common standards, but the liberal minded architect, builder or contractor who builds for profit—and most of them aim to—can see where each has its

omy in cost of construction are undoubtedly important factors. To meet present demands in Topeka and other places visited by the editor recently in the Middle West there must be a large living room and a breakfast nook in the kitchen.

The brick fireplace with built-in bookcases the full width of the room has of course always been an attractive feature of a living room. The arrangement of the dining room with French doors opening to the porch, which may be used as an outdoor dining or supper room in summer is another popular feature.

It will be noted that the two sleeping rooms and bathroom are entirely cut off from the rest of the house except for the one entrance from the dining room into the connecting hall. This seems to be a popular arrangement. There is an unusual amount of closet room for so small a bungalow.

However, the most distinguishing feature of this type of bungalow—and it would appear from general observation that practically every new bungalow in Topeka has this feature—is the combination sleeping porch, sun parlor and playroom over the rear end of the house. The advantages of this light, airy and second-story addition as a sleeping and lounging room need hardly be enlarged upon, but possibly its convenience as a playroom for children has not been emphasized. Being over the kitchen, and reached by a stairway out of the kitchen, it gives the mother a chance to keep general supervision of the children yet not have them underfoot.

The interiors of these bungalows are the result of many years' study on the part of Miss Iva G. Lieurance, who does all the designing. They are specially intended to fulfill the needs and desires of the housewife, as interpreted by a woman with sympathy enough to understand them—if you will.

Mr. Garlinghouse is a practical builder and real estate operator. He does all his building work with his own organization, does his own financing and has his own planing mill. Except for doors, windows and flooring, he does all his own mill work, buying oak, walnut and other hardwoods in the rough.

His practical experience has taught him many economies in construction work which make his houses exceptional values. A single example might be cited. Oak flooring, or for that matter any hardwood flooring, is seldom ordered in less than 8 ft. lengths and generally in even foot lengths. The result is that mills have a large waste in

short pieces from 1 to 2 ft. long. Mr. Garlinghouse has discovered that these short pieces not only make as serviceable a floor as the full lengths, but to many tastes a much more attractive one owing to the "parquet" effect obtained.

The success of his houses in Topeka and surrounding towns has led Mr. Garlinghouse to utilize his practical experience in the building game in another and unusual way. He is now marketing complete working drawings, specifications and bill of material of any and all of his houses, which



L. F. Garlinghouse, a Topeka builder with a growing national reputation



Iva G. Lieurance, designer of the Garlinghouse bungalows and houses

proper place in the building industry, and that the one is no less important than the other.

We have shown many plans of individual houses designed by architects and builders, but the plan shown herewith is in the nature of a *general type of house*, which the actual selling experience of L. F. Garlinghouse, builder, of Topeka, Kan., shows is very popular in that section of the country at the present time.

Reasons for Popularity

There is no accounting for individual tastes so it is necessary to generalize and do a little guessing in drawing conclusions as to why one type of house is popular in a particular locality, while another may not be. In this case economy of space and econ-

now number several hundred. This service he sells for from \$5 to \$15 and it includes, as can be readily seen, not estimated quantities, but a bill of material actually incorporated in a house that he has designed and built with his own organization. A sample of the plans and service in which he deals is the house detailed in the accompanying insert and the specifications and bill of material which follow:

SPECIFICATIONS

DRAWINGS—The drawings are intended to delineate the different parts of the building and are to be used as an illustration of and in connection with the specifications. Anything shown on the drawings or mentioned in the specifications is to be done as though called for by both unless especially excepted in the contract.

SPECIFICATIONS—The specifications are intended to name and describe the various kinds and

quality of material to be used, and to describe those parts of the building which would not be clearly understood by the drawings alone. A copy of the specifications and drawings should be kept at the building at all times for the benefit of the different workmen and superintendent.

PRECEDENCE—Should there appear, at any time, to be a discrepancy between the drawings and the figured dimensions, the latter shall in each case be taken. Any omission from any drawing or the specifications shall not be held to govern what is shown elsewhere.

DIFFERENT BRANCHES—Each contractor, or sub-contractor, should read the specifications for all the work to be done on the building in order to be informed as to the work to be done by other contractors in connection with his own and vice versa.

ALTERATIONS—Should the owner, at any time during the progress of the work, require any alterations of, deviation from, addition to or omission from it as contracted, he shall have the right and power to do so and the same shall in no way injuriously affect the contract, but the difference shall be added to or deducted from the contract, as the case may be, by a fair and reasonable valuation and the time allowance shall be adjusted in conformity therewith. The additional cost or deduction, and the time shall be agreed upon in writing and become a part of the contract.

DIMENSIONS—The drawings and the sizes given in the specifications are intended to show the exact sizes and dimensions, required in the construction of the work, or in approved cases, their nearest stock sizes.

POWER TO DISCHARGE—The owner, or his representative, shall have the authority to cause any workman, whom he finds incompetent or neglectful, to leave the premises at once and to order the work wholly or partially stopped until the objectionable man or any unsuitable material shall have been removed from the premises.

QUALITY—All material, labor and mechanism shall be according to the true intent of the drawings and specifications and unless specially stated otherwise each item shall be first class in all respects.

DAMAGE TO WORK—Each contractor shall be responsible for any damage to the building or to the other contractors caused by any error in laying out his work, defects in its execution or any defacement of work or by any nuisance committed in or about the building or by any avoidable delays, caused by him or his employees. The contractor shall give the work careful attention at all times and provide a competent foreman to whom instructions can be given by the owner or his representative. No work passed temporarily through concealment or oversight shall relieve the contractor from the responsibility of correcting errors in workmanship or material.

SEPARATE CONTRACTS—Should the work be sublet or in separate contracts, the contract for each branch shall be held to include all minor details necessary to complete that portion of the work and leave it in first-class condition, unless the same be called for especially under some other branch of the work.

EXTRAS—No work shall be considered an extra unless a separate estimate for it shall have been approved and signed.

POSSESSION OF PREMISES—Any contractor shall only be in possession of the premises for the purpose of performing his portion of the work and shall not interfere in any manner with the occupation of the premises by the owner or other contractors and their workmen.

REMOVING DEBRIS—Contractors for each portion must clean up and cart away their own debris, filth and waste, which they put on the premises, in such a manner as not to interfere with other work or occupation of the building. Clean out the cellar and trash from under the floors before same are laid.

HEATING—The contractor shall provide fuel and other means for heating the building if necessary to dry the plaster and warm the building,

while carrying on his work. The plasterer shall provide temporary doors and muslin at the windows, if the season demands, to keep out the wind, storm and cold while the plastering is being done and dried, as there shall be no glass in windows until after the plastering is done.

PERMITS—All work is to be done according to the city ordinance and the contractor shall obtain the necessary permits and pay fees for same to the proper authorities.

PROPOSALS—Owner may accept or reject any or all bids.

EXCAVATION

EXCAVATE for all foundations, footings, chimney bases and piers to the depth shown on the drawings. Dig all walls and basement floor smooth and level. Excavation for outside walls and piers to be as shown on drawings. All earth removed from excavation is to be graded on the lot or removed as may be directed by the owner or his representative. Back fill around all exterior walls, tamping well at every foot of fill.

CONCRETE AND MASONRY

MATERIALS—All concrete shall be composed of one part portland cement and three parts sharp sand and five parts gravel. All cement shall be of an approved brand. Foundation mortar to be of one part cement and three parts clean, sharp sand.

FOOTING AND WALLS—Build the footings around exterior walls to the size shown on drawings. The top of the footings to be 4" below the level of the basement floor. The pier foundations to be as shown on drawings. Foundation walls to be 16" thick and laid up of rock with brick selected by owner on outside walls above grade.

CEMENT FLOORS—Level and tamp the earth in the basement floor. Lay 4" concrete floor as above specified. While damp but before concrete has fully set, finish with dressing composed of one part portland cement and two parts clean, sharp sand, troweled to a smooth and even surface. Basement floor to be pitched to bell trap drain as shown on drawings.

BRICKWORK

ALL BRICKWORK as shown on drawings to be built to dimensions shown of good hard burned brick laid up in cement mortar composed of one part cement and three parts clean, sharp sand.

FIREPLACE, PIERS AND FLUE: Build up fireplace and flues as shown on plans and lay up as above specified. Provide and put in place timbers for furnace, boiler heater and kitchen range. Build pit for fireplace hearth. Fireplace to be faced with pressed brick selected by owner. Line fireplace with firebrick laid up in fireclay. Provide one cast iron damper and ash dump. Hearth to be laid with brick or colored cement to cost 60 cents per square foot. Basement and terrace piers to be 13" brick and front porch piers to be 2'0"x2'0" brick with base as shown on plan. Fireplace flue to be built of brick. All outside brick work to be the same as foundation.

LATH AND PLASTER

LATHING—All stud walls and ceilings throughout shall be lathed with No. 1 lath free from sap, knots or bark and nailed at every stud. All lath to be put on horizontally and joints broken every sixth lath. Around all openings and whenever necessary run $\frac{5}{8}$ " grounds, securely nailed and run straight and plumb.

PLASTER—All lath as above specified shall receive three coats of Pioneer or other fibre sanded plaster. The first coat to be applied with sufficient force to insure a good key and the last coat to be a cement finish with enough lime to temper, and troweled to a smooth surface.

CARPENTER WORK

MATERIALS—All framing lumber shall be of fir or yellow pine, free from defects impairing strength or durability, as well seasoned as can be obtained and of sizes shown on plan.

FRAMING—Girders to be 8"x8". First floor and porch floor joist to be 2"x8" set 16" o.c. with two rows of bridging across each span. Bridging to be 1"x3" cut on level and nailed at each end

with two ten-penny nails. Attic and all other joists to be 2"x6" set 16" o.c. All studs to be 2"x4"x8" set 16" o.c., double around all openings and corners built up solid. All openings over 3'6" in width shall be well trussed. Roof rafters to be 2"x4" set 16" o.c. braced with a row of 2"x4" half way between the foot and top of each rafter, ends of rafters where exposed to be surfaced.

SHIPLAP—Lay 1"x8" shiplap diagonally over entire floors, breaking joints over bearings only two nails at each bearing. Cover attic joist with 1"x8" shiplap where space between joist and rafters is 3' or more. Exterior walls to be covered with 1"x8" shiplap laid diagonally. Cover all roofs except where cornice is exposed with 1"x6" sheathing spaced 2", and where cornice is exposed to be covered with $\frac{7}{8}$ " car siding, ceiling or beaded partition lumber with surface side down, and take care that no nails show on under side.

BUILDING PAPER—Cover entire floors and all exterior walls with building paper.

SHINGLES—The entire roof to be covered with 5-2 clear shingles laid $4\frac{1}{2}$ " to weather.

SIDING—All exterior walls to be covered with fir, spruce or redwood siding, 4", 6" or 8", as owner may choose.

PORCHES—The ceiling of porches to be $\frac{5}{8}$ " beaded ceiling without exposed joints. All porches to be floored with $\frac{7}{8}$ "x4" V. G. fir flooring with tongue and groove well leaded as being laid.

EXTERIOR TRIM—All exterior trim to be fir or cypress finish, kiln dry and free from all imperfections and left smooth and clean.

WINDOW AND DOOR FRAMES—All window frames to have $\frac{7}{8}$ " yellow pine stile with $\frac{7}{8}$ " cypress sill and 2" sub-sill. Outside case to be a full inch thick by 4" in width. Head case to be $5\frac{1}{2}$ " wide with 2" water table. All window frames to be pulley style with parting bead and blind stop, except casement windows. Outside door frames to be 1 $\frac{1}{2}$ " stock rabbeted to fit the doors, and with oak sill. Case and head case for doors to be the same as windows.

SASH—All windows to have 1 $\frac{3}{8}$ " sash with check rails. Sash cut as shown on elevations.

DOORS—Front door to be 1 $\frac{3}{4}$ " thick of design shown on front elevation with bevel plate glass. French doors to be 1 $\frac{3}{4}$ " thick of design shown on elevation with bevel plate glass. Outside entry door, kitchen door to entry and grade door to be 1 $\frac{3}{8}$ " thick, glazed. All interior doors to be No. 1 selected 1 $\frac{3}{8}$ " thick, two panel and sizes shown on plans.

INTERIOR FINISH—Living room, dining room and breakfast room to be finished in best grade quartered red oak with oak doors. All other rooms to be finished in best grade gum finish with birch doors. All floors to be clear plain sawed oak and to be surfaced and sandpapered to a smooth finish, and not to be laid until all other interior carpenter work is completed. All shall be carefully run and put up free from machine and tool marks and well sandpapered.

TRIM—All interior window and door openings to be finished with $\frac{1}{2}$ "x4" casing and head casings with $\frac{3}{8}$ "x1 $\frac{1}{4}$ " back band rabbeted to fit casings with $\frac{1}{4}$ " lip. Window stool to be 1 $\frac{1}{8}$ "x3 $\frac{1}{2}$ ". Put $\frac{5}{8}$ "x6" base around all rooms with $\frac{3}{4}$ "x1" shoe at floor. Living room, dining room and breakfast room to have 2 $\frac{1}{2}$ " base mould; 1"x2" picture mould to be placed in the angle of all rooms.

CLOSETS—Each closet to have two 18" shelves and 1"x4" hook strip around all sides except linen closet, which shall have four shelves.

THRESHOLDS—Place 3 $\frac{1}{2}$ " oak thresholds with beveled edges at all outside doors.

DOOR STEPS—Place rubber tipped door stops at all doors.

GLASS—All glass 30" and over to be double strength, free from waves and other imperfections, cut to size, tacked, puttied and back puttied. Medicine case to have bevel plate mirror.

SCREENS—Front door, French doors, outside entry door and grade door to have screen doors with cypress frames and black wire hung with spring hinges with suitable screen door latch. All windows except stationary sash to have full

screens with cypress frames and black wire hung on Gossett hangers (or a make equally as good) and fastened on inside with hook and eye at bottom.

SHEET METAL WORK—Flash over all exterior openings. Flash and counter flash around all chimneys and pipes where they come through roof. Counter flashing shall be let into brick joints wedged and cemented, cutting the lower edge straight to roof line. Lay all valley gutters of 30 lb. old style carrying tin 10" on each side under shingles. Put up 3" galvanized iron downspouts as shown on plans securely fastened to siding and gutters. Form smooth curves under eaves. Run all downspouts to sewer. All sheet metal work to be painted two coats of metal paint. All tin to be redipped of an approved brand.

PAINTING

EXTERIOR—All exterior trim and siding to have priming coat of thin lead and oil. After all nail holes and other imperfections have been put up give two coats of lead and oil, color selected by owner. Roof shingles to have one coat of dark green shingle stain.

INTERIOR—All interior oak woodwork to have one coat of stain color selected by owner, well rubbed off, one coat of shellac and two coats of flat varnish. Sandpaper lightly between coats. Bathroom finish to have four coats of flat white and one coat of enamel. All other finish to have one coat of natural color filler and two coats of flat varnish. All floors to be well surfaced and to have one coat of past filler and two coats of standard floor varnish.

ELECTRICAL WORK

WIRING—Furnish and run to each outlet marked on plans approved heavy insulated rubber core wire, heavy enough to supply the outlets with six 16-candle-power lamps, with number marked without rise in temperature when all lights are burning, of more than 60 degrees. All wiring must be in accordance with the rules of the National Board of Fire Underwriters and city ordinances. Conceal all wires under floors and in partitions, using porcelain tubing and knobs where wires run through or are secured to timbers, where necessary, as additional precaution to prevent wire from touching woodwork, and at outlets use circular loom covering. Place strong blocking for support of all fixtures. Wire circuits to accord with fixtures as marked on plans. All switches to be flush. Place at entrance of wires to building a heavy knife cutout and arrange wires ready for meter connection. Use fuses of an approved quality.

BELL WIRING—Wire house for door bell with push plate at front door to match hardware to ring a N. P. bell in kitchen, wires to be connected to light wires with transformer to reduce current all furnished complete and in perfect working order.

ELECTRICAL FIXTURES—Furnish and hang all fixtures, allowing \$75 for cost of fixtures, including hanging, to be selected by owner.

DECORATING

INTERIOR walls and ceilings to be decorated with such decorations as owner may select at a cost not to exceed \$75, including labor.

PLUMBING

THE PLUMBER shall furnish all material and labor necessary for the completion, in a first-class manner and in accordance with the city ordinance, the following system, the carpenter supervising all cutting of woodwork required.

WATER SUPPLY—The water service to consist of ¾" galvanized iron pipe laid to and connected to city main with all necessary stops, boxes, permits and meter. Connect all fixtures with hot and cold water with the exception of the closet which will have cold water only. Furnish and place hot and cold water bibs in basement and N. P. sill cock on sill of house.

CAST IRON PIPE—All cast iron pipes and fixtures for soil and waste and vent lines to be extra heavy, sound, smooth on inside and free

from cracks and sand holes and of uniform thickness, coated inside and out with asphalt. All branch connections made with Y'S and bends with eighth bends or obtuse angles, unless otherwise absolutely necessary.

BELL TRAP—Put cellar drain properly trapped in basement floor.

ARRANGEMENT OF SYSTEM—Run the 4" soil pipe up through the building, taking off all Y branches for drains and fixtures. Run through roof extending 1' above. Make the joints between pipe and roof tight with six pound sheet lead flashing, turn into pipe hub and dress down smoothly, calking the joint same as other joints in cast iron pipe. Run branch vent lines from all fixtures in cast iron or lead where not exposed, up at not less than 45 degrees angle to main vent line. Similarly, run all branch soils and wastes except when they are only required to have sufficient pitch to drain freely with no sags or pockets. All exposed wastes and vents above basement shall be N. P. brass and the vents taken off as near the crown of the trap as possible.

TESTS—Test in accordance with the ordinance governing plumbing. Should any leaks or defects show in the joints or pipes they shall be repaired and any length of pipe showing cracks or sand holes shall be removed and a new length or fitting be put in without the use of very short lengths of pipe collars or double hubs.

TILE HOUSE SEWER—The plumber shall do all necessary excavating, furnish and lay a 6" salt glazed vitrified tile drain from the cast iron drain to the sewer, making all connections. This sewer shall be run with a uniform grade of not less than ¼" to 1' on the bottom of the trench, the trench being carefully dug so that the tile will have even, straight and solid bed to avoid sags. Make all joints in the tile by filling the joints with portland cement mortar and drawing a swab full size of the pipe through over the joint after the cement has been put in, leaving no cement on the inside of the joints. After the cement is set and the lines inspected, pack the earth well on each side of the pipe and fill and tamp the trench. Connect all downspouts to sewer.

FIXTURES—All fixtures shall be approved by owner.

SINK—Provide and set in kitchen a 20"x30" roll rim one-piece sink with back with N. P. fittings complete.

BATHTUB—Place in bathroom a 5' roll rim tub with 4½" fuller cock N. P. and N. P. overflow.

CLOSET—Place in bathroom a low down porcelain tank wash down closet with N. P. valves and fittings and mahogany seat.

LAVATORY—Place in bathroom a white enamel lavatory 18"x21" with 4" apron N. P. wastes and fittings complete.

BASEMENT—One 30-gallon galvanized range boiler on stand and fit with gas heater properly connected with vent to flue.

GAS SERVICE—Run gas pipe from the side of the cellar nearest the main line to fireplace, boiler heater and kitchen.

HEATING

STACKS AND REGISTERS—Run two heat stacks connected to furnace to living room and one to each of the other rooms, including sleeping porch and dressing room. Locate a register to match hardware at each opening.

FURNACE—Install a warm-air furnace in basement, which shall be guaranteed by the heating company to heat the house in a first-class manner. Sufficiently large to heat the house.

HARDWARE

THE CARPENTER shall furnish and put on at the proper time and in a skillful manner all the necessary hardware and fittings of the kind and quality herein called for to make the job complete. Put all on with screws to match, after the painter has finished his work. The finish hardware included in this contract up to the sum of \$75 shall be chosen by owner. Hang the double acting door between kitchen and dining room with approved double acting floor spring hinge. All drawers and

bins shall have plain pulls and cupboards, elbow catches and turns.

CLOTHES HOOKS—Place in all hanging closets strong double copper hooks 10" apart, and double ceiling hooks on under side of shelves in each closet.

BILL OF MATERIALS AND QUANTITIES

- 16 pcs. 2"x8"x16'—Spiked together with borken joints for girders (8"x8").
- 66 pcs. 2"x8"x14'—First floor joist and joist headers.
- 24 pcs. 2"x8"x12'—First floor joist and joist headers.
- 18 pcs. 2"x8"x12'—Front porch joist.
- 90 pcs. 2"x6"x14'—Attic and sleeping porch joist.
- 600 lin. ft. 1"x3"—First and second floor bridging.
- 8 pcs. 2"x10"x14'—Basement stair horses and treads.
- 392 pcs. 2"x4"x8'—Outside and partition and sleeping porch studding.
- 48 pcs. 2"x4"x16'—Studding plates, two above and one below.
- 260 pcs. 2"x4"x16'—Gable and dormer studding, rafters and rafter bracing.
- 162 lin. ft. 1"x6" cypress or fir 18' lengths—Outside rafters.
- 200 sq. ft. No. 2 matched flooring—Coal bin.
- 4500 sq. ft. 8" or 10" shiplap—Boxing, dead floor and attic floor.
- 1200 sq. ft. 6" sheathing spaced 2".
- 1000 sq. ft. ¾" car siding or beaded partition lumber—Sheathing where cornice is exposed.
- 26 M. 5—2 clear shingles—Roof.
- 9 Rolls building paper.
- 2050 sq. ft. 4" fir or cypress siding—Exterior.
- 210 Metal corners—Used instead of corner boards.
- 404 sq. ft. 4" V. G. fir flooring 9' lengths—Front porch floor.
- 404 sq. ft. ¾" beaded ceiling 9' lengths—Front porch ceiling.
- 4 pcs. 1"x8"x8'—Front porch stair risers.
- 8 pcs. 1"x8"x4'—Back and side porch stair risers.
- 12 pcs. 1¼"x5"x8'—Front porch stair treads.
- 24 pcs. 1¼"x5"x4'—Back and side porch stair treads.
- 616 lin. ft. angle mould. (Bed mould).
- 170 lin. ft. 2½" water table.
- 170 lin. ft. 1"x8" cypress—Outside base.
- 6 pcs. 2"x8"x12'—Front porch cord.
- 4 pcs. 2"x8"x9'—Front porch cord.
- 144 lin. ft. 1"x8"—cypress—Trim around front porch and porch cord.
- 3 pcs. 2"x6"x12' cypress—Upper front and side porch rail.
- 2 pcs. 2"x6"x8' cypress—Upper front and side porch rail.
- 3 pcs. 2"x4"x12' cypress—Lower front and side porch rail.
- 2 pcs. 2"x4"x8' cypress—Lower front and side porch rail.
- 126 pcs. 1¼"x2½"x2' cypress—Front and side porch balusters.
- 180 lin. ft. 1"x4" cypress—Lattice frames.
- 600 lin. ft.—Lattice.
- 1 door frame 3'0"x7'0" rabbetted 1¼"—Front door.
- 2 door frames 2'8"x6'8" rabbetted 1½"—Grade and entry doors.
- 1 frame—3 gang with 8" mullion—center—4'0"x7'0" for French doors, each side 28"x46"—Opening size—for casements—tops even.
- 5 window frames—twin—8" mullion—30"x26"—2 sash—glass size.
- 2 window frames—casements—opening 28"x30".
- 3 window frames—single—30"x14"—2 sash—glass size.
- 2 window frames—single—30"x18"—2 sash—glass size.

- 1 window frame—twin—8" mullion—30"x14"
2 sash—glass size.
- 2 window frames—twin—8" mullion—24"x
26"—2 sash—glass size.
- 1 window frame—triple—8" mullion—24"x
26"—2 sash—glass size.
- 1 window frame—5 gang—8" mullion—24"x
26"—2 sash—glass size.
- 4 attic sash frames—opening 36"x20".
- 5 cellar sash frames—opening 48"x18".
- 10 wds.—30"x26"—2 lt.—glass size—top div. 4
lts. wide.
- 2 wds.—30"x18"—2 lt.—glass size—top. div.
4 lts. wide.
- 5 wds.—30"x14"—2 lt.—glass size—top div.
4 lts. wide.
- 12 wds.—24"x26"—2 lt.—glass size—top div.
3 lts. wide.
- 4 sash—14"x46"—sash size—div. 2 lts. wide,
4 lts. high.
- 4 sash—14"x30"—sash size—div. 2 lts wide,
4 lts. high.
- 4 attic sash—36"x20"—sash size—div. 5 lts.
wide.
- 5 cellar sash—48"x18"—sash size—div. 4 lts.
wide.
- 11 1/4 M.—4' lath.
- 75 sacks inside plaster.
- 7 sacks finish plaster or plaster of paris.
- 4 bbls. lime.
- 2100 sq. ft. clear plain sawed oak flooring. In
laying, best should be selected for the living
room and dining room.
- 1 oak threshold 3'0"—Front door.
- 1 oak threshold 4'0"—French doors.
- 1 oak threshold 2'8"—Outside entry door.
- 1 oak threshold 2'6"—Kitchen door to base-
ment.
- 140 lin. ft. 5/8"x6" oak base.
- 140 lin. ft. 2 1/2" oak base mould.
- 150 lin. ft. oak base shoe—Extra shoe is for
around bookcases, etc.
- 15 rubber tipped door stops.
- 158 lin. ft. oak picture mould.
- 1 pc. oak 1/2"x4"x7"x6"—Head case for liv-
ing room windows.
- 2 pcs. oak 1/2"x4"x4"—Head case for living
room windows.
- 1 pc. oak 1/2"x4"x11'6"—Head case for din-
ing room window and French doors.
- 3 pcs. oak 1/2"x4"x4"—Head case for break-
fast room windows.
- 1 pc. oak 1/2"x4"x4"—Head case for front
door.
- 2 pcs. oak 1/2"x4"x9"—Head case for open-
ing between living room and dining room.
- 5 pcs. oak 1/2"x4"x3'6"—Head case for doors
in dining room and breakfast room.
- 1 pc. oak 1 1/8"x3 1/2"x7'6"—Window stool,
living room windows.
- 2 pcs. oak 1 1/8"x3 1/2"x4"—Window stool, liv-
ing room windows.
- 2 pcs. oak 1 1/8"x3 1/2"x4"—Window stool, din-
ing room windows.
- 3 pcs. oak 1 1/8"x3 1/2"x4"—Window stool,
breakfast room windows.
- 1 pc. oak 3/4"x4"x7'6"—Apron, living room
windows.
- 2 pcs. oak 3/4"x4"x4"—Apron, living room
windows.
- 2 pcs. oak 3/4"x4"x4"—Apron, dining room
windows.
- 3 pcs. oak 1 1/8"x3 1/2"x4"—Apron, breakfast
room windows.
- 90 lin. ft. 1/2"x1 1/8" oak—Window stop.
- 260 lin. ft. 7/8"x1 1/4" oak, rabbeted to fit cas-
ing with 1/4" lip—Backband on window and
door casings.
- 1 pc. oak 1/2"x8"x5"—Mullion case.
- 2 pcs. oak 1/2"x8"x7'1"—Mullion case.
- 2 pcs. oak 1/2"x4"x5'6"—Living room win-
dow case.
- 4 pcs. oak 1/2"x4"x4"—Living room window
case.
- 2 pcs. oak 1/2"x4"x4'6"—Dining room win-
dow case.
- 6 pcs. oak 1/2"x4"x3'6"—Breakfast room win-
dow case.
- 2 pcs. oak 1/2"x4"x7'6"—Front door case.
- 4 pcs. oak 1/2"x4"x7'6"—Case for opening
between living room and dining room.
- 6 pcs. oak 1/2"x4"x7"—Dining room door
case.
- 4 pcs. oak 1/2"x4"x7"—Breakfast room door
case.
- 1 set plain jambs, oak—Opening between liv-
ing room and dining room—8'0"x7'0".
- 1 set plain jambs, oak—Openings between
dining room and breakfast room—2'6"x
6'6".
- 2 sets plain jambs, oak—For double action
doors—2'6"x6'6".
- 1 oak door 3'0"x7'0"x1 1/4"—Front door with
bevel plate glass designed, as shown on
front elevation.
- 2 oak doors 2'0"x7'0"x1 1/4"—French doors
with bevel plate glass, designed as shown
on left elevation.
- 3 oak doors 2'6"x6'6"x1 1/8"—2 panel.
- 2 fir doors 2'8"x6'8"x1 1/8"—Top panel glass
—Outside entry door and grade door.
- 1 fir door 2'6"x6'6"x1 1/8"—Top panel glass—
Kitchen door to entry.
- 7 birch doors 2'6"x6'6"x1 1/8"—2 panel.
- 4 birch doors 2'0"x6'6"x1 1/8"—2 panel.
- 2 pcs. gum finish 1"x12"x14"—Stair skirting.
- 14 pcs. gum finish 1"x8"x3"—Stair risers.
- 13 pcs. oak 1"x9"x3"—Stair treads.
- 390 lin. ft. 8" gum finish base.
- 390 lin. ft. gum finish base shoe.
- 190 lin. ft. gum finish picture mould.
- 710 lin. ft. 7/8"x1 1/4" gum finish, rabbeted to
fit casing with 1/4" lip—Back band on win-
dow and door casings.
- 310 lin. ft. 1/2"x1 1/8" gum finish—Window stop.
- 5 pcs. gum finish 1 1/8"x3 1/2"x7'6"—Window
stool, bed room and kitchen windows.
- 2 pcs. gum finish 1 1/8"x3 1/2"x4"—Window
stool, bath room and entry windows.
- 1 pc. gum finish 1 1/8"x3 1/2"x15'6"—Window
stool, sleeping porch and dressing room
windows.
- 1 pc. gum finish 1 1/8"x3 1/2"x9"—Window stool,
sleeping porch and dressing room windows.
- 2 pcs. gum finish 1 1/8"x3 1/2"x6'6"—Window
stool, sleeping porch and dressing room
windows.
- 5 pcs. gum finish 1"x4"x7'6"—Apron, bed-
room and kitchen windows.
- 2 pcs. gum finish 1"x4"x4"—Apron, bath
room and entry windows.
- 1 pc. gum finish 1"x4"x15'6"—Apron, sleep-
ing porch and dressing room windows.
- 1 pc. gum finish 1"x4"x9"—Apron, sleeping
porch and dressing room windows.
- 2 pcs. gum finish 1"x4"x6'6"—Apron, sleep-
ing porch and dressing room windows.
- 12 pcs. gum finish 1/2"x8"x5"—Mullion case.
- 1 pc. gum finish 1/2"x8"x3"—Mullion case.
- 16 pcs. gum finish 1/2"x4"x5'6"—Case for bed-
rooms, sleeping porch and dressing room
windows.
- 4 pcs. gum finish 1/2"x4"x4"—Case for bath
room and entry windows.
- 2 pcs. gum finish 1/2"x4"x3'6"—Case for
kitchen windows.
- 4 pcs. gum finish 1/2"x4"x7'6"—Case for out-
side entry door and grade door.
- 52 pcs. gum finish 1/2"x4"x7"—Door case.
- 5 pcs. gum finish 1/2"x4"x7'6"—Head case,
bed room and kitchen windows.
- 2 pcs. gum finish 1/2"x4"x4"—Head case,
bath room and entry windows.
- 1 pc. gum finish 1/2"x4"x15'6"—Head case,
sleeping porch and dressing room windows.
- 1 pc. gum finish 1/2"x4"x9"—Head case, sleep-
ing porch and dressing room windows.
- 2 pcs. gum finish 1/2"x4"x6'6"—Head case,
sleeping porch and dressing room win-
dows.
- 2 pcs. gum finish 1/2"x4"x4"—Head case, out-
side entry door and grade door.
- 18 pcs. gum finish 1/2"x4"x3'6"—Door, head
case.
- 8 pcs. gum finish 1/2"x4"x3"—Door, head
case.
- 9 sets 1 1/8" gum finish jambs, rabbeted
3/8" for 2'6"x6'6" doors.

4 sets 1 1/8" gum finish jambs, rabbeted
3/8" for 2'0"x6'6" doors.

56 lin. ft. 1"x10" gum finish—Closet shelving.

72 lin. ft. 1"x4" gum finish—Closet strips.

No base blocks as the casings extend to floor.

Bookcases, breakfast table, seats and cabinet,
kitchen cupboards, porch columns, brackets and
medicine cabinet as shown on details of plan.

Dry Rot in Wood and Buildings

ONE of our Florida subscribers, W. E. W., asks the cause and cure of dry rot.

C. J. Humphrey, pathologist for the Forest Products Laboratory, Madison, Wis., to whom the inquiry was referred, announces: "Inasmuch as we have had a number of complaints concerning the decay of building timbers in your city (St. Petersburg) I assume that you are interested particularly in this connection. The fungus causing the greatest amount of loss at St. Petersburg is one which I am now calling *Poria incrassata*. This fungus is very similar in its action to the true dry rot fungus, *Merulius lacrymans*, but for technical reasons we prefer to limit the term dry rot to *Merulius*. It is difficult to say just how infection in buildings originates in every case, but in all probability some of it is due to the use of timber already infected on the lumber yard, so that builders should be extremely careful and inspect the timber to see that there is no trace of decay present. When infected timber is placed in a moist situation, particularly in contact with the ground, any rot in the stick is bound to develop and cause further trouble. When rot has once developed in a building it is often the case that in making repairs not all of the decayed wood is removed, and these fragments often serve as infection sources for the new material. In eradicating this fungus it is absolutely necessary to do a thorough job in removing every bit of infection. The timber used in replacing the decayed wood should be given an antiseptic treatment wherever possible. In the case of timbers beneath the building where the color and odor are not objectionable, coal tar creosote is perhaps the best substance to use. For timber which must be used for interior purposes a colorless preservative like sodium fluoride is indicated. This is soluble in cold water up to about 4 per cent. Any of these preservatives can be applied with an ordinary brush, using from two to three coats, with intervals between for drying. The better practice, however, is to use timber which has been given a preservative treatment which insures that the wood is thoroughly impregnated and not merely surface sterilized. The conditions for fungus growth in your region are very highly favorable throughout a large part of the year, so that you must expect that when an infection gets under way it will continue to develop rapidly and disastrously. If you catch it in the early stages your repair bills will be very much reduced."

A Two-Apartment House of Modified Spanish Design with Garages Adjoining

By G. E. McDonald

WE give herewith sketch plans and pictures showing details of construction of a two-family apartment building of modi-

cral effect of placing the garage doors frankly forward on a line with the front door of lower apartment, far from being

terrace at the front door, having an antique iron lamp on an ornamental wrought-iron bracket at its corner. Also, the broad fa-



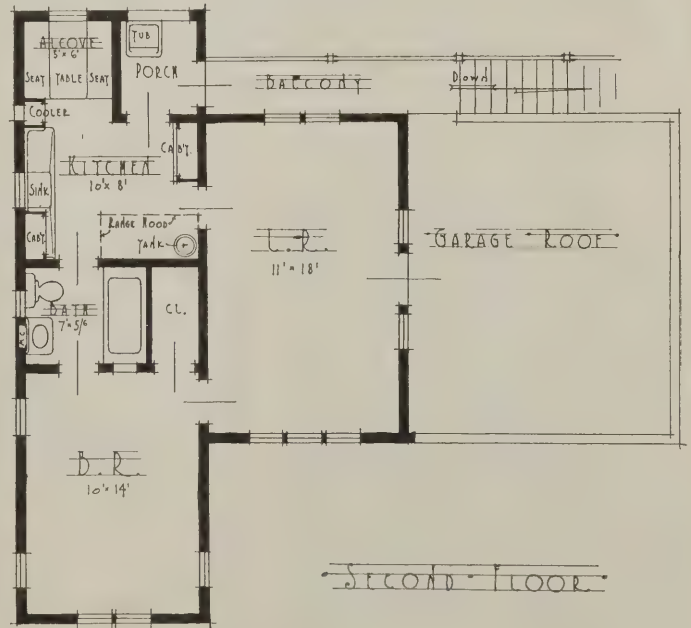
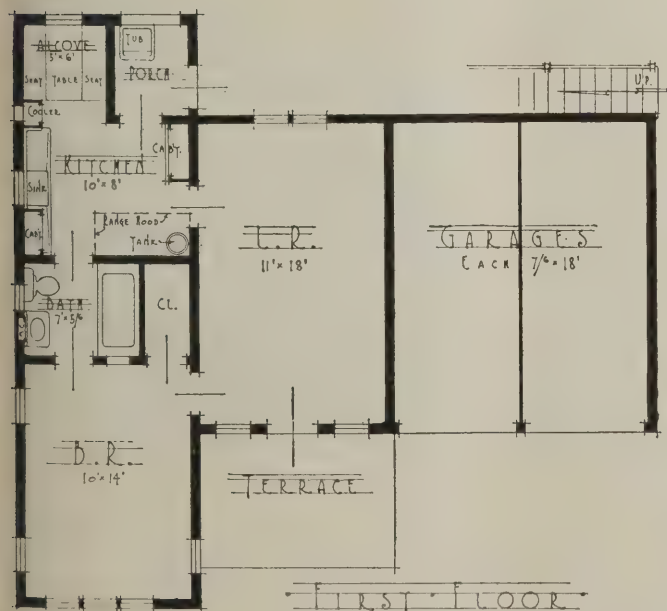
Fig. 1

Fig. 1—When landscape work is complete, and an iron grill is in place around the terrace, and the facade above the garage doors is festooned with ivy and roses, the general effect of this house will be singularly pleasing



Fig. 2

Fig. 2—Showing rear of the building after being waterproofed, screened and painted. The landscape work will give a transforming touch to the garden



fied Spanish design, with garages adjoining, as designed by Architect Walter S. Davis of Los Angeles for W. I. Nichols, realtor and general contractor of that city.

It will be seen that in this case the gen-

unwieldy, gives a poetic suggestion of ancient fortress gratings in the cut of the garage doors, which suggestion will soon be further enhanced by the placing of a specially made, quaint iron grill around the

cade above the garage doors will be festooned with ivy and roses, affording but a glimpse of the gay striped awning and palms on the roof garden above, and giving a suggestion of high-placed ramparts.



Fig. 5

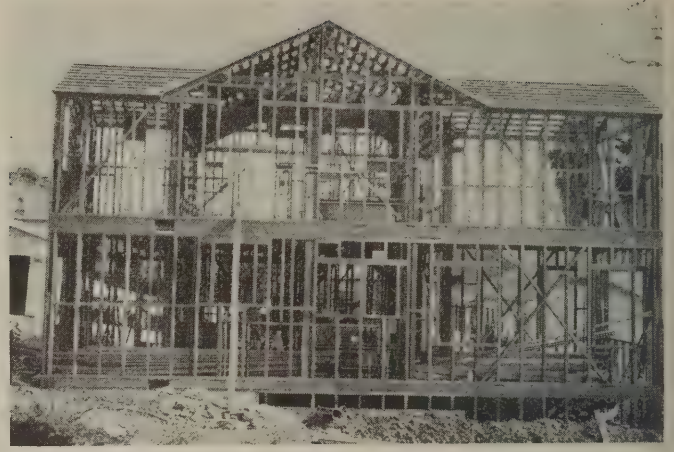


Fig. 6

Fig. 5—Framed and waiting for lathers and plasterers. The hose has been turned into the earth fill of terrace prior to tamping
Fig. 6—Side view of frame. Electric wiring and gas and water-piping in place. Openings where coolers are to be located are made just below floor line. Floor is left intact to guard against filling up with plaster and rubbish. Hole is cut out later by finish carpenter and screened at floor and ceiling lines



Fig. 7—Rear view of building showing button lath and wire reinforcing in place



Fig. 8—Button lath, reinforcing and flashing

The general effect of quaintness is further heightened by the exterior plastering, known technically as a mission texture but referred to by the workmen as "jazz," and which in the finish or waterproof coat was tinted in buff color. The shingles are stained a deep maroon (same being applied after laying), and the window sash and screen frames and the line of gable and eaves a turquoise blue, while the balance of trim is a light gray-buff and the doors walnut color.

The roof of the garage is covered with a waterproof deck of heavy roofing paper, well overlapped and caulked with pitch. A stairway from the side rear ascends to this deck, from which one enters the living room of upper apartment through a very wide doorway and that is flanked on either side by French windows opening inward and with stationary screens outside. This deck is the chief charm and keynote of the upper apartment and will be furnished with wicker furniture, beautified by potted flowers and shrubs and covered by the bright-hued awning one sees so often in Mexico. The living room is plastered in mission effect and

tinted in golden browns and the woodwork done in antique ivory with weathered effect. The bedroom has a striped wallpaper, old colonial style, and the woodwork is finished the same as that of the living room. Bathroom and kitchen are in white enamel, and

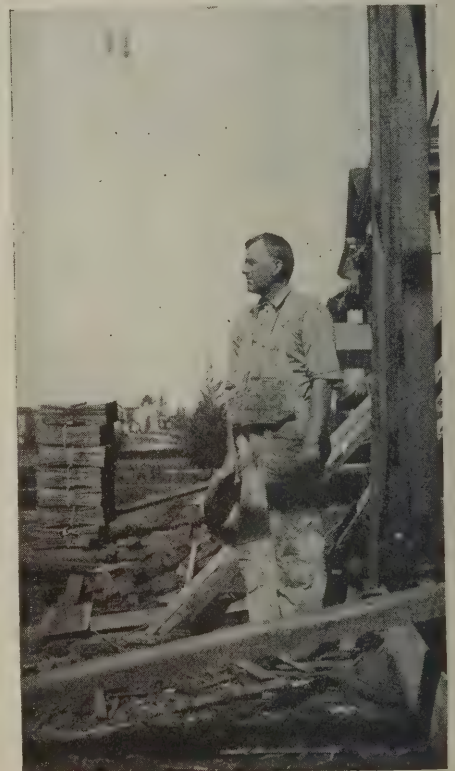


Fig. 9—H. W. Cleeve, building superintendent

most all the available wall space in the kitchen is filled up with cupboards, and a capacious cooler or cold-air refrigerator built in. No gas stove is provided, but an automatic water heater and tank are installed, a stationary tub is set in the screen porch, and there is a magnesite drainboard and 'sink-back, as well as magnesite floor in the bathroom. The idea of placing the tub in the niche is to make it convenient for the arrangement of shower curtain. Pro-



Fig. 10—Unenclosed rear upstairs hall from deck of garage



Fig. 12—The scratch coat in place



Fig. 14—Applying the finish coat



Fig. 11—Wrought-iron lantern and bracket in place, with numbering of upper apartment. Entrance stair at side rear

vision has been made for access to the plumbing of the tub by a little door made specially for the purpose and screwed into place on the other side of the wall.

There is a solid, continuous foundation wall around the outside, no cellar, but concrete piers inside—the concrete being mixed about one part cement to six of rock and



Fig. 13—Dampening down the scratch coat

sand—and the rock and sand 50-50. The floors of the garages and the front terrace are solid earth fill, well tamped for some weeks before laying the concrete floors and steps.

In framing the house, 2x6 redwood mudsills were used, and on top of that 2x4 underpinning to bring the floor to the de-



Fig. 15—Applying the "jazzy" effect of Mission texture. Edges have to be smoothed off

sired height. All studding is 2x4, the girders and posts 4x6; 2x6 floor joists were used on the first floor, 2x10 on the second floor, and the rafters are 2x4. Subfloors are 1x6 pine, surfaced one side, over which was placed a layer of tar paper and one layer of tarred felt before laying the $\frac{3}{8}$ x 1½-inch clear oak flooring. Buttonlath,



Fig. 16—Laying the waterproof deck of heavy roofing paper over garage. Underneath is caulked with pitch. Magnesite floor may be installed later

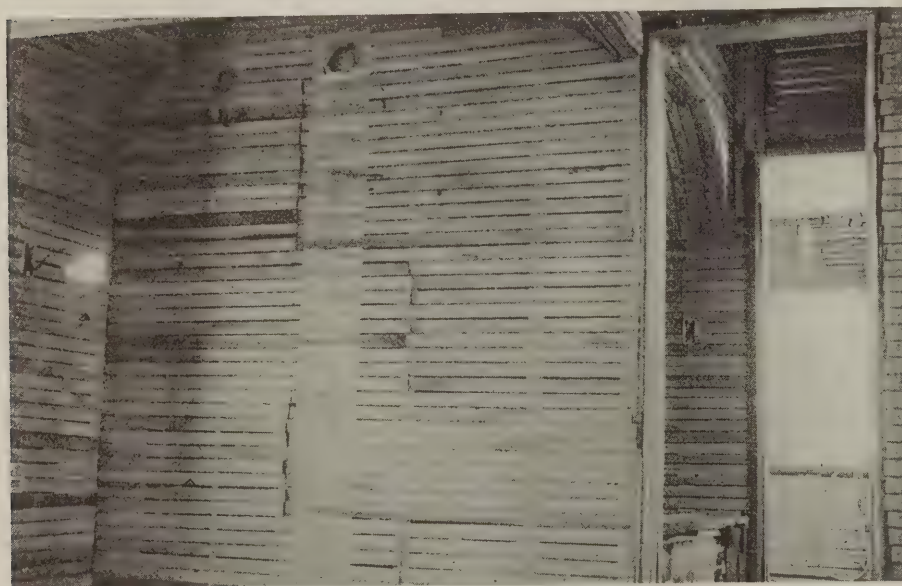


Fig. 17—Bathtub niche and kitchen hood lathed ready for the plasterers



Fig. 20—Breakfast nook, lower door of cooler, and glimpse of stationary tub in outer porch



Fig. 18—Wide-rim tub set in place and bricked up in front. Boards laid on top to protect from plaster, etc. Note that both doors enter into bathroom, the hinges being on the framed side of one-piece frame and jamb, and that the outer side provides a firm clincher or bond for plaster

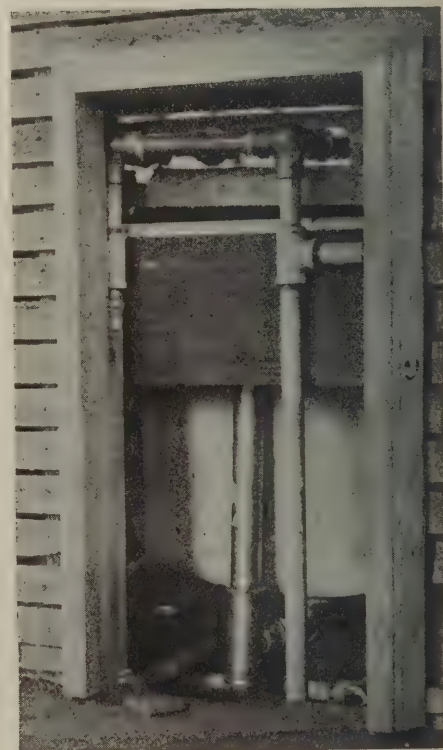


Fig. 19—Detail of plumber's vent-hole at head of tub. This also gives near-up view of the frame side of one-piece jamb-and-frame pattern imported from Europe and milled specially for Contractor Nicholls

reinforced with $1\frac{1}{2}$ -inch mesh chicken wire, was used on exterior of house, and given two coats of plaster, the "Mission" effect being put on simultaneously with the last coat. Wood lath was used inside of the

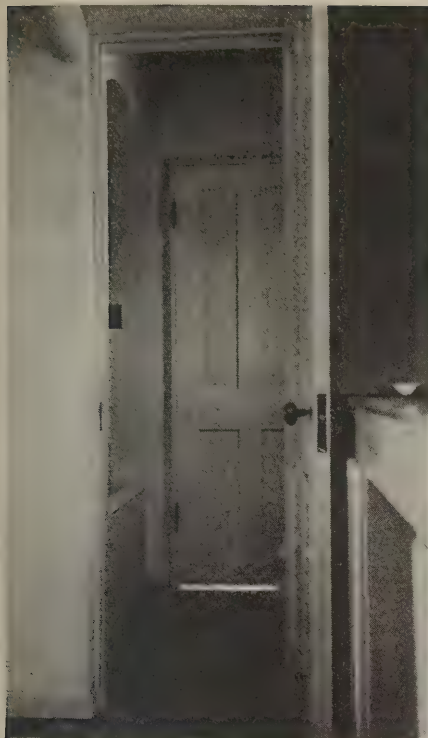


Fig. 21—Reverse side of one-piece jamb-and-frame. The stop is the only extra. Saves lumber and time

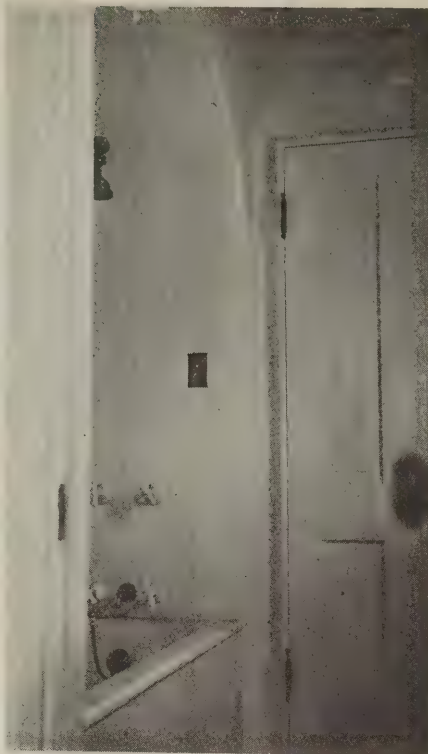


Fig. 23—Placing the tub in a niche is to make it convenient to locate an overhead shower and a curtain

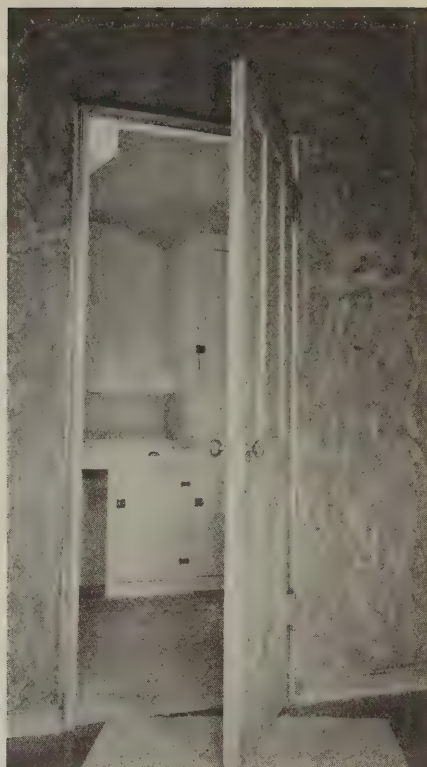


Fig. 25—Looking from living room to kitchen showing part of the kitchen equipment already noted, and also the two doors of the cooler or cool-air refrigerator



Fig. 22—Magnesite floor laid in bathroom and magnesite drain-board in kitchen sink. The sink is in combination with cupboard, flour-bin and drawers



Fig. 24—Shows a bit of the living room and closet from the front room. Note that with a one-piece jamb-and-frame the door must open and hinges be placed on framed side



Fig. 26—View from living room into front bedroom. Oak floor waxed and polished and protected with paper strips. The living room walls are finished in Mission plaster effect, painted in golden brown tones. Lattice windows open inward and are fitted with parliament hinges

house, this being more readily obtained in the coast cities.

Electric wiring was done immediately after the house was framed, and the water

and gas fitting attended to and drains laid at the same time. The bathtub, also, with wide, flat rim for walling in, was set in place when the house was framed, and was

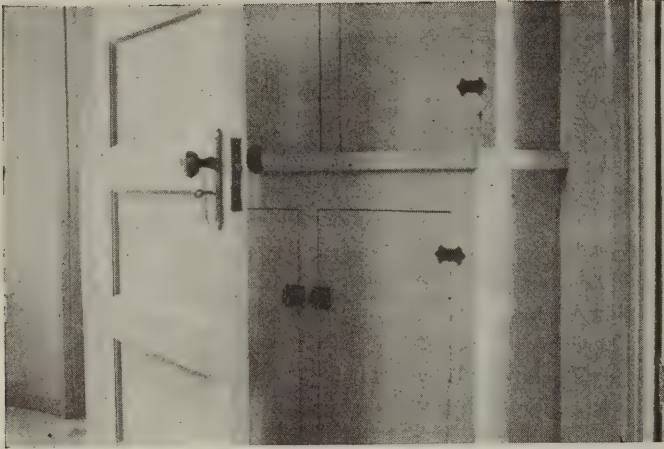


Fig. 27

Fig. 27—There are cupboards also between the screen porch and living room doors in kitchen
 Fig. 28—Magnesite drainboard installed over complete lumber sub-base and 1½-inch wire mesh reinforcing

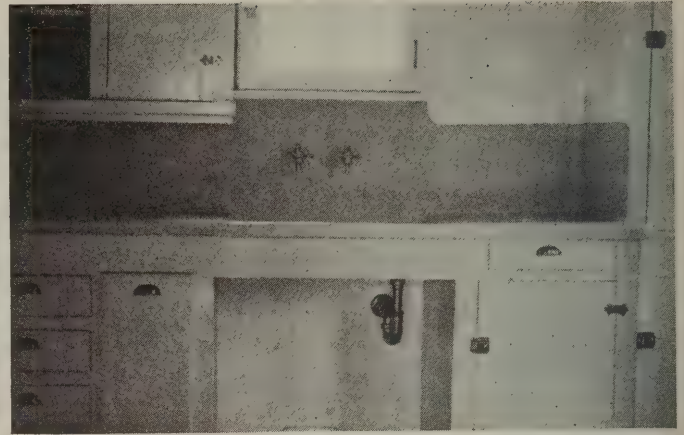


Fig. 28

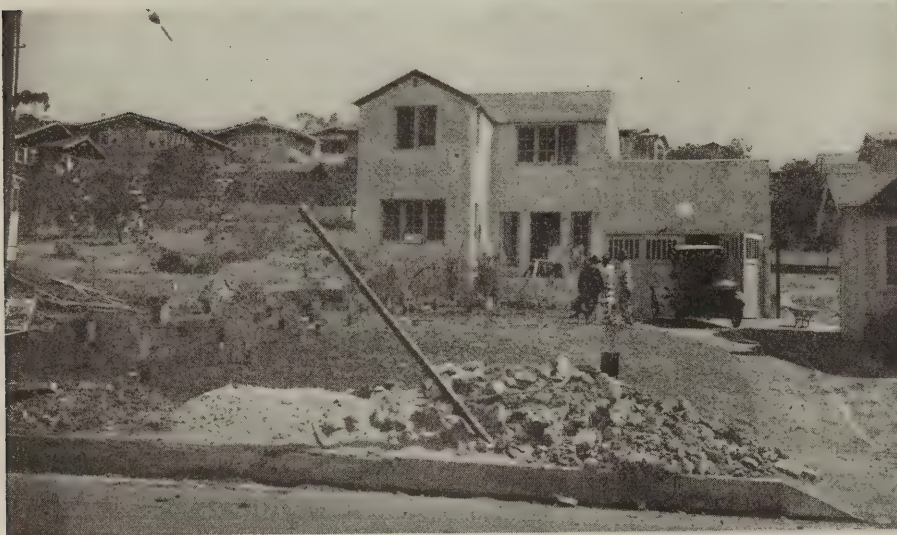


Fig. 29—The landscape gardener's crew arrive; clear up the rubbish, grade the front of lot; apply fertilizer and seed the lawn, and now commence to set out the plants and shrubs

then bricked up in front and protected with lumber on top until such time as it was walled in when the balance of the interior plastering was done.

The upper apartment will rent for \$75 a month, and the lower for \$70 if not occupied by owner, or the entire property will be turned over at a selling price of \$7,000, landscape gardening and planting all included.

Wooden Column Tests Started at Madison

THE first of a series of column tests for the purpose of obtaining data on the effect of density and defects such as knots, checks, cross grain, etc., on the strength of structural columns of Southern pine and Douglas fir, have been started at the Forest Products Laboratory at Madison, Wis., under the direction of J. H. Newlin, in charge of timber tests at the laboratory, and D. F. Holtman, Construction Engineer, of the National Lumber Manufacturers' Associ-

ation. The material for the first section of these tests consists of 40 pieces each of Douglas fir and Southern pine, measuring 12 in. by 12 in. by 24 ft. The experiments will cover a period of four years and the data will be used as a basis for recommending safe working stresses for structural columns.

Iron Waterproofing Cement

THE "Ferro-Tite" Method of Structural Waterproofing is described and illustrated in a well-designed "Handbook of Structural Waterproofing" issued by the Contract Waterproofing Company, engineers and contractors, St. Louis, Mo., with branch offices in the more important cities. The company does not sell its product, but makes contracts for "Ferro-Tite" structural waterproofing, owing it is said to the fact that success with this waterproofing is more dependent on the skill and understanding in its application than in the material itself. With this waterproofing, as described in the handbook, interior surfaces can be waterproofed against water pressure, important economy being made in thus avoiding excavating for applying membranes, asphalt, etc., on the exterior. This, it is said, is due to the character of the waterproofing material which becomes an impervious, water and water pressure resisting, undivisible identity with the structural material itself. The material is explained to be made of 98 per cent pure iron, ground to a fineness that 40 per cent will pass through a 200-mesh screen. The porosity of concrete, tile, etc., allows water to filter through slowly, and the minute particles are carried into these pores by the water to a depth up to one-eighth inch, oxidize and expand to twice their volume, making an absolute seal. The iron which does not penetrate the voids or pores on the surface to which it is applied is oxidized into a compact mass. Old as well as fresh concrete can be waterproofed with success by this method.



Fig. 30—Showing the landscape gardening begun

Bricklaying

By Wm. Carver, Architect, and A. Pentland, Mason Contractor

Influence of the Strength of Brick and Its Action in Resisting Compression in Solid and Ideal Walls

IN the October (1921) number we discussed the relative strength of various types of mortar in isolated cubes and in the wall. In this article the influence of the strength of the brick and its action in resisting compression in solid and Ideal walls is discussed.

A brick is a solid building unit of burned clay. A well burned brick has almost incredible strength, and even unburned brick will carry great loads, as will be shown subsequently. Even before being burned the "green" brick are called upon to resist great stresses, being stacked on edge in the kilns twenty feet high or more. Although placed a slight distance apart to permit the fire passing between them, the weight of the mass of wet brick does not even press those in the lower courses out of shape.

The table herewith shows the compressive strength of brick from various states and is culled from various authoritative sources. It will be observed that the lowest strength developed of any in the table (that of an underburned brick) is 1,659 lbs. per sq. in. or 119 tons per sq. ft. The strongest brick failed under the enormous load of 26,763 lbs. per sq. in., or 1,926 tons per square foot! There is little wonder that in describing most new building material, a comparison is generally sought between the new material and brick.

While affording a valuable indication as to the quality of the unit and of the strength of a wall, pier or structure built of it, the compressive strength of an individual brick is only one of several properties that are brought into play when a load is placed on the wall. This load must, of course, be supported by brick and joint alternately, and the slight irregularities in the bed joints and in adjacent courses produce bending and tensile stress in the brick. Such stresses are, of course, slight for ordinary loads, but where brick walls or piers are tested to destruction in a powerful testing machine, it is seen that the total supporting power of a brick wall depends largely upon these additional properties of the individual brick, for test specimens always fail by splitting and not by crushing.

This explains, to some degree, the remarkable increase in the strength of brick piers when constructed with brick laid on edge instead of flat. Concerning tests made on this type of pier, E. J. McCaustland, C. E., states:

"The Watertown tests show a greater

strength in piers built with the brick placed on edge, and it was argued that this increased strength came from a decrease in the number of joints, and the consequent reduction in volume of mortar used. It is more probable that the increase is due to the tendency of the bricks to act as beams when the bearings are uneven, and under these conditions the edgewise brick has an advantage over the flat one."

The whole question is summed up in the phrase "the tendency of the bricks to act as beams in the wall." This tendency is common to bricks laid in any form of brick wall, and anyone knows that a floor joist, for instance, is stronger when placed on edge than when placed flat.

Preliminary tests made upon Ideal walls at the U. S. Bureau of Standards, and witnessed by the author, bear out the conclusion of Mr. McCaustland, the walls showing results amazingly high. An old brick contractor who was present expressed himself as willing to stake his last dollar that the Ideal wall would fail long before a solid wall of equal thickness. If someone had taken him at his word he would have been a pauper.

If the results of the full series of tests of Ideal and solid brick walls now under way coincide with the results of the preliminary tests, the benefit of the great economy of this form of construction may be made available to the building industry for many purposes besides residence walls.

In an ordinary two-story house, the load at the first floor line seldom exceeds $1\frac{1}{2}$ to 2 tons per foot run, including full, theoretical floor loads of 45 lbs. per sq. ft. on each story and attic and snow load on the roof—a mere fraction of the capacity of an Ideal wall eight inches thick. In any form of residential building and in many other types of structure, the loads are comparatively light. It is for this form of construction especially that the Ideal wall is at present advocated, for the manufacturers of brick very wisely are not actively promoting this construction at present for heavier structures until definite figures regarding its exact strength are available.

Partly as a result of a demonstration of this type of wall before the recent Building Officials' Conference, the following cities now allow Ideal construction under their building codes, and many others are revising their codes to include it: Washington, D. C., Cleveland, Toledo, Cincinnati, Erie, Newark, Fort Worth, Gary, Seattle,

San Antonio, Los Angeles, Minneapolis, Portland, San Diego, Atlantic City, Terre Haute, El Paso, Wheeling, Kansas City, South Omaha, Newton, Chicago suburbs, St. Louis suburbs, Salt Lake City, Anacostia, Belmont, Decatur, Alton, Edwardsville, Rosedale, Lake Charles, Shreveport, Cambridge, North Adams, Brookhaven, Hattiesburg, Dunkirk, Homestead, Reading, Chattanooga, D'Hanis, Gonzales, Morgan, Vancouver, Hampton, Huntington and Represa.

A few comments from builders who have used the Ideal wall are here given. From Samuel B. Cox, Anacostia, D. C.:

"I saw a short article in the NATIONAL BUILDER, which I take, and with what I could learn from that I have had a basement for a bungalow laid up with 9-in. Ideal walls. The wall is perfectly satisfactory, although the part that is below grade is in a wet soil, so wet in fact that we had to lay a drain on the outside of the foundation. The part above grade has been exposed to heavy driving northeast rains of two or three days' duration without any perceptible dampness showing on the inside."

From James F. Adams, Industrial Engineer, Refresca, Calif.:

"Before the dissolution of our partnership was in business at Tucson, Arizona, the firm name being A. C. Jacobson & Co., 'Builders of Beautiful Bungalows.' I first stumbled on Ideal construction during a shortage of brick and used it over lintels only. Later I tried it out on a garage at a residence and it worked so well that we adopted it for all of our residence construction."

From Nance Construction Co., Los Angeles, Calif.:

"All of our Ideal wall houses have stood the rainy season perfectly, not one complaint from moisture coming through the wall. We have now under construction a \$35,000 residence using Ideal walls."

The material and labor required for 100 sq. ft. of 8-in. Ideal all-rolok wall is as follows:

904 brick, 8 hrs. bricklayer's time, 6 hrs. laborer's time, 1 94-lb. sack cement, 1.2 sacks hydrated lime, 3 cu. yds. sand.

Meantime, architects and engineers have been inquiring as to the definite bearing value of this style of construction. Enough old examples have been found and enough new buildings have been erected to demonstrate its insulating value and its dryness

where the inside plastering is applied direct to the brick; and the saving in material is a simple matter of arithmetic. But what will the wall carry? Reasonings from the-

ory—from incomplete experiments—from the fact that the Ideal wall is a girder structure and therefore likely to be of high efficiency—are not capable of being trans-

lated into an exact number of pounds per net or gross inch of bearing surface.

To develop this information, the U. S. Bureau of Standards has donated the use

Compressive Strength of Individual Brick Tested Flat.

Brick	No. of Tests	Transverse Strength. Pounds per Sq. In. Modulus of Rupture	Pounds per Sq. In. Ultimate Crushing Strength	Tons per Sq. Ft. Ultimate Crushing Strength
ARKANSAS				
(a) Red. Grade 1	3		13,253	953
(a) Red. Grade 2	3		11,966	860
(a) Red. Grade 3	3		5,620	406
D. C.				
(b) Red	5		7,370	530
(b) Arch	3		8,230	592
(b) Press	4		7,092	511
ILLINOIS				
Representative brick from Chicago district.				
(c) Hard burned		1,180	3,200	231
(c) Medium burned		1,140	3,150	226
CENTRAL ILLINOIS				
(d) Shale building brick	18	1670	10,690	770
(d) Underburned common	16	481	3,920	282
IOWA				
(e) Hard burned common	4		9,522	685
(f) Common	6	660	3,370	243
(f) Soft or salmon	3	300	1,850	133
KANSAS				
(e) "Red brick"	4		9,432	679
KENTUCKY				
(e) Dark gray	1		20,030	1,442
(e) Gray	1		16,793	1,210
(e) Dark cream	6		7,243	521
(e) Red	7		5,290	380
LOUISIANA				
Representative brick from New Orleans district				
(c) Hard burned		733	7,340	528
(c) Medium burned		893	6,880	496
(c) Soft burned		1,090	6,510	468
MARYLAND				
(e) "Dark cream"	3		6,424	463
(e) Red	2		4,922	354
(e) Light red	3		3,266	235
MASSACHUSETTS				
(g) Hard burned common	23		12,907	929
(h) Medium burned common	3		11,073	797
(i) Light hard common	15		5,682	409
MISSISSIPPI				
(a) "Light red building brick"	3		7,573	545
MISSOURI				
(e) St. Louis "dark red"	5		22,976	1,654
NEW YORK				
(a) Northern N. Y. "dark brown building brick"	3		26,763	1,926
Representative brick from New York district				
(c) Hard burned		601	5,630	405
(c) Medium burned		616	4,430	319
(c) Soft burned		497	2,710	195
NORTH CAROLINA				
(e) Red common	7		5,307	382
(e) Light red common	4		3,662	264
PENNSYLVANIA				
Representative brick from Pittsburgh district				
(e) Hard burned	12	1,945	11,965	861
(e) Medium burned		1,370	7,880	567
(e) Soft burned		345	1,659	119
WASHINGTON				
(e) "Buff colored building brick"	4		4,560	328
(e) "Light buff building brick"	6		2,987	215
(e) "Cream colored building brick"	6		4,066	292
WYOMING				
(e) "Light red light hard"	3		3,450	248
(e) "Rose-colored"	3		2,290	165



Ideal wall



Ideal wall house under way



A corner in Ideal wall

- (a) Tests of metals, etc., Watertown Arsenal, 1908.
 (b) Tests of Metals, etc., Watertown Arsenal, 1884.
 (c) Bureau of Standards, Technologic Paper No. 111, 1918.
 (d) University of Illinois, Bulletin 27, 1909.
 (e) Tests of Metals, Watertown Arsenal, 1906.
 (f) Iowa State College Bulletin 6, 1908.
 (g) Average of 3 tests in 1884; 15 tests in 1904; and 5 tests in 1907, Watertown Arsenal.
 (h) Tests of Metals, etc., Watertown Arsenal, 1884.
 (i) Average of 10 tests in 1904 and 5 tests in 1907, Watertown Arsenal.

of its ten million pound testing machine—the largest in the world—at its Pittsburgh laboratories, and the services of its staff of physicists; and the Pittsburgh chapter of the American Institute of Architects has named a committee, headed by Sidney F. Heckert, to superintend the construction of the test panels; these bodies working in co-operation with the Common Brick Manufacturers' Association of America, at whose instigation the tests are being made.

These tests will also provide, for the first time, real information on the strength of solid brick walls eight and twelve inches thick and of average story height.

One of the most important objects of the present series of tests also is to determine, if possible, a more definite ratio between the strength of a built-up structure and some easily ascertainable property of the unit bricks.

As soon as the panels, now being constructed, are 60 days old, testing will begin. Those who wish are also invited to watch the building as well as the actual testing of the 42 panels, which will each be six feet wide and nine feet high.

The results of preliminary compression and fire tests made by the Bureau of Standards on the Ideal wall has been issued in a general statement by the bureau. This statement, which is not for publication, may be had by individual inquirers who address the U. S. Bureau of Standards, Washington, D. C.

semi-obsolete buildings. The first consideration is that of cost and plans. What has been done is a valuable guide to what is to be done, and in this direction associated builders and contractors can do themselves and each other a great service by keeping construction data and cost records of all jobs. The most dangerous competition is ignorant competition and it would seem that helping to instruct is really a kind of enlightened self-interest.



Cutting out mortar between masonry joints by machine

Machine for Cutting Out Mortar Between Masonry Joints

A NEW machine for cutting out the mortar between bricks or building stones before tuck-pointing has been placed on the market by the R. G. Haskins Co., 27 Des Plaines Street, Chicago, Ill. The machine is equipped with a $\frac{1}{4}$ -hp. motor operating at 3,500 r.p.m. The shaft is direct connected to the motor and is $\frac{5}{16}$ in. in diameter, 5 ft. long, suitable for transmitting $\frac{1}{4}$ hp., and is provided with metal wound casing, hand piece and guard. The wheels used in this operation are special rubber bond wheels, furnished in varying widths to accommodate the work on hand. Wheel diameter is 6 in. The machine on one Chicago job is said to be doing work equivalent to that of five men. It can be operated in either horizontal or vertical position equally well.

Manure Pit Construction and Waterproofing Underground Concrete

IN response to the request of W. W. McC., of Fort Worth, Tex., for literature dealing with manure pits and with waterproofing of underground concrete construction, the Portland Cement Association, to whom the request was referred, wrote him in part as follows: "For your reference in manure pit construction, we are sending one of our circulars which contains suggested plans for different types of pits and also describes correct practices in concreting to obtain best results in work of this kind. Regarding waterproofing of underground concrete construction, you will find full information on this point in our set of notes on 'Recommended Practice for Building Water Tight Basements with Concrete.' These notes are supplemented with a chart showing sections of walls and basement floors, illustrating the uses of tar joints as an added protection against possible seepage. You will note that layers of burlap mopped with hot tar or asphaltum may be used where ground water pressure exists."

Remodeling Without a Plan

THE remodeling job shown herewith is the work of the Weber Construction Co., of Janesville, Wis., and is interesting from the fact that there was no definite plans prepared, but all dimensions were figured on the job, though unfortunately no data was kept. The transformation of a more or less undesirable property into a salable or rentable one in a few weeks is an inspiration to others to remodel obsolete or



House as it appeared March 15, 1921



After remodeling, May 1, 1921

London County Council Contracts

Direct with Labor in Real Estate Development

By John Y. Dunlop

More than One Hundred Twelve Million Dollars for Developing Housing in London Suburbs. The Guild of Builders with Labor in Control, a New Form of Combine, is a Self-Governing Unit that "Hires Capital at a Fixed Rate"

TO meet the problem of housing of the people of London, England, the governing body of the County of London as a whole has adopted a comprehensive scheme for the development of existing vacant lots

and the acquisition of new subdivisions.

The plan provides for the erection of not less than 29,000 new buildings, of which it is expected that not less than 10,000 will be built inside of two years. The capital out-

lay is estimated at between \$112,000,000 and \$120,000,000 exclusive of the cost of purchasing land beyond that to be developed.

The work is going forward actively. Most of the houses are being put up under con-



Fig. 1

Fig. 1—Double stucco house with tile roof. The gables containing the entrance project past the line of the front wall. The door cap is in cement—Gidea Park suburb



Fig. 2

Fig. 2—This six-apartment house is L-shaped in plan with the entrance door in the internal angle—Gidea Park suburb



Fig. 3

Fig. 3—Corner house in one of the main avenues. The house is in brick and stucco with semi-circular arches over the upper windows exposed—Gidea Park suburb



Fig. 4

Fig. 4—Stucco and brick house with tile roof. The projecting windows on the ground floor have brick lower wall. The rest of the structure is in wood—Gidea Park suburb



Fig. 5

Fig. 5—Street view in Hampstead suburb, showing variety in the design of brick and stucco



Fig. 6

Fig. 6—Stucco house in Letchworth suburb. The fireplaces in the different apartments in this house are grouped so as to pass into one chimney stack



Fig. 7

Fig. 7—A pair of brick houses in which the chimneys and windows form artistic features—Letchworth suburb



Fig. 8

Fig. 8—Three double houses built close together in Eltham suburb. Lower front is in brick and upper walls in brick and stucco



Fig. 9

Fig. 9—Six-family house in Hendon suburb. The introduction of gable fronts make an effective design with simple construction



Fig. 10

Fig. 10—Four-family terrace house in Hendon suburb. Built in brick and stucco. Each family has upstairs and downstairs rooms

tract, while many are being put up by the Guild of Builders, a new form of combine in which the old method of a contracting combine of shareholders to secure increased dividends is discarded. The new form of combine is one of self-governing units with labor in control and capital hired at a fixed rate.

The Guild of Builders is only dealing as yet with the housing plans of the public authorities. The price paid by the authorities is the prime cost of material and labor at standard rates with the addition of \$160 a house to enable the guild to guarantee continuous employment to the workers in all contingencies and 6 per cent calculated on the estimated cost to provide for plant and administration expenses.

From the workman's point of view the advantage of this system is the idea of continuous employment and pay, as labor becomes the first charge on the production. There is pay in sickness and in bad weather and ultimately in work or in reserve.

In no circumstances will the surplus be distributed as dividend, but will go to the improvement of the service rendered in improving the equipment of the guild in technical training and, above all, in research.

Some look to the scheme to produce a revival in the building art greater than has been seen since the Middle Ages.

One of the first contracts which the Guild of Builders received was in the Walthamston area. There are now 250 men working on the housing there and these workers show much zeal and enthusiasm in their new conditions of employment.

With few exceptions the houses in these garden suburbs are two-story for economic reasons. The most of the houses are in pairs or made up of groups. The internal arrangement of some of the grouped houses is defective, owing to the badly formed internal lobby in the plans which often detracts from the size and general appearance of the living rooms.

The size of the average house in these suburbs ranges from four to six rooms. Climatic conditions and the modes of living and household economy make any details or plans of the internal arrangement comparatively useless to the American designer and builder. The simplicity and effect of the designs shown in the illustrations are suggestive and may be adapted by American builders to fit their own public and climatic conditions.

Reinforced Concrete Suspended Drain

A VERY interesting example showing the adaptability of reinforced concrete is demonstrated by the recent construction of a suspended drain in this material, some 800 ft. in length. The work was carried out for The Empire Paper Mills, Ltd., at its works at Greenhithe, Kent. The mills are situated on the southern bank of the

river Thames, and the foundation is such that the existing buildings have to be carried wholly on piles, the bearing capacity of the ground being insufficient even for the lightest of working loads.

Since this drain was required to pass under the ground floor of the buildings, for the greater part of its length, the latter difficulty was serious from a designing point of view. The only practical means of supporting this drain was to hang it to the underside of the floors, which are constructed of rolled steel joists embedded in concrete. Certain parts of this floor are subject to some vibration from machinery overhead, and careful consideration had to be given to this aspect of the problem, before deciding on suspension as a means of carrying the drain.

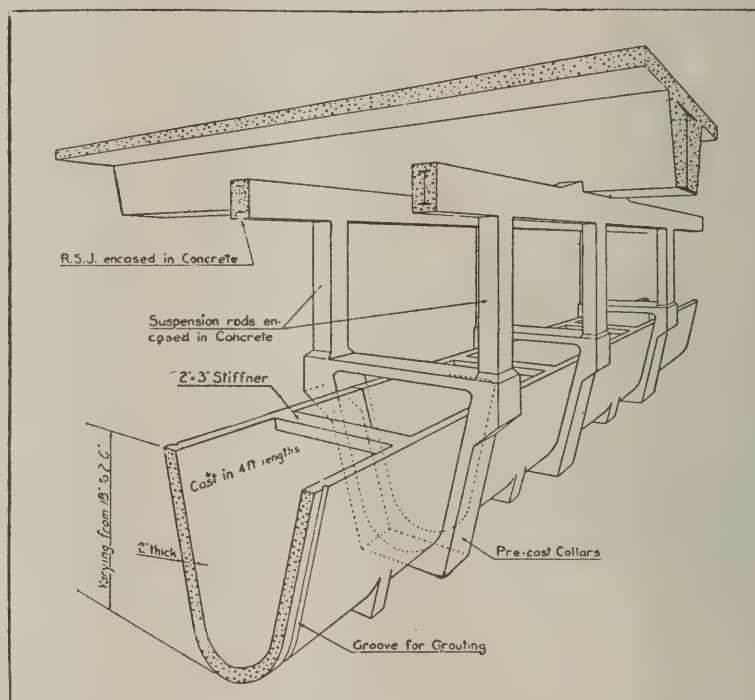
Another difficulty presented was the very

at the top by a central reinforced concrete strut, 2 in. by 3 in.

When the sections and "collars" were fixed in position, the joints were run in with rich concrete grout, and the attachment to the underside of the floor concreted up in position. A detail of the latter attachment is shown, and the illustration shows a short length of drain in position, which will give the reader a very good idea of the difficult nature of the work.

The design of this drain was placed in the hands of The Considere Construction Co., Ltd., of Westminster, and the success of the drain, both during tests and in practice subsequently, proves that the somewhat novel decision to carry this drain by suspension was warranted.

The concrete for the work was composed of 1 part of cement to 1 part of sand and 2



A reinforced concrete suspended drain

limited headroom, which was insufficient to permit a man to stand upright, and also the nature of the soil, which is composed of soft material some feet thick, containing a large percentage of wood pulp and moisture. These objections, together with the fact that artificial light was necessary at all times, rendered in situ construction so difficult as to be impracticable. It was therefore decided to construct this drain in pre-cast lengths, and to connect these lengths by means of pre-cast "collars," which were in turn slung to the underside of the steel floor bearers. The exact arrangement employed may be seen from the accompanying sketch.

The sections were cast in 4-ft. lengths, and made U-shaped. They were 2 in. thick, and reinforced with a single mesh of steel composed of plain round-section rods laid in both directions, and wired at their intersections. Each length as cast was stiffened

parts of larger aggregate. The aggregate stones were uniformly graded and screened so as to pass a $\frac{1}{2}$ -in. square mesh, and to be entirely retained on a $\frac{1}{4}$ -in. square mesh.

The whole of the work was carried out on the site, and the surface of the pre-cast concrete while "green" was dusted with neat cement well rubbed into the pores with rags, and the excess removed. As soon as possible after moulding the surfaces were coated with one part of sodium silicate to five parts of water, this being applied with a brush. Four coats were applied thus, at intervals of between 6 and 20 hours. All the joints between the pre-cast pieces were similarly treated, and the whole of the concrete was kept damp for at least a fortnight, in order to prevent shrinkage.—W. L. Scott, in *Concrete and Constructional Engineering*, London.

Questions, Answers, Kinks and Discussions--V. L. Sherman, Editor

Herein is a Department of Mutual Help for the Exchange of Experiences and Ideas.
It is Not Only Well Worth Your While to Give Your Experiences for
What You Get Back from Others, but National Builder
Pays You for Doing So in Good Hard Cash

Expansion Bolt Holder for Use in Brick or Concrete

G. A. L., Washington, D. C., writes: "There are on the market any number of patent types of expansion bolt grips for use in brick walls and concrete walls and floors, but sometimes because of delay or for one thing or another these are not available. At such times it is possible to make up these expanders from materials at hand in the way illustrated below, Fig. 1. This consists in using the bolt of the desired size but of extra length to extend into the wall or floor. A 6 or 8-in. length of wrought iron pipe, as large on the outside diameter as the bolt head, is sawed

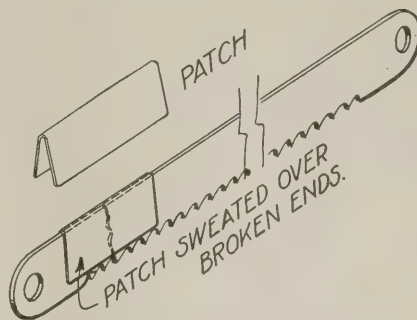


Fig. 2

delay where new blades are difficult to get. The repair illustrated, Fig. 2, here is possible when the break is close to either end. Use a piece of tin about 1½ in. long and ¾ in. wide. Bend this sharply lengthwise

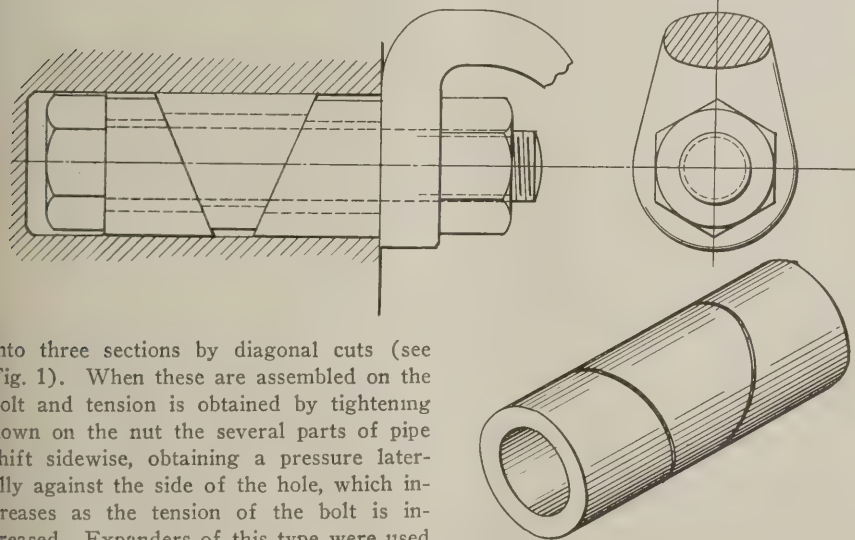


Fig. 1

into three sections by diagonal cuts (see Fig. 1). When these are assembled on the bolt and tension is obtained by tightening down on the nut the several parts of pipe shift sidewise, obtaining a pressure laterally against the side of the hole, which increases as the tension of the bolt is increased. Expanders of this type were used recently in putting up some porcelain wash-bowls in a local building, with perfect results, even though the building is subject to considerable vibration from hydraulic pumps located in the basement."

A Patch to Use When the Hacksaw Blade Snaps

G. A. L. of Washington, D. C., writes: "It's usually the last hacksaw blade in the kit that snaps the quickest, and being able to make a repair on it may save a long

End Plates

J. F. H. of Hornsby, Tenn., a builder and contractor in that locality and a reader of NATIONAL BUILDER, submits the following suggestion: "All builders know they have to put in extra joist or spike a 2x4

or something to which to nail the end of the overhead ceiling. I find it economical in time and material, and most satisfactory, to use a 2x6 for this plate. (See Fig. 3.) Most buildings these days are double plated, and the 2x6 works especially well for this arrangement, using a 2x4 for the first plate

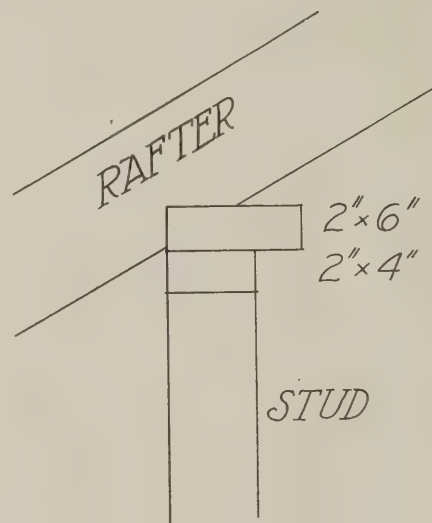


Fig. 3

and the 2x6 for the second. This makes the second plate project 2 in. beyond the first and affords sufficient surface for the nailing on of the ceiling ends. This arrangement is good in the case of hip roofs, where the rafters are in the way of the first ceiling joist."

Shingle-Roof Scaffolding

"Most carpenters nail the shingles on 2x4's and then nail on top of the stationary shingles," says A. R. of Harrison, S. D., "but there are three points that I don't like about that method: (1) The shingles used for that purpose are of no more use; (2) the nails driven in the stationary shingles will cause leaks from the nail holes; (3) taking off the scaffolding will cause the stationary shingles to crack.

"The scaffolds put up by my method I call 'built-in scaffolds.' As shown in the sketch (Fig. 4), we nail a 4-in. shingle on the 2x4 every 6 or 8 ft. When doing

When applying shingles to scaffold.

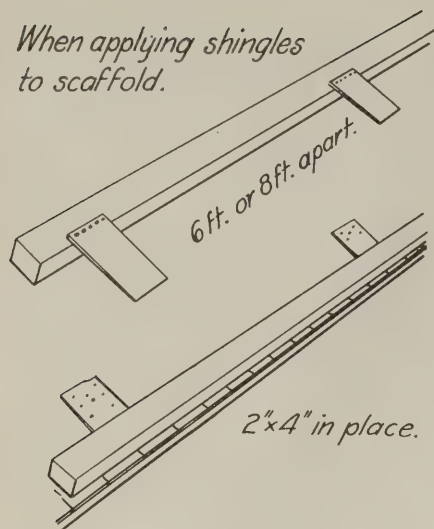


Fig. 4

this, remember that these shingles remain on the roof and so take pains to lay them at least 1 in. away from the last row cracks, for this scaffold serves as a straight-edge as well. In nailing on these shingles we run the butt end of the shingles about $\frac{3}{4}$ in. on the 2x4, using about five nails. Then we measure $4\frac{1}{2}$ to the weather from the last row of shingles, turn the 2x4 over, line it up true and nail securely to the roof. Apply the nails high enough to let the next row of shingles cover the nails. After the roof is all shingled, and the scaffolding can be removed, we take a shingling hatchet and lift the 2x4 a little. This raises the shingles that hold the 2x4 scaffold enough to allow us easily to saw them off flush with the scaffold. But we do not saw them quite through; only nearly so that when the shingles on the entire length of the 2x4 have been so cut, by tipping the 2x4 toward the roof they will all crack off nicely. This makes a neat job, saves shingles and avoids abusing the roof. We have used this method for more than 10 years, and have never had one come down on us."

Another Device for Cutting Through Double Floors

Referring to L. G.'s inquiry on page 56 of our December issue, G. A. M. of Worthington, Minn., writes: "I have worked in the eastern factories to some extent and believe I know precisely what L. G. is up against, and as there is no such saw on the market I would suggest that he construct one on the order of an ice saw that is used with such success on our Minnesota lakes. I would secure an 8-in. heavy duty circular saw and about a 1-h.p. electric motor with starter clutch installed. These I would mount on a small hand truck, driving the saw at a good speed, say 1,200 r.p.m. A link belt on the order of a motorcycle chain could be used to drive the saw, and the mandril should be so constructed that it

could be raised and lowered by means of a hand level to cut any depth desired or to bring the saw clear of the work when needed."

In the January number of NATIONAL BUILDER the reader will find an advertisement of a portable power tool which fills the bill if current is on tap. If it is not, L. G. will find many small gasoline and oil motors on the market which would give all the power he would require and operate with little attention.

Hanging Two Sash on One Weight

A. N. P. of El Cajon, Calif., sends the following kink: "This is not a new trick,

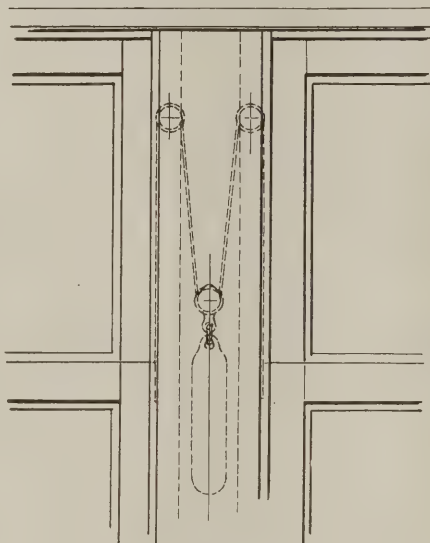


Fig. 5

but it is not generally known by carpenters. Attach a small awning pulley to a weight of double size. (See Fig. 5.) A $4\frac{1}{2}$ in.

casing may be used, making the wider mullion and pendulum strap unnecessary. I always use this method, and it is an advantage when the extra space required for the window frame is needed."

Computing the Weight of Window Weights

W. M. C. of Oklahoma City writes: "I have a way of determining the proper weight for window weights for all ordinary double strength glass. Multiply the height by the width of the glass in one sash and point off the two right-hand figures. The figures to the left of the point will give you the weight in pounds and the figures to the right will be the fraction of pounds in hundredths. For example, take a window 24x28 in. Multiplying 24 by 28 gives 672; point off the two right-hand figures and we have 6.72, or approximately $6\frac{3}{4}$ lb. for each of the weights. This simple computation saves the task of weighing each window or of guessing the size of the weights."

Isometric Drawing

An inquiry from L. A. K. asks for elucidation on the subject of isometric projection, which, as he says, is used in laying out piping drawings. When the word elucidation is used we make the problem difficult enough to write quite a little about it. Iso-metric means equal measure and that is about all there is to it. Tilt a cube 1 in. on a side until all of the sides are equally foreshortened and you form, as in Fig. 6, a regular hexagon with each of the sides reduced to about $\frac{13}{16}$ in. On each square face of the cube is inscribed a circle 1 in. in diameter. In looking at a circle you will always see one diameter, a full diameter, no matter how you tilt it to form an

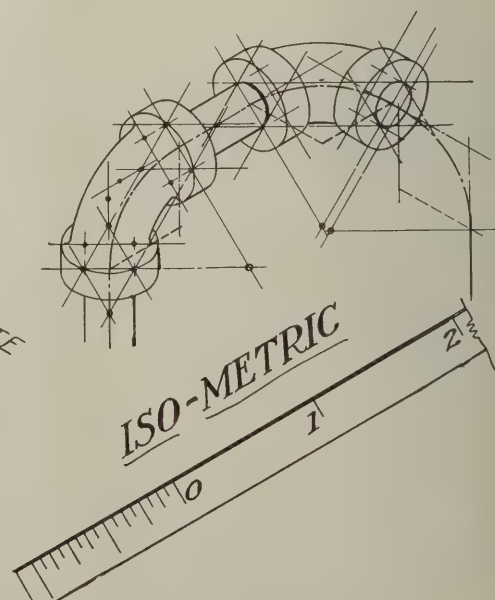
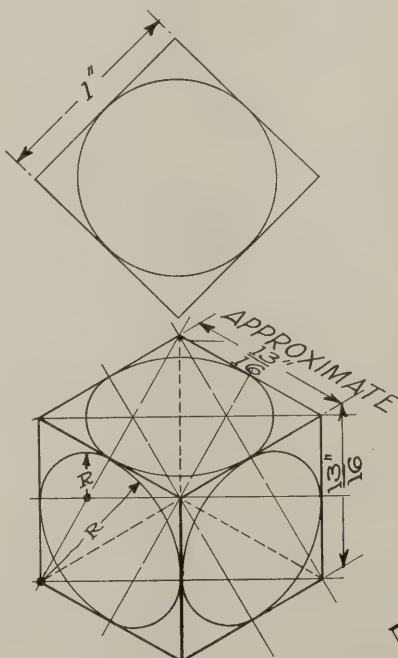
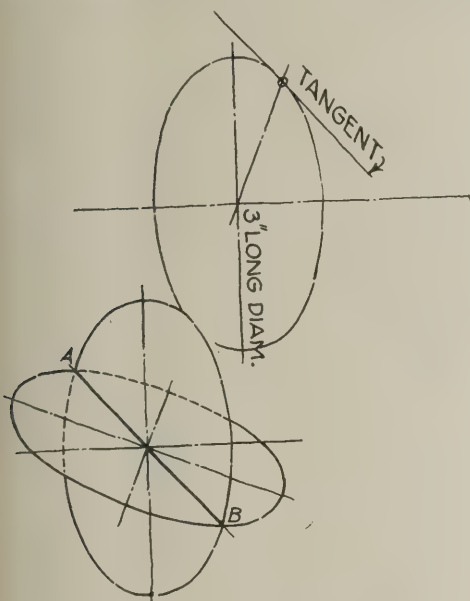


Fig. 6

ellipse. Therefore the circles retain a long diameter of 1 in., in theory, but not in practice. To draw the ellipses note the radii marked "R," and measure them to see that while the long diameter should be 1 in. it is really about 15/16 in. (There is another more complex method for drawing the ellipses which brings them to nearly



Figs. 7 and 8

1 in., but since isometric drawing is for convenience, that method is hardly worth the trouble.)

You will note that the three planes, or

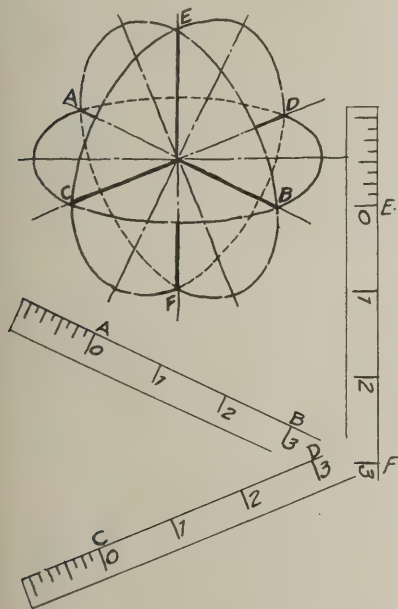


Fig. 9

three general directions, or the elevation and ground lines all have the same proportioning and are made with the 30-60° triangle, and that the ellipses are all drawn with only two different radii. Lay out a little scale, as shown to the lower right corner of Fig. 6 in which 1 in. is marked off every 13/16 in. Then take up the piping layout. Almost every measurement but

the long diameters is made with this scale. The long diameters of pipes, flanges, etc., should be made with an ordinary scale. In the first elbow the radius of the elbow bend is marked off on the pipe center line with the little scale and lines drawn from the points at right angles to the pipe center lines. Using the intersection as a center the arc of the bend is drawn in and the neck of the elbow. Then the long diameters of the flanges are marked off with a true scale and divided into four equal parts. Through the mid-points 60° lines are drawn until they cut the main center lines. There you have the arc centers for the flanges. As a general rule the smaller ellipses are put in free-hand unless there are no larger ones to act as guides, but since the drawings are necessarily to scale, and you should be able to scale them with considerable accuracy, never monkey with free-hand center-line arcs or the main centers. Use the triangle and compass. Sharp leads and patience pay big dividends in isometric drawing.

The chief advantage in isometric pipe layouts comes in the fact that a complex system is easily put into the imagination, whereas in orthographic projection a good deal of time is spent in figuring directions.

As we said at the start, the work may look difficult, but with a little practice you will find it is fairly easy.

There is another method, somewhat similar in character to isometric, but meant for free-hand work which is shown in Figs. 7, 8 and 9. The advantage in this is that you can pitch the general direction away from or toward you as you please, showing more of one side than another. It is not so convenient to work as isometric, and is essentially free-hand, but can be made just as accurate.

First you locate one center line, and, with a long diameter at right angles, you sketch in an ellipse which you think will suit. The one shown, in Fig. 7, we will say is 3 in. From the center you draw a vertical line and where it crosses the ellipse you draw a tangent. The center line of the ellipse and the tangent, Fig. 7, determine the two ground lines. Put a line through the center of the ellipse parallel to this tangent (see Fig. 8) and sketch an ellipse on a vertical axis which will have the same long diameter as the first ellipse, that is 3 in., but passes through the points A and B.

Now for the last. Put in a long diameter perpendicular to the axis AB and with the same long diameter again, 3 in., sketch an ellipse which will pass through C and D, and E and F. Here you have circles appearing as ellipses in all three planes, and the lines AB, CD and EF all represent the 3 in. lengths as they stand in perspective. Scales can be made for each of the three directions and work gone at with confidence if you remember that *all long diameters are full size and perpendicular to the center lines.*

The writer has seen sectioned six-cylinder motors sketched in this method sufficiently accurate to scale parts.

Putting Up Corner Beads

Referring to the method of putting up corner beads suggested by F. M. W., an engineer of Norfolk, Va., the Concrete Engineering Company, Omaha, Neb., writes: "A device of this kind is not necessary with our Ceco corner bead . . . which under ordinary conditions requires no straightening device of this kind as the metal is drawn snugly below the nose of the bead forming a T section. Anyone can hold a 12-ft. length of this bead out from him and it will not sag. This extraordinary rigidity is due to the T section and makes this corner bead very economical in erection costs." A sample of the corner bead is submitted by the company, confirming this information.

Water-Proofing Window Sills

W. E. B. of Grand Island, Neb., makes the following suggestion: "Here is a good idea for window sills, which I have tried. Mix putty with linseed oil so that it is thin enough to spread easily with a putty knife. Before putting the window stool on give the sill a good smooth layer of the putty where sill and stool join. This can be done in a moment. It prevents rain and wind from blowing in, and it saves the sills and stools from rot."

New Method of Applying Wallboard

THE bug-bear of nail holes and nail heads in wallboard has been overcome by a simple and ingenious method devised by Mr. Charles A. Upson, president of the Upson Company of Lockport, N. Y. This

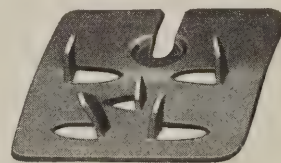


Fig. 1—The Upson self-clinching fastener. Note the straight center prong which holds the board immovable and the curved, staggered prongs which clinch into the back of the board as shown in Fig. 2. Note also the counter-sunk space for the "in-to-stay" nailhead

is in the form of a new fastener, the "Upson Self-Clinching Fastener," that goes on the studding *before* the wallboard and not *after*.

Fig. 1 shows the fastener and its general construction. It is made of thin steel of a special temper. It is about 1 in. square and has one straight and four curved prongs staggered, two on each side. The

particular curve on the prongs makes them self-clinching, as noted in Fig. 2.

The fastener is nailed to the studs or joists every 9 or 10 in. in the panel (Fig. 3)

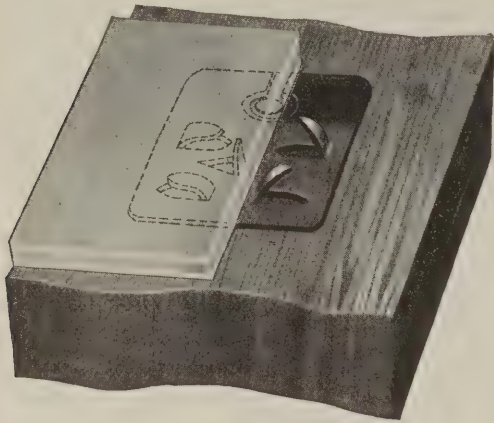


Fig. 2—Showing a "radiograph" view of part of fastener clinched into back of wallboard far enough to hold permanently but beneath the wallboard surface

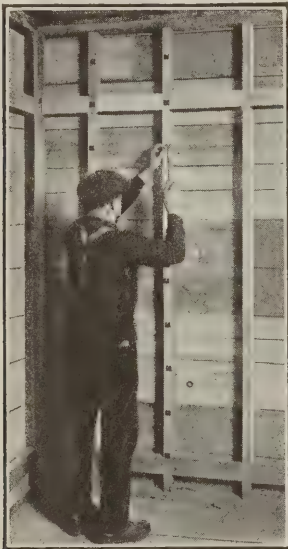


Fig. 3—The fasteners being applied 9 or 10 inches apart on studding

with 1-in. nails, the prongs of the fastener extending outward. Note the depression in the fastener (Fig. 1) for the "in-to-stay" nailhead to fit flush with the body of the fastener. The wallboard is applied over the fasteners and a piece of 2 by 4 in. lumber the square edges of which have been slightly rounded off to prevent defacing the panel is laid on the wallboard over the fasteners and struck a few heavy blows with a hammer. (Fig. 4.)

As the board is forced down on the fasteners the prongs clinch deeply into the back (Fig. 2), the straight prong holding the panel so it will not move to either side as the curved prongs clinch.

The prongs go into the board from the back far enough to grip it tightly, but not far enough to penetrate the board. As a result the surface of the board presents a clean unbroken appearance. As soon as

the fasteners are all driven in the board is ready for decorating, there being no nails



Fig. 4—Applying the wallboard over the fasteners, using a piece of 2x4 with rounded corners to avoid marring the panel. A few blows of the hammer on the 2x4 placed on the wallboard over the fastener clinches the prongs in the board and leaves a smooth, unbroken surface

to countersink or holes to fill with putty as when nails are used.

Finishing Concrete to Resemble Marble

J. R. S., of Mt. Pleasant, Tenn., asks for information as to the method of finishing concrete so it will resemble marble. *Answer*—The Portland Cement Association, to whom his inquiry was referred for expert advice, reply: "The inquirer does not state whether the concrete is in floors, concrete block or vertical walls. The notes following refer to terrazzo on floors, but they can be applied with equal success for walls. Following these notes are the specifications for terrazzo by D. L. Turner, C. E., chief engineer to the Transit Construction Commission, New York City."

Portland Cement Association Notes on Terrazzo Floors

Foundations—A terrazzo finish should preferably be laid on a concrete slab, but can be laid on a wooden floor if necessary. In the former case the terrazzo finish should be 2 in. thick and reinforcing is not usually required; in the latter case the terrazzo finish should be at least $3\frac{1}{2}$ in. thick and should be reinforced with wire mesh or expanded metal.

Base Course—The terrazzo should be laid if possible before the concrete floor has hardened. If the concrete foundation slab is allowed to harden before the finish is placed, it should be left somewhat rough, and when ready to apply the finish it should be carefully cleaned, drenched with water

and painted with a grout of neat cement of creamy consistency. Immediately thereafter the base course of the terrazzo finish should be placed, making it 1 in. to $1\frac{1}{4}$ in. thick. Sometimes a 1:2:4 mixture of portland cement, sand and small pebbles, small stones or cinders is used for this base or "filler" course, but a 1:3 cement sand mortar is considered better. The sand should be clean and well graded. This base course should be tamped into place and screeded to a smooth, even surface.

Finish Course—The placing of the finish is sometimes delayed 24 hours, but better results are obtained if it follows immediately after the base course is completed. The finish consists of a mixture of portland cement and marble, or stone chips or screenings, to which a little sand may be added. Some architects specify definite proportions of cement and chips, such as 1:3, while others merely specify that enough cement be used to fill the interstices. This mixture is spread evenly to the proper thickness and rolled; then additional marble chips either of the same size or a little larger are spread over the surface and rolled in. Enough chips should be used so that they will cover at least 85 per cent of the finished surface.

Finishing—After the finish course has hardened somewhat (often at the end of 24 hours), but before it gets too hard, it should be ground down by a rotary rubbing machine, or by hand, using a carborundum brick, to a smooth, even surface, thus exposing the chips on their largest diameters.

General—For a white surface white portland cement and white marble chips may be used. By using mineral coloring material and chips of different colors, shapes and sizes, an infinite variety of color and mosaic effects may be obtained. Borders and patterns of contrasting colors can readily be worked out by placing boards in the proper position when the main body of the floor is laid and later filling in the vacant places thus provided with a mixture of the desired color. Joists that are hardly noticeable can thus be secured. Although much larger areas have been laid successfully, it is best to lay terrazzo blocks not over 10 ft. square in order to provide properly for expansion and contraction.

D. F. Turner's Specifications for Terrazzo

Thickness of terrazzo floors when placed on concrete slabs 2 in., when placed on wood joints $3\frac{1}{2}$ in. and reinforced.

Concrete foundation slab should be carefully cleaned, thoroughly drenched with water, painted with a grout of neat cement and covered with fresh concrete within four hours.

First course of terrazzo finish: One part portland cement to five parts clean sharp lake or bank gravel which will pass a $\frac{1}{2}$ in. screen; mix to a stiff consistency and ap-

ply immediately. Spread evenly with a screed rod, making its surface exactly $\frac{3}{4}$ in. lower than finished floor level. Do not trowel, but leave surface in sand finish.

Within 24 hours set expansion joints, using a single or double row of $\frac{1}{2}$ or $\frac{3}{4}$ in. marble plaquettes set in a mixture of cement and a little lime. These plaquettes to be straight and true, their top surface being left $\frac{1}{16}$ in. above final floor level. Each panel should be as nearly square as possible and not over 100 sq. ft. in area.

Within 24 hours terrazzo surface must be placed, first carefully cleaning the base course, drenching it with water and painting it with neat cement. Immediately thereafter fill the panels with a 1:2 mixture of portland cement and marble chips, first mixed dry and then with water to the consistency of a thin plastering mortar. Fill panels flush with the top of the plaquettes, using a screed rod to insure flush filling. Spread thereon a layer of clear chips $\frac{1}{2}$ in. thick, concealing all the previously placed mixture.

Immediately thereafter roll each panel with a heavy iron roller until surface is flush with top of plaquettes. Trowel to a smooth, even surface, leaving only enough cement on the surface to insure filling of voids. Leave floor alone for four days. In hot weather, or if building is too warm, drench the panels with water three times a day and keep them wet until rubbing is completed. The rubbing should be done by means of the electric floor surfacing machine.

The first grinding should be done with medium grade carborundum blocks, and immediately after each panel is rubbed it should receive a coating of neat cement, be well trowelled and thoroughly ground over with a very fine carborundum or sand stone. This coating of cement is to remain on the floor until the final polishing, which is not to be done until directed by the architect. After that the floor must show not less than 85 per cent of the marble in every part of the surface.

Base and wainscoting to have rounded top and a cove at floor, and to be of the same material and workmanship as the floors, excepting the rolling process. They will receive a stiff trowelling to bring the required quantity of marble to the surface. Plinth blocks are to be installed in the same manner.

Terrazzo stairs are to be installed upon a reinforced concrete slab so placed as to allow 2 in. for both the tread and riser. The nosing of the terrazzo tread shall extend $\frac{3}{4}$ in. over the riser, with a cove at both junctions of the riser and the treads. Risers are to be not less than 1 in. thick, the stringer where specified to be $\frac{7}{8}$ in. thick and to project 4 in. over the top edge of nosing, material to be the same as floors.

Terrazzo wainscoting may be placed upon a brick, tile, mackolite or stone wall or

upon wood studding covered with truss-loop or hy-rib metal lath. All walls shall first receive a scratch coat of 1:2 cement-sand mortar with enough lime added to make a good trowelling mixture. Its face shall be even and $\frac{1}{2}$ in. back of the wall line. It should be well scratched before setting. The following day this scratch coat should be painted with a grout of neat cement and

the terrazzo surface applied immediately by the aid of guide strips bedded in the wall. Just before the terrazzo sets it should receive a very stiff trowelling with a flat trowel. It should then be left alone for three days, after which the rubbing process may begin. The wall must be left true and even and show not less than 70 per cent of marble upon its face.

Table of Exact Lengths of Common and Jack Rafters

By S. W. Jackson, Builder

BUILDERS using the following table in laying off rafters should remember that given lengths are computed from center lines, hence the run of each rafter is from center of ridge board to outside face of plate, and if a ridge board is used, half the thickness of same must be deducted from figures named. To get top and bottom cuts a true miter is used for all half pitch roofs. And for third pitch, 8 and 12; for fourth pitch, 6 and 12, on the steel square gives the correct cuts. Always use the long bevel for bottom cut. It is more convenient to lay off the bottom cut first, then take dimensions given in the table. For finding the length of jack rafters when building is half pitch, make the first long jack 34 in. shorter than the adjoining common rafter, and each succeeding one 34 in. shorter than the one above. For third pitch, cut long jack 29 in. shorter than common rafter adjoining. For fourth pitch, cut long jack 27 in. shorter than the adjoining common rafter, and each succeeding jack 27 in. shorter than the one above. The above jack rafters are supposed to set 2 ft. on centers. For getting the cuts on hip and valley rafters, 6 and 17 for fourth pitch roofs, 8 and 17 for third pitch and 12 and 17 for half pitch roofs. To get the diagonal cut at top of jacks, lay off the thickness of jack, square from the plumb cut, then square across the top or back of jack, then the diagonal line intersecting these; form the bevel for cutting. Applicable to any pitch.

Table giving exact length of common and jack rafters for width of buildings as given below:

Building.	Length of rafter.
10 ft. wide, half pitch,	7 ft. 14/16 in.
" " third " "	6 ft. 1/4 in.
" " fourth " "	5 ft. 6 13/16 in.
12 ft. wide, half pitch,	8 ft. 5 3/4 in.
" " third " "	7 ft. 2 1/2 in.
" " fourth " "	6 ft. 8 1/2 in.
14 ft. wide, half pitch,	9 ft. 10 3/4 in.
" " third " "	8 ft. 5 1/8 in.
" " fourth " "	7 ft. 9 7/8 in.

16 ft. wide, half pitch,	11 ft. 3 3/4 in.
" " third " "	9 ft. 7 in.
" " fourth " "	8 ft. 11 3/8 in.
18 ft. wide, half pitch,	12 ft. 8 5/8 in.
" " third " "	10 ft. 9 13/16 in.
" " fourth " "	10 ft. 3/4 in.
20 ft. wide, half pitch,	14 ft. 1 11/16 in.
" " third " "	12 ft.
" " fourth " "	11 ft. 2 3/16 in.
22 ft. wide, half pitch,	15 ft. 6 11/16 in.
" " third " "	13 ft. 2 3/4 in.
" " fourth " "	12 ft. 3 7/16 in.
24 ft. wide, half pitch,	16 ft. 11 5/8 in.
" " third " "	14 ft. 5 1/16 in.
" " fourth " "	13 ft. 5 in.
26 ft. wide, half pitch,	18 ft. 4 5/8 in.
" " third " "	15 ft. 7 1/16 in.
" " fourth " "	14 ft. 6 15/16 in.
28 ft. wide, half pitch,	19 ft. 9 9/16 in.
" " third " "	16 ft. 9 7/8 in.
" " fourth " "	15 ft. 7 13/16 in.
30 ft. wide, half pitch,	21 ft. 2 9/16 in.
" " third " "	18 ft. 3/8 in.
" " fourth " "	16 ft. 9 1/4 in.

Storage Qualities of Cement

N. S., Pigeon, Michigan, writes as follows: "Our editor, Mr. S—, has a dairy basement floor to cement, 40x50 feet. He bought his cement 9 months ago and kept it in a dry place. He also rolled it over several times to keep it fine. Would he be sure of a good floor by using that cement alone, or should he get some new cement with it?" *Answer*—This inquiry was referred to the Portland Cement Association for expert information, and the reply was: "If the cement has been in a perfectly dry condition it should not be damaged any by this length of storage. However, if in turning it over Mr. S— has found lumps in the sacks, it would indicate that the cement has absorbed moisture from the air, and in that case its use in making concrete could not be recommended. If he has never found any lumps to exist in the sacks he should feel safe in using this cement to construct his proposed floor."

Accounting for Contracts and Sales

Routine of Contracts and Invoices—Accounting Procedure Through Sales Analysis —Determining Value of Accounts Receivable, Sales and Uncompleted Contracts

No. 4--By G. W. Hafner

Audits, Systems, Federal Tax Service, Industrial Engineering

A BUILDING contractor ordinarily secures his business by bidding on contracts. Certainly he does other work, in the way of repair jobs and the like, and he may, on occasion, sell some material, and receive some direct income from his team or truck operations, where these are occa-

After due consideration of bids received from the contractors who have submitted them, the contract is awarded; i.e., an agreement is entered into between the owner and the contractor, and a contract is drawn up for their signatures, which sets forth the legal relations existing between them.

purpose, among others, of notifying the owner of the amount due the contractor.

These certificates are made the basis for another entry through the Sales Analysis. The total value of the work (not the 90 per cent only) completed during the period, as shown by the architect's certificate is entered

[illegible]

sionally employed in hauling for outside individuals or firms. Nevertheless, the major portion of his income is derived from the construction of buildings under contract.

Securing Contracts

Copies of specifications and blue prints for the building to be erected are sent to various contractors (or the contractors may call and obtain them from the architect) and sealed bids for the construction of the building are submitted by these contractors, after a thorough analysis of the specifications and drawings have been made, and an estimate prepared. (The subject of estimating will be covered in a subsequent article.)

Ordinarily these bids are submitted in the manner illustrated below.

....., the undersigned, hereby
proposes to construct a building for.....

in strict accordance with drawings numbered and the foregoing specifications, for the sum of

..... \$.....
If pine trim is substituted for oak.

If pine trim is substituted for oak,
deduct \$.....

If one-panel doors are substituted
for five-panel, add..... \$.....

If pine doors are substituted for oak, deduct..... \$.....

If thirty (30) days' additional time
is allowed for construction; deduct... \$.....

Signed.....

The Sales Analysis

The contract having been awarded to the contractor, the estimate sheets on which his bid was based; or a copy of the bid itself, after it has been amended, if necessary, to agree with any subsequent changes, may be used as the original record for entry in the Sales Analysis (Fig. 9).

The total price to be received for the work, as shown by the contract, is entered in the column headed "Accounts Receivable," under the general heading "Debits"; the corresponding credit being entered in the column headed "Uncompleted Contracts," under the general heading "Credits." The date, contract number and name of the owner are shown in the columns provided.

This serves the purposes of charging the owner, at one time, with the total amount to be paid by him, without overstating the aggregate total of accounts receivable, since the total credit balance in the "Uncompleted Contracts" account is deducted from the total debit balance in "Accounts Receivable" account, to determine the net collectible value of outstanding receivables.

As the work on the contract progresses, it is customary for the architect to make, each month, an estimate of the value of the materials and labor, used in the construction of the building up to that date, and to issue to the contractor a certificate for 90 per cent of such value, for presentation to the owner. Such a certificate serves the

in the column headed "Uncompleted Contracts" under the general heading "Debits," while the corresponding credit is entered in the column headed "Completed Contract Sales" under the general heading "Credits."

The effect of this is to credit the sales account only with the value of such part of the work as has been completed during a given period; and by passing the corresponding charge to the account with "Un-completed Contracts," the balance of this account will always serve as an offset to the total value of the "Accounts Receivable" account, by means of which the net is ascertained. This is the logical and safe way in which to handle these transactions, in order that the accounts in the General Ledger may always represent the true status of the affairs of the business.

When material of any kind is sold, as sometimes happens in the case of repair work, and otherwise, the face value of the charge is entered in the column headed "Accounts Receivable" under the general heading "Debits," and the corresponding credit would be entered in the column headed "Material Sales," under the general heading "Credits." The number of the invoice covering such charges, together with the name of the purchaser, would be shown in the columns provided.

The column headed "Miscellaneous" under the general heading "Credits" is to be used for the entry of any items for which a specific column has not been provided;

[illegible]

as, for instance, team and truck income from outside sources, and the like. The offsetting debit of such items would, of course, be entered in the "Accounts Receivable" column.

At the end of the month the totals of all columns of the Sales Analysis are posted to either the debit or credit of their respective accounts in the General Ledger, as shown by the general headings: "Debits" and "Credits."

Each item entered in the "Accounts Receivable" column requires to be individually posted to the account of the particular customer in the customers' ledger.

Customers' Ledger Sheets

The Sales Analysis serves as the medium of posting to the customers' ledger (Fig. 10). An individual ledger sheet should be opened up with each owner or customer, as the case may be, to which are separately posted all the items chargeable thereto.

It should be borne in mind that a trial balance of the customers' ledger should be taken off each month, in order that it may be seen that the aggregate total of all debit balances in the customers' ledger equal the debit balance found in the "Accounts Receivable" controlling account in the General Ledger. If these are not in agreement, the error or errors should be located and adjusted immediately.

The source of all credit information for the building contractor lies in the accounts in the customers' ledger, the form being designed to provide certain salient information respecting the particular individual for whom work is being done. It is not necessary, however, for the proprietor or manager to keep in touch with all accounts. Generally speaking, his attention is required only in those accounts which are overdue, and these can readily and easily be watched by having the bookkeeper report all overdue items. As soon as an account or partial payment is past due the bookkeeper should make out a statement showing the status of the account, and turn it over to the individual responsible for credits. By this means his attention is directed to all overdue items.

The ledger itself may be divided alphabetically by owners' or customers' names; or by territories or towns, and then by customers' names, also in alphabetical order. Or it may be indexed, first, under the names of architects, and then by customers' names.

Sales Invoices

For the purpose of billing extras on contracts, or direct material sales, or jobbing and repair work, or charges for teams and trucks to outside parties, a sales invoice (Fig. 11) becomes necessary.

These are ordinarily made out in three copies:

1. Sales invoice, to be sent to the customer.
2. Office copy, or permanent record, for the purpose of charging the customer and determining the sales, to be filed in numerical order. These are entered, as previously explained, in the Sales Analysis.
3. Office copy, to be filed in alphabetical order. This additional copy will be found a great convenience in very many instances, especially in the case of charges for extras on contracts, since an additional copy of the invoice can always be secured thereby, without the necessity of making out an entirely new bill.

Credit Memoranda

As the building progresses, the owner and architect, as well as the builder, often see items which might be changed to the advan-

tage of all concerned. There is seldom any work in which improvement cannot be made as it progresses, and sometimes this results in a material reduction from the contract price.

In such cases it is always advisable, if not altogether essential, that the contractor make out a credit memorandum (Fig. 12), in order that the proper credit may be immediately passed to the account of the owner of the building. Other uses for credit memoranda are also apparent; as, for instance, recording an allowance made for overcharge on jobbing and repair work, and the like.

In the handling of these credit memoranda, it is necessary to bear in mind that they are treated in the same manner as invoices.

It will be found advisable, as in the case of invoices, to make out three copies of credit memoranda, as follows:

1. Customers' copy.
2. Office copy, or permanent record, to be filed in numerical order.
3. Office copy, to be filed in alphabetical order.

If a sufficient number of credit memoranda are issued to make it desirable, a sepa-

HAFNER METHOD

FIGURE 11
INVOICE
NAME OF FIRM
CHICAGO, ILLS.

SOLD TO:

┐

┐

INVOICE NO. 832

DATE

OUR ORDER NO.

YOUR ORDER NO.

CONTRACT NO.

VIA

CAR NO.

FREIGHT

F.O.B.

└

└

SHIPPED TO

QUANTITY	DESCRIPTION	PRICE	UNIT	AMOUNT

Sanitation, Heating and Lighting for a Suburban or Country House

No. 4—By Edward E. Ashley, Engineer, Starrett and Van Vleck, Architects,
New York City

WATER piping is properly designed when an ample supply is obtainable at any fixture any time. There is nothing so irritating as to be drawing water for bath purposes and see a dribbling stream. The piping should be so proportioned as to permit filling the bath in the least possible time.

should be made to provide outlets for fire protection.

Where service is taken from a water main the size of the service must be of ample size to supply the maximum demand for water, allowing amply for friction losses of piping, meters, etc.

sufficient shut-off valves to permit of easy and quick repairs and replacements.

Cold water piping should be so located as to avoid close proximity to flues, heating pipes or the hot water piping. Also, avoid water piping coming in contact with electric wires or conduits.

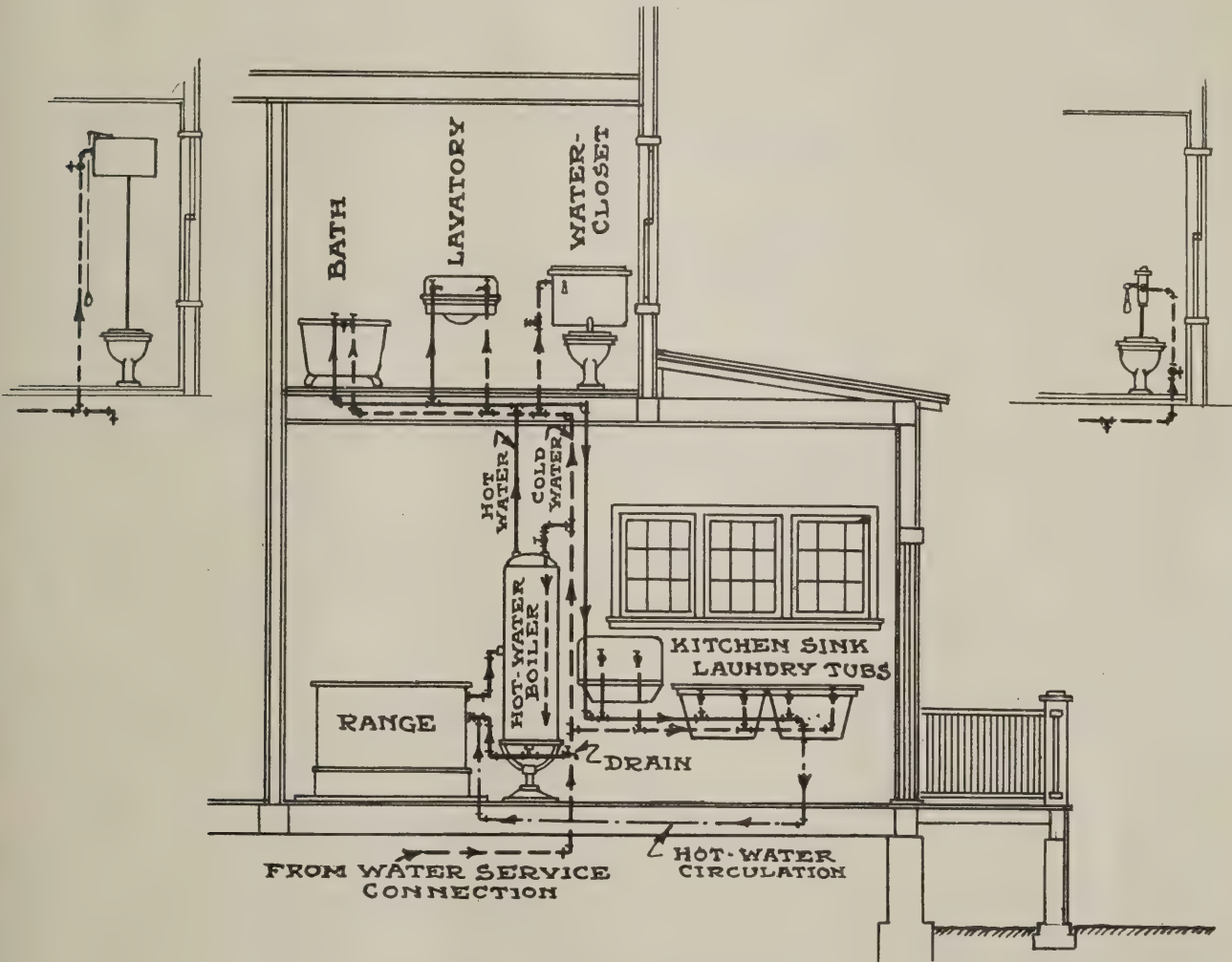


Fig. 1—Typical hot water heater

With the use of flush valves the piping must be of such size so as to provide a large supply to each water closet and of sufficient volume and pressure to properly flush the bowl.

Provision should be made in the outside piping for hose outlets for garden, flowers, washing porches and extension to garage or barn for automobile washing, poultry, etc.

Where pressure is available arrangement

The capacity of service mains 100 feet long and with a loss in pressure of approximately 5 pounds will be as follows:

1/2 inch.....	125 gal. per hour
3/8 inch.....	210 gal. per hour
3/4 inch.....	300 gal. per hour
1 inch.....	670 gal. per hour
1 1/4 inch.....	1160 gal. per hour
1 1/2 inch.....	1750 gal. per hour

All piping should be installed in a manner to prevent freezing and should be provided with ample means of draining, also with

Hot water should be provided in sufficient quantity for baths, lavatories, showers, dish and clothes washing and for general cleaning.

The hot water piping should be installed in what is known as a loop system to provide for a positive circulation, permitting drawing of hot water instantly at any faucet. Abundant storage should be provided with means for heating rapidly.

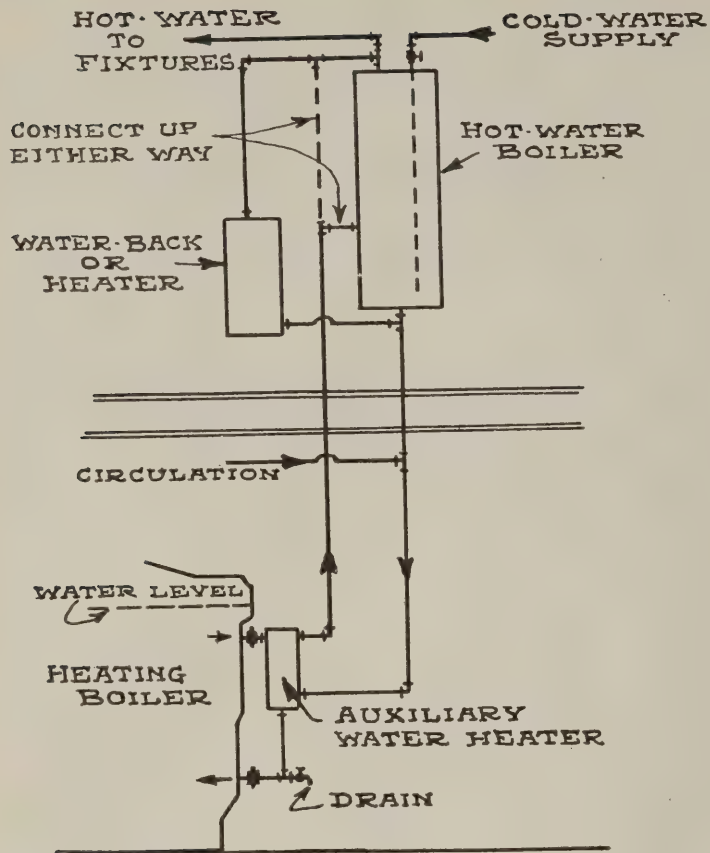
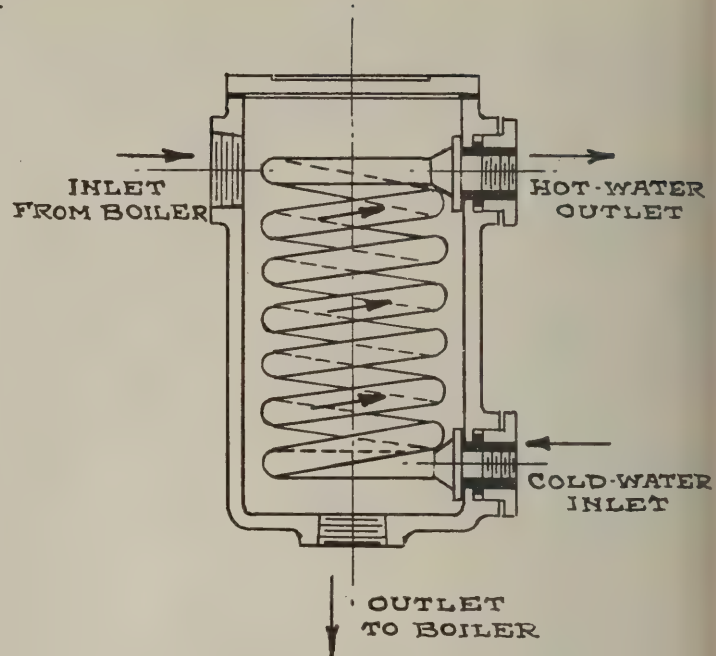


Fig. 2



**AUXILIARY
WATER HEATER**
30 TO 120 GALLONS
PER HOUR CAPACITY

Fig. 3

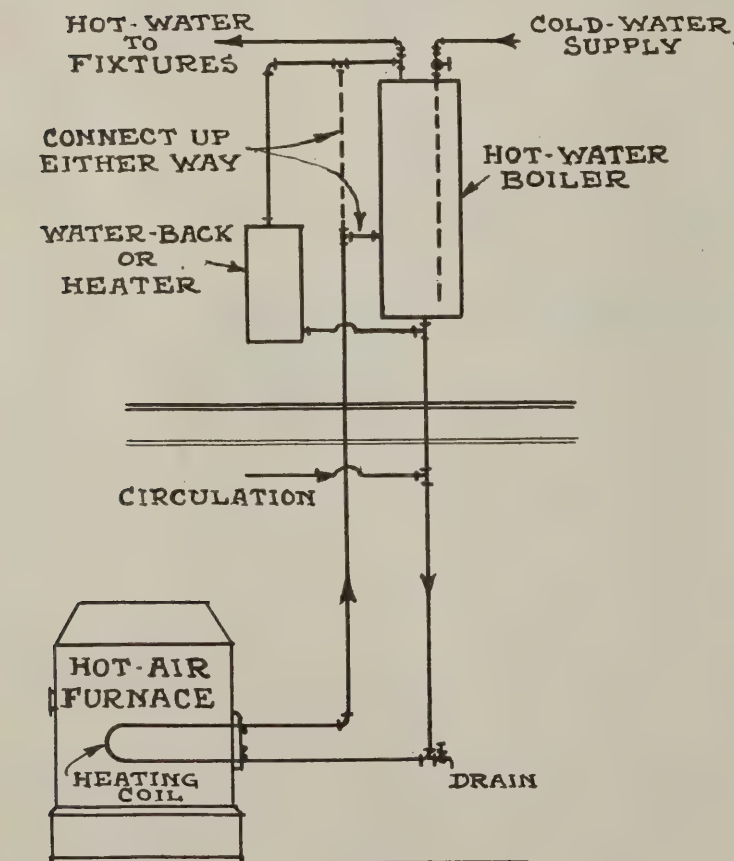


Fig. 4

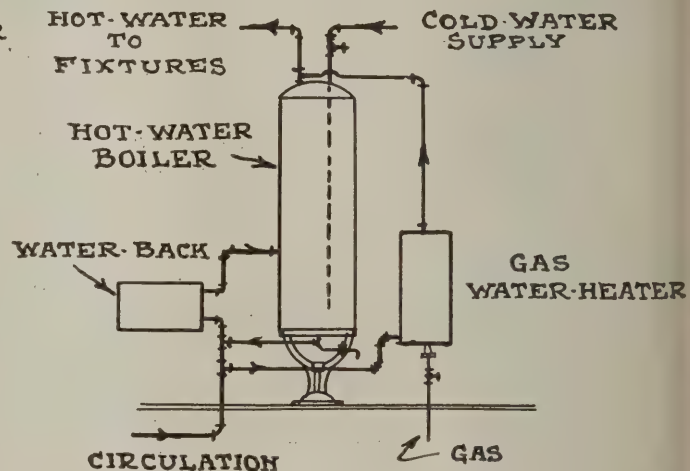


Fig. 5

It is advisable to provide, in addition to the usual water back or hot water heater an auxiliary heater attached to the heating boiler. These heating devices will be described later on.

The proportioning of water piping and fixture branches is a matter of experience and judgment, as it is based on the number of fixtures and how many fixtures will be used simultaneously, which is a difficult matter to determine accurately.

There can be no set rule for the number of plumbing fixtures required, beyond the fact that it would seem necessary to pro-

vide at least one complete bath room, laundry tubs and kitchen sink—from this beginning expansion can be made to suit the personal choice of the prospective owner. The ideal arrangement would be to provide a bath for each bedroom or for each two bedrooms.

Practice has fixed the sizes of branch piping to various fixtures as follows:

Water closets—Flush valve.....	1 1/4 inch
Water closets—Flush tank.....	1/2 inch
Shower baths	1/2 inch
Tub baths	3/4 inch
Lavatories	1/2 inch
Sinks	1/2 inch
Double wash tubs.....	3/4 inch

4 to 8 fixtures—	1 inch
9 to 12 fixtures—	1 1/2 inch
13 to 32 fixtures—	1 1/2 inch

Where fire protection is desired piping should be not less than 1 1/2 inch to outlet. Both hot and cold water piping should be similarly proportioned. The hot water circulating return should be not less than 1/2 inch for the average medium size house. The hot water system should be provided with a vent and expansion pipe and should be so installed as to avoid air pockets.

direction causing unnecessary friction. It should be carefully supported to prevent sagging or undue strain on fixtures or fittings; it is desirable to provide air chambers at the connections to fixtures to absorb the shock in closing of faucets. The effect of sagging or trapping of piping is that air will collect in the high parts of the piping, thus forming air locks. If the piping has been carelessly installed and there are several traps, it is quite possible that they will stop the flow of water entirely. For instance, if there were 20 sags

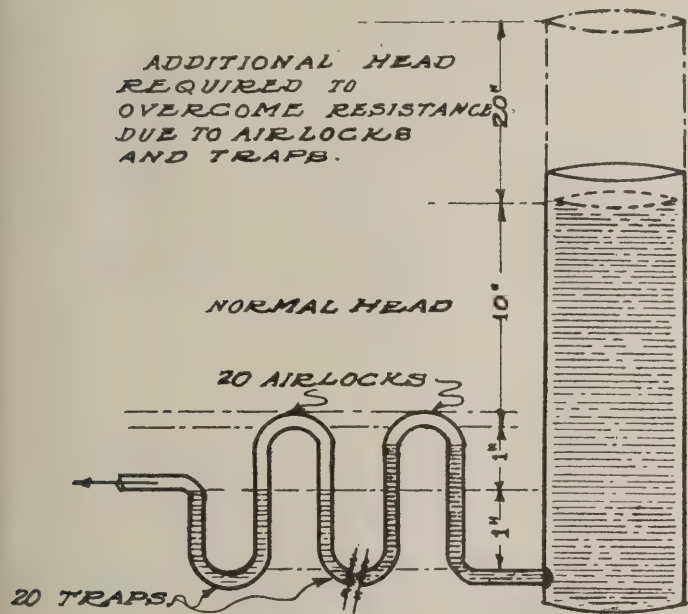
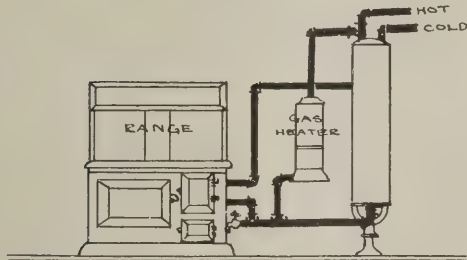
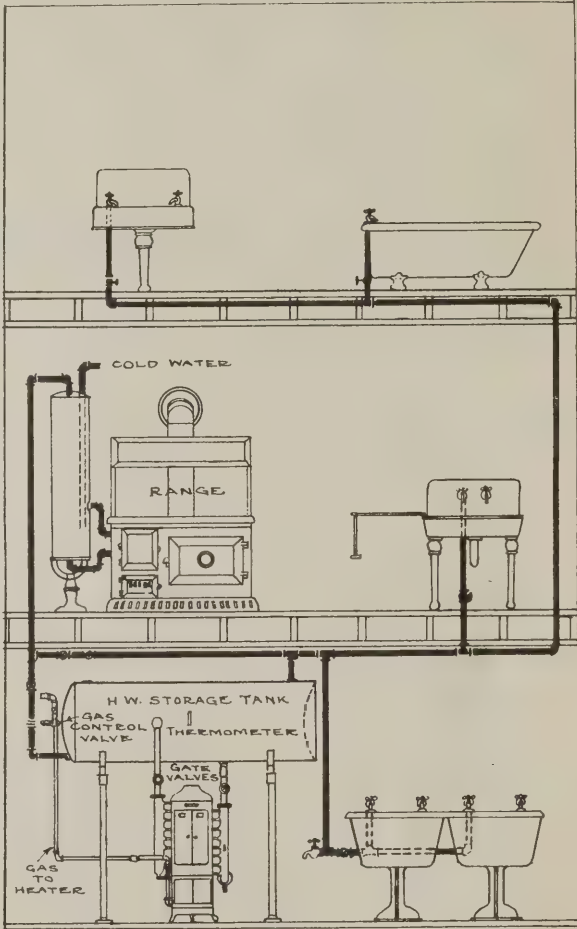


Fig. 6



Type "a"—Fig. 7



Type "b"—Fig. 8

Single wash tubs.....	1/2 inch
Heating boilers	3/4 inch
Hose outlets	1/2 inch
Carriage washers	3/4 inch
Washing machines	1/2 inch
Garden hose outlets.....	3/4 inch

Flush valves should not be used where pressure is not constant and is less than 5 pounds at the fixture. Where flush valves are used the pipe to them should be 1 1/4 inches for one and 1 1/2 for two with no additional increase for the additional fixtures, such as lavatories, tubs, etc.

Generally, a bath room with three fixtures will require a 3/4-inch supply—one with four fixtures would require 1-inch—two bathrooms of three fixtures each a 1-inch pipe and so on as follows:

Hot Water Piping

The sizes for hot water branch supply connections to fixtures are the same size as the cold water connections previously stated.

In the installation of water piping care should be exercised to see that all pipes are laid to drain, either in the lowest fixture or there should be provided a drain or emptying connection. The water pipes should not be placed near steam pipes nor should they be run in exterior walls unless this is unavoidable, then they should be heavily insulated to prevent freezing.

The piping should be laid out so as to avoid as much as possible traps or air locks, and all unnecessary offsets or changes in

or traps in a line of one inch each or a total of 20 inches, there would be a required pressure of 20 inches before any water would flow in the pipe. This can readily be appreciated where a tank supply is used and the pressures are very small (see Fig. 6).

Friction depends not only on the diameter and length of a pipe, but upon the velocity, the roughness of the pipe, the pressure and viscosity of the liquid. For instance, ice cold water would indicate a greater resistance than hot water. Curves, bends, valves, etc., all tend to increase the friction, which for small pipes may roughly be taken as equivalent to increasing the length in feet about two to four times the

diameter of the pipe for each 90 degree bend and a valve is equivalent to about six diameters of length of the pipe.

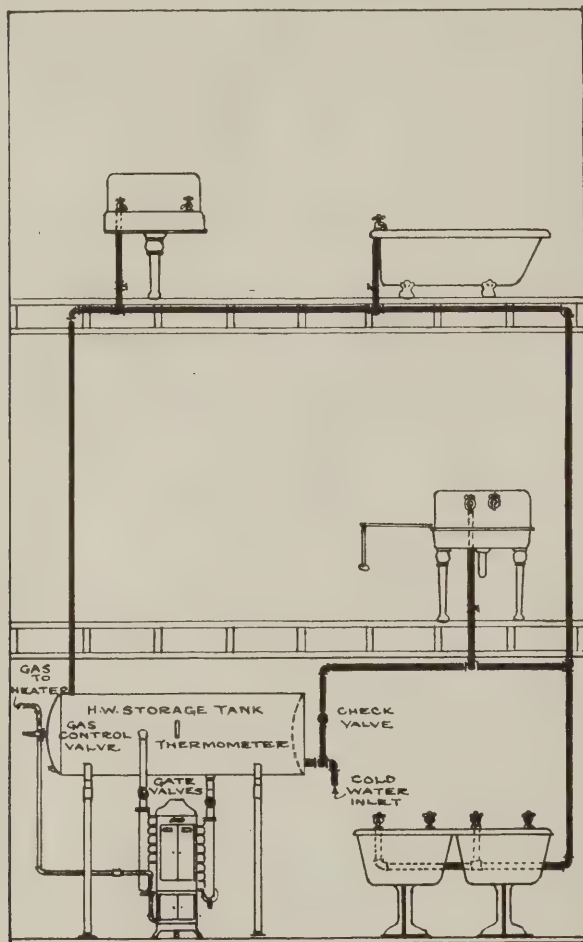
When a faucet is closed while the water is flowing, the water behind the faucet is retarded and a dynamic pressure produced, and when the valve is closed quickly this pressure may be much greater than the static pressure and is then called water hammer. This action is dangerous and should be avoided by providing air chambers and omitting rapid closing valves.

one or more burners connected at its base, permitting the flames to impinge on the lower sections of heater and the heat rising coming in contact with the balance of the coils—a vent flue connected with chimney is desirable—this heater is connected with the range boiler or tank, as shown in the sketch.

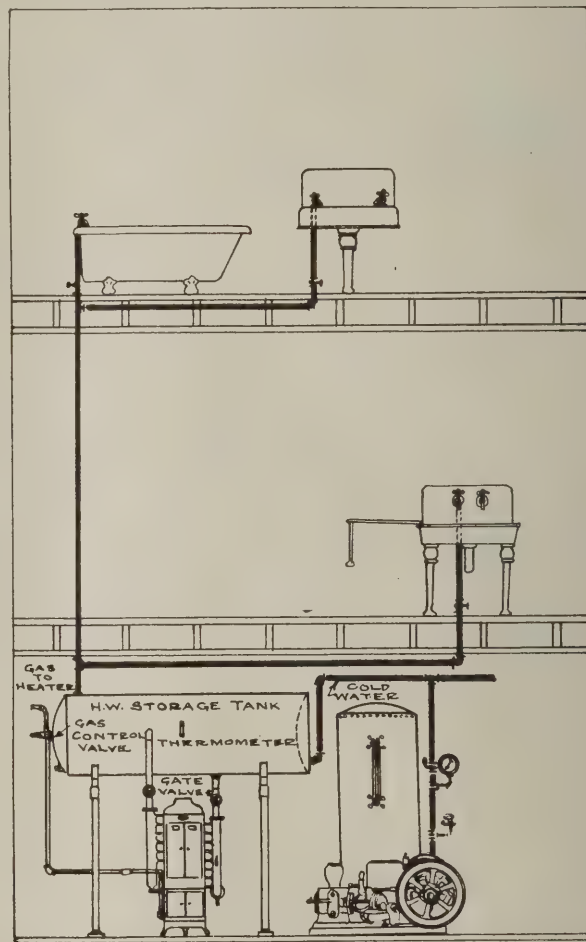
These heaters are economical in fuel consumption, as they need be started up only a little while before requiring the water, which is heated quite rapidly and consumes little gas.

tion pipe is required and whenever water is required the dead or stagnant water must be drawn off before the hot water is obtained.

The operation of heater is by variation of pressure on the hot water supply, which is caused by opening or closing a hot water faucet, thus causing the gas valve on supply to automatically open or close, thereby regulating the flow of gas to the main burners. The pilot light is independently connected to the service and when once lighted re-



Type "d"—Fig. 9



Type "e"—Fig. 10

Water Heaters

For the small house, where gas is available, it would seem advisable, especially when consideration is given to the labor of handling coal and ashes, to employ gas as the medium of heating the water; again, it may be desirable only to use gas in the summer time, and a water tank in the kitchen range in winter when the heating of kitchen may also be accomplished by the heat thrown off from the range.

There are several types of gas heaters:

- a—Gas heater with tank.
- b—Automatic gas heater with tank.
- c—Automatic gas heater without tank.
- d—Instantaneous gas heaters.

Type a, Fig. 7, generally consists of a copper or brass coil or cast iron sections, arranged vertically in a casing or shell with

This heater is very often used as an auxiliary to help out the water tank in range when the demands are heavy. They are not intended for service requiring continuous operation.

Type b, Fig. 8, generally consists of a coil heater with a group of burners and a storage tank with the gas supply controlled by a thermostatic valve and pilot so that when the temperature of the water in tank drops below a certain pre-determined point, due to drawing of water, the gas is turned on and the heater begins to function. This type of heater is generally used where large demands are made suddenly and where large quantities of water are required.

Type c heater is very similar to type b in construction, but is used without storage tank. With this heater no circula-

mains so, thus providing means of instantly igniting the gas in the main burners when the gas and water valves are open. With this type of heater, very little gas is consumed except when actually drawing water.

The flow of gas is also controlled by thermostats so as to maintain a constant water temperature of any predetermined degree.

Type d, Fig. 9, an instantaneous gas heater, is intended for use in connection with an individual bath, lavatory or fixture, generally by gravity flow and not under pressure. They are generally surface type with water sprayed over conical discs, with gas flames on under side of same. The water and gas supplies are controlled by a single lever so as to prevent turning on one without the other. This type of heater requires a pilot

light and is limited in its scope of usefulness.

Probably the most economical water heater is the simple cast iron water jacketed heater sometimes provided with flat top for laundry purposes. It generally has a grate of from 8 to 12 in. in diameter and requires a bucket of coal night and morning and with a fairly well proportioned storage tank provides all the water requirements of the usual suburban house. Of course, the drudgery of coal and ash handling must be considered, for very often the additional expense for gas is more than compensated by its convenience.

water heater having capacity for heating 4 gallons of hot water per minute 50 degrees Fahrenheit, or a coal heater with capacity to heat 48 gallons of water per hour from 40 to 140 degrees Fahrenheit with firing every 8 hours.

(To be continued)

Gas Engines

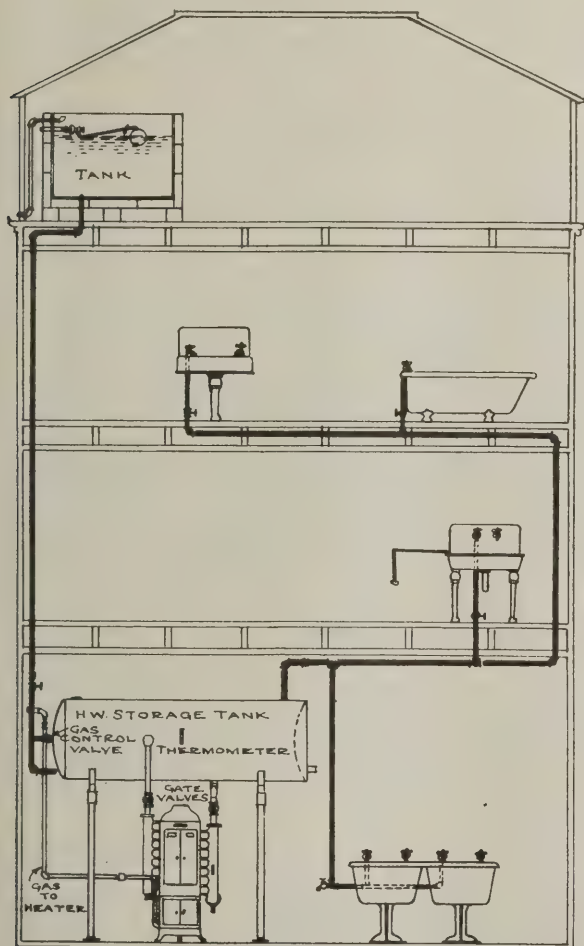
ONE GAS ENGINE manufacturer states: Every engine is inspected, tested and all adjustments carefully made before it leaves the factory. We try to spread the doctrine

Be sure the buzzer works on your spark coil.

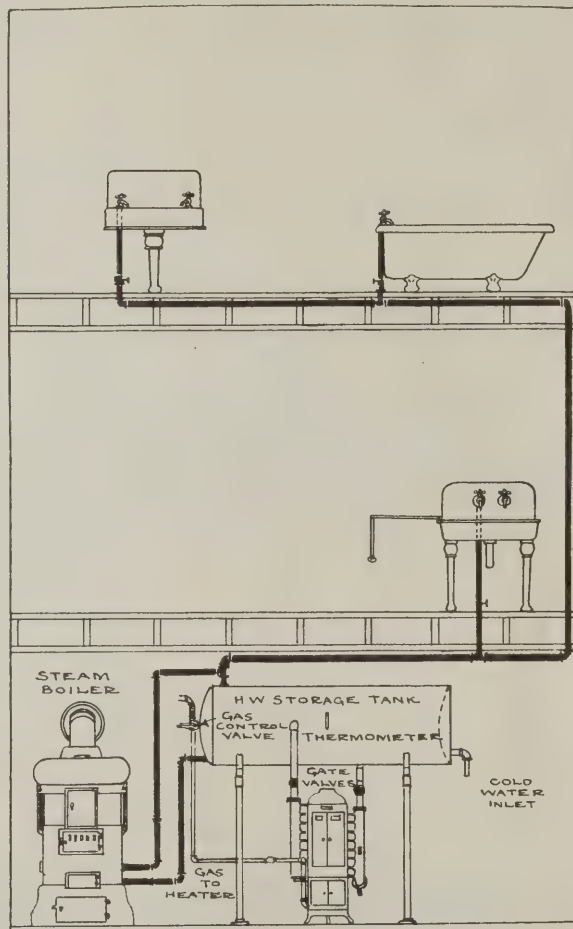
Before trying to start the engine be sure that there is a plentiful supply of gasoline. Flood the carburetor bowl so that gasoline runs back through overflow pipe.

Do not use steam engine cylinder oil. Good gas engine oil must be used. See that all grease cups are kept filled and keep oil in the oil holes of the cam, rocker arm, governor latch lever, governor shoe and governor weight. Also on valve stems. Keep the oiler filled and properly adjusted.

When the engine is new it is a good



Type "f"—Fig. 11



Type "g"—Fig. 12

There are also several exceptionally efficient oil water heaters of quite similar construction to the gas heaters, using kerosene oil for fuel instead of the gas. The scope of these heaters is limited to the needs of houses with one or two baths. The consumption of oil will run about one gallon per day for the needs of a family of four.

Sizes and Capacities: In estimating the requirements for hot water it is generally desirable to allow in boiler or tank capacity 20 gallons for each bath, 10 gallons for each sink and 5 gallons for each lavatory.

The average two-story cottage will require a 35 to 40-gallon boiler or tank with a gas

that no attempt should be made to change any adjustment on our engine until the operator has become thoroughly familiar with it.

The three most common causes of trouble in the internal combustion engine are the electrical equipment, fuel supply and the spark plug.

If the engine is battery equipped, put the box of batteries and coil in a dry place and keep them covered and away from heat and dampness.

See that the binding nuts are kept tight and that all terminals are scraped clean before connections are made.

thing to use more oil for a few days.

Before starting the engine for the first time or after it has been idle for some time, remove one of the hand hole covers on the side of the crankcase and put in enough gas engine oil so the nuts on the connecting rod will just dip into it on the down stroke. To add more is wasteful. See that water in the jacket is renewed as it boils away, but it is not necessary to replace it with cold water when it gets hot. A little oil on the top of the water will prevent it boiling over and rusting the engine. Examine the connecting rod often. Do not let it run loose.

A New Plan of Store-Front Construction

Proposed Unification of Philadelphia Business Building Showing the Possibilities in the Architectural Treatment of the Entire Facade from Street to Street as a Single Whole

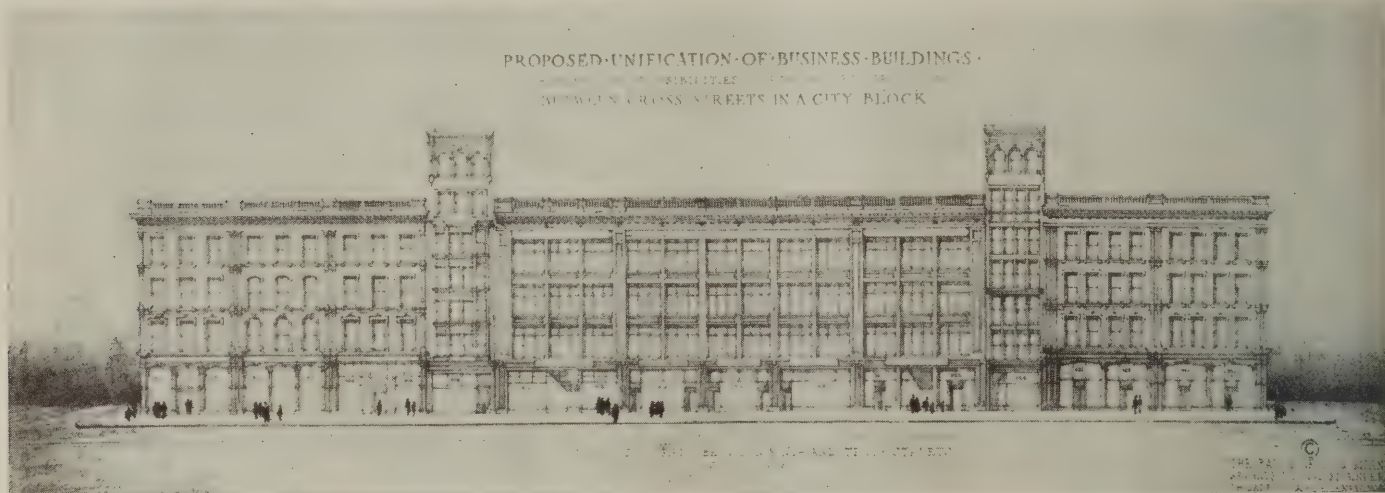
PHILADELPHIA offers to the country a new idea in store-front construction. It is a scheme to improve city business squares by establishing a general architectural plan for the facades as a whole. In

thoroughfare of retail business in Philadelphia.

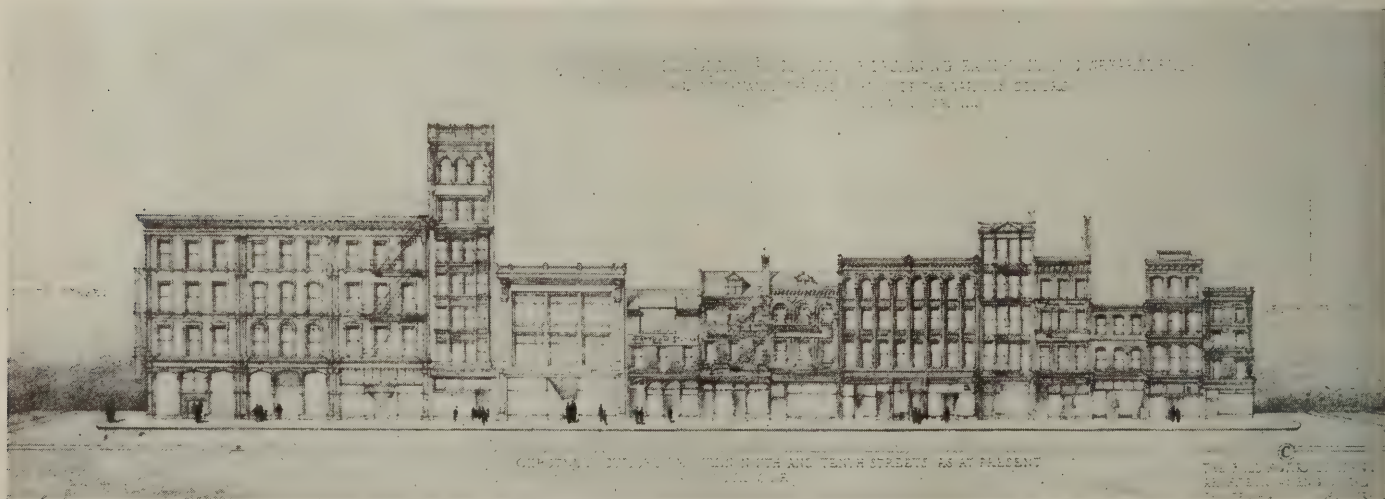
Several city squares were considered and the services of the Ballinger Company, engineers and architects, obtained. A pains-

One photograph shows the present uneven line of structures, some modern but the majority old, while the other view presents the entire facade as the architect's plan.

The idea is not radical or new as far as



How business buildings will look if unified according to architect's plans



The business block as it is at present

brief, a study was made by the Chestnut Street Business Men's Association to determine whether certain business squares could be improved to not only enhance the realty value but to keep pace with the smart shops which have recently been erected in Walnut street, now an active competitor to the main

taking survey was made and one city square selected as an example, that between Ninth and Tenth streets, facing the Federal building. The illustrations indicate clearly what may be accomplished and what undoubtedly will be put into concrete form as soon as the individual firms have approved the plans.

Europe is concerned. In many continental cities the practice of designing entire facades between streets has long been in vogue, and in many instances is demanded by municipal regulation. The Rue de Rivoli, in Paris, opposite the Garden of the Louvre, is a very notable example. The principles

involved are few and very simple, consisting of establishing a general architectural treatment for the entire facade between streets and conforming to a uniform cornice line.

The former, while following a homogeneous scheme in the design, permits of variety in the architectural treatment of the buildings, but this variety is obtained by the grouping, arrangement and disposition of the architectural features and motives, while at the same time retaining throughout a similarity in the architecture.

By contrasting this idea with that of the present practice of designing each individual building as a separate unit in itself without regard for its relation either to adjacent or to opposite buildings or to the square as a whole, it is immediately evident why the majority of our city streets have facades which present such a hodge-podge of designs lacking in rhyme or reason. Why, after any property holder has invested capital in the erection of a building of good design, should the owner of an adjacent or opposite property be permitted to erect a

contain an exhibition together with the general location in the square between certain streets. Since the display windows are retained in the suggested plan, it is obvious that no business loss would result from the proposed treatment.

The erection of the various buildings in any given block to the maximum height permitted under a city regulation, establishes a uniform cornice level provided all the properties are erected to the maximum height. Buildings, except those already

built, will not be permitted above this level except by setting back the fronts a distance equal to the additional height. Therefore, the simplicity and uniformity to be observed in the tentative sketch is not so much the result of architectural design as it is conformative to the city regulations. Special features above this cornice level, frequently desired as matters of design and often practically necessary, will tend to add interest and avoid the monotony of a uniform cornice for square after square.

Three Small Stores with Special Window-Shopping Loggia

HERE is illustrated an especially good arrangement in the designing of small store buildings. With a frontage of 53 feet

neath the plate-glass windows are finished with blue-brown tile, while the wood trimming of the front is painted brown. The roof of the front part of the building is of dark red roofing tile, and that of the back part is of composition. Each of the three stores has two skylights, to assist in interior lighting.

The stores, it will be observed from the plan, vary slightly in the matter of width, but each is 67 feet in depth. Each is provided with a sink and toilet and with running water. The interior woodwork consists of Oregon pine, stained a dull brown shade, and the walls are plastered and tinted.

The building has no basements and is also without furnace equipment. It is located in Glendale, Calif., and was designed by Alfred F. Priest, architect, of Los Angeles, Calif. The present building cost is estimated at about \$15,000, complete.



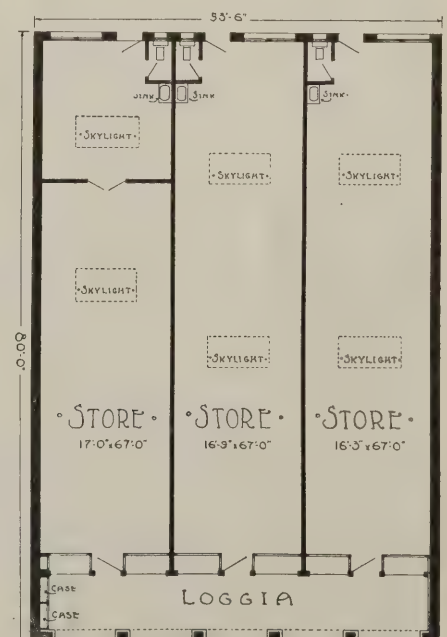
Shopping loggia for three stores

cheap monstrosity and an eye-sore to the neighborhood and especially to the detriment of those buildings which really are good?

The criticism may be advanced that by employing the principles suggested by the Philadelphia plan, the individuality of business buildings would be lost and that customers would not know the stores, as they now do, by the fronts they present to the street. It is an established fact, however, that customers do not remember stores except by the display windows and what they

6 inches, the building contains three store rooms, and across the entire front extends a 9-foot loggia. The fronts of the stores, in other words, are set back about 9 feet from the sidewalk, and a special arcade for "window-shopping" is thus provided free from interference with pedestrians. The show windows are therefore kept exceptionally attractive.

The building is of brick construction. The front or arcade arches, however, are of terra cotta, finished at the top with a galvanized iron cornice, and the walls under-



Safe Chimney Construction

Adapted from an Ordinance for Construction of Chimneys Suitable for Use in Cities and Towns of Any Size or as a State Law, Recommended by the Board of Fire Underwriters Committee on Construction of Buildings

THE Fire Underwriters Committee on Construction state that the additional cost of the construction of chimneys herein recommended as compared with ordinary practice would seldom exceed \$10 to \$15 a chimney, and the increased expense would be returned manifold in saving of life and property and the efficient use of fuel.

The ordinance has been reviewed and approved by various architects and engineers having wide experience in the subject and the following associations:

American Institute of Architects,
American Society of Heating and Ventilating Engineers,
Associated Tile Manufacturers,
Clay Products Association,
Common Brick Manufacturers' Association,
Eastern Clay Products Association,
National Boiler and Radiator Manufacturers' Association,
National Fire Protection Association,
National Brick Manufacturers' Association,
National Lime Association—Eastern Bureau,
National Lumber Manufacturers' Association,
National Warm Air Heating and Ventilating Association.

The ordinance does not apply to chimneys for high pressure boilers, furnaces used in manufacture, or other heating appliances where high temperatures are maintained.

In this adaptation of the formal ordinance the appendix notes are inserted in the sections referring to them for the convenience of our readers.

1. The walls of all chimneys to which this ordinance applies, whether the fuel used be wood, coal, gas or oil, shall be built of brick, concrete, stone, or hollow tile, of such thickness and construction as is hereafter specified, but this shall not preclude the use of a metal smoke-stack when located inside of a vent shaft having walls not less than 8 inches thick, and having an air space between the walls and stack on all sides.

2. Brick chimneys shall be built of solid brick, or may be built of perforated radial brick manufactured for the purpose and adapted to withstand high temperatures, but no other hollow brick shall be used.

3. The walls of brick chimneys shall be not less than $3\frac{3}{4}$ inches thick (width of a standard size brick), and shall be lined with fire clay flue lining.

4. Flue lining may be omitted in brick chimneys for private dwellings provided the walls of the chimneys are not less than 8 inches thick, and that the inner course shall

be a refractory clay brick having a softening point of at least 1922 degrees Fahrenheit (Seger Cone 05). See Appendix Notes I and II.

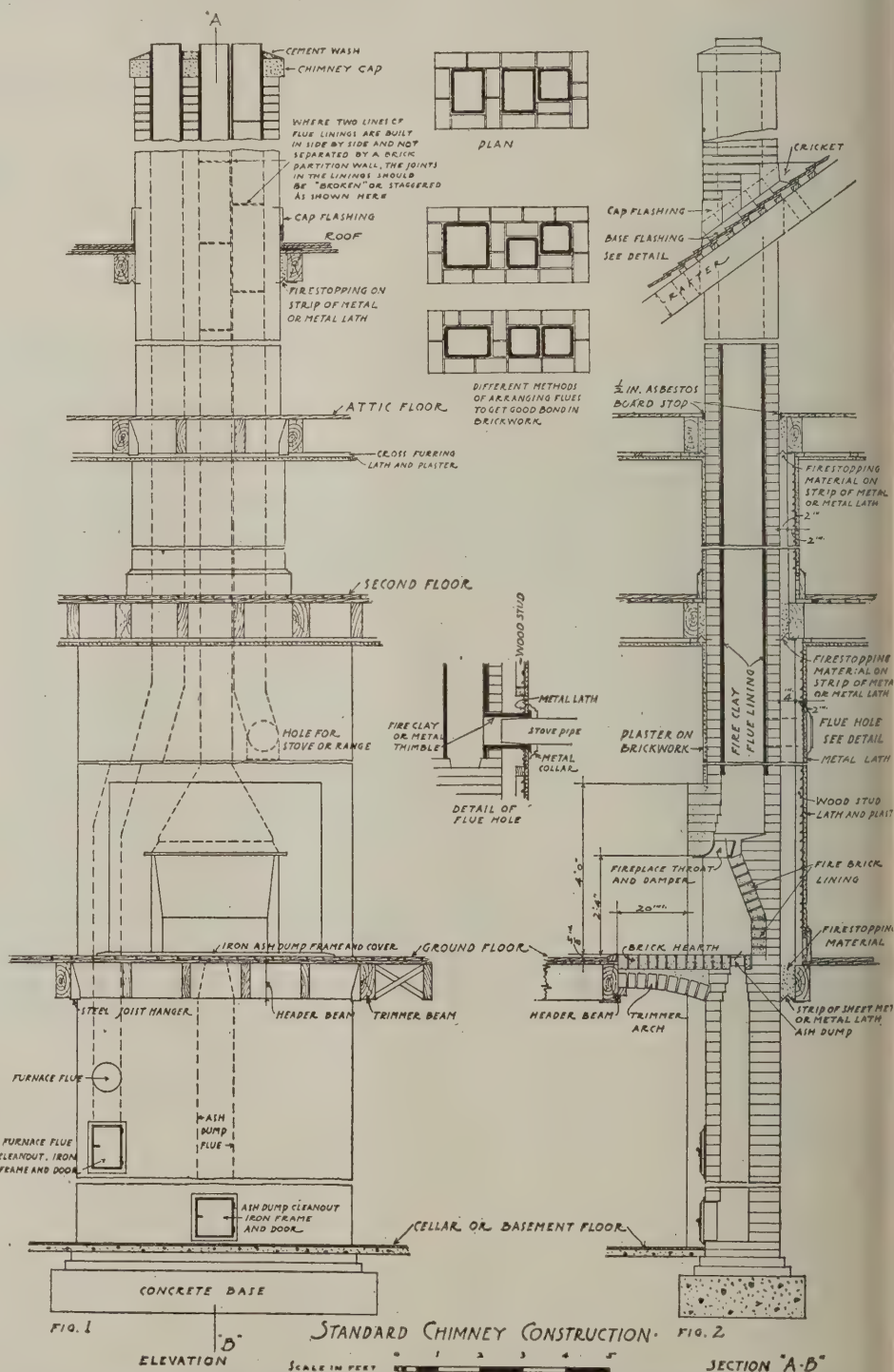


Plate I—Elevation and section of an interior independent chimney showing recommended construction. Extra flues can be added as desired

Appendix Note I—Heat Resistance of Brick

Brick meeting the temperature requirement of Section I, paragraph 4, of the ordinance can be obtained in all sections of the country at a slight cost above that of ordinary brick. In several regions the ordinary brick of the market will meet the requirement, and in such places there would be no additional cost.

It is suggested that each manufacturer of

Appendix Note II—Thickness of Exterior Chimney Walls

For exterior chimneys, or chimneys having any wall exposed to the weather, it is recommended that all such exposed walls be not less than 8 inches thick even though lined. This additional thickness will produce a more uniform temperature in the flue, thereby greatly improving the draft, which will result in fuel economy and a lessening of smoke annoyance.

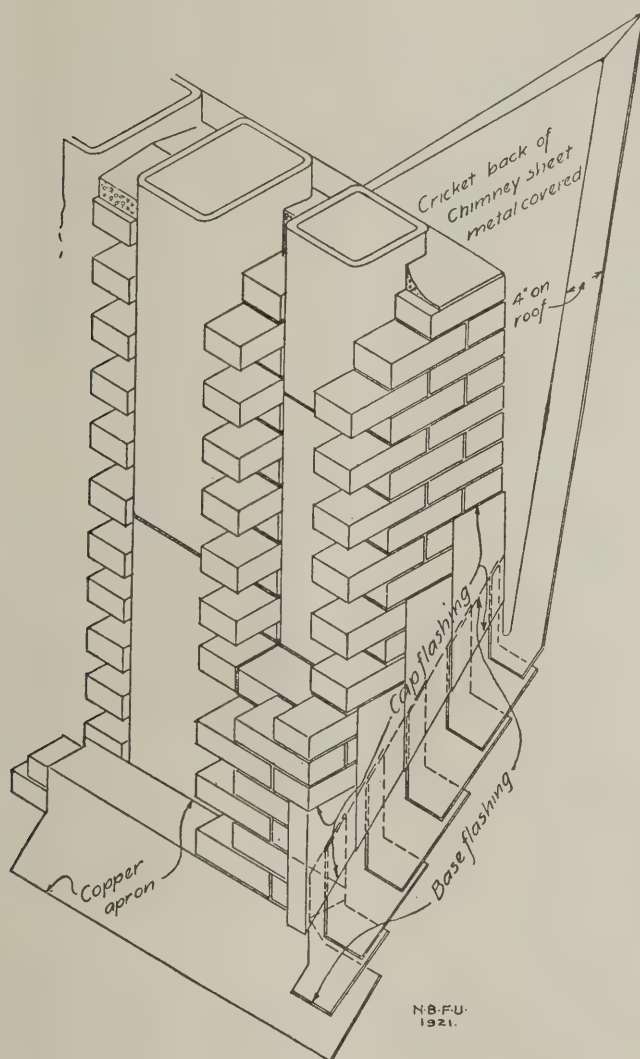


Plate II—Details of chimney construction showing method of flashing at roof surface, also a wash course, but no cap surrounding flues at top. See Plate I

flue linings or heat resisting brick suitable for chimney lining should have tests made of the softening point of the clays used in the manufacture of such products. Such tests should be made by a laboratory of recognized standing, and the test certificate would constitute the authority for acceptance of the product as fulfilling the requirements, provided suitable identification marks were placed on the material. This would be a simple method of accomplishing the object, and the quality of clay from any particular bank is sufficiently uniform to secure reliable results.

5. Perforated radial brick chimneys may be unlined, provided the brick shall have a softening point of not less than 1994 degrees Fahrenheit (Segar Cone 03), and shall be not less than $7\frac{1}{2}$ inches in radial thickness, except that when such chimney is located inside a vent shaft having walls not less than 8 inches thick, the thickness of the chimney wall may be determined by engineering design. The brick shall be shaped to the circular and radial lines of the various sections of the shaft so as to form even joints.

6. All brick work shall be laid in spread

mortar, with all joints push-filled. Exposed joints both inside and outside shall be struck smooth. No plaster lining permitted.

7. Concrete chimneys cast in place shall be suitably reinforced vertically and horizontally. The walls shall be not less than $3\frac{3}{4}$ inches thick and shall be lined with fire clay flue lining.

Flue linings may be omitted in reinforced concrete chimneys for private dwellings, provided the walls of the chimneys be not less than 6 inches thick, and provided further that quartz gravel shall not be used as the coarse aggregate. See Appendix Note III.

Appendix Note III—Concrete Chimneys

Pure quartz gravel or other highly silicious gravel concretes are not adapted to withstand high temperatures, therefore should not be used where subject to direct attack of heat.

The reinforcement required in concrete chimneys cast as a unit, or when built of large blocks enclosing more than one flue is to resist stresses due to temperature variations or unequal settlement of foundations.

8. Concrete blocks used in chimney construction shall have walls not less than $3\frac{3}{4}$ inches thick, and blocks enclosing more than one flue shall have suitable reinforcement completely encircling the blocks and well embedded in them. All concrete block chimneys shall have fire clay flue lining. See Appendix Note III.

9. Stone chimneys shall be at least 4 inches thicker than required for corresponding brick chimneys, and shall have fire clay flue linings. Rubble stone chimney walls shall be not less than 12 inches thick.

10. Hollow building tile shall not be used for the walls of isolated or independent chimneys, but may be used for chimneys built in connection with exterior hollow tile walls of buildings not exceeding three stories in height, in which case the chimney walls shall be not less than 8 inches thick. The outer 8 inches of a building wall may serve as the outside wall of the chimney, but the remaining chimney walls shall be constructed of two layers of 4-inch tile set with broken joints; or they may be built of 4 inches of solid brickwork. In either case the walls of the chimney shall be securely bonded into the wall of the building. No chimney shall be corbeled from a hollow tile wall. All chimneys built of hollow building tile shall have fire clay flue lining. See Appendix Note IV.

Appendix Note IV—Filling of Hollow Building Tile

When chimney walls are built of hollow tile as provided in Section I, paragraph 10, it is recommended that the inner course of cells next to the flue lining be filled with mortar.

11. Chimneys shall be built at least 3 feet above flat roofs, and 2 feet above the ridges of peak roofs, and shall be properly capped with stone, terra cotta, concrete, cast iron,

or other approved material; but no such cap or coping shall decrease the required flue area. See Plates I and II.

12. Fire clay flue linings shall be manufactured from suitable refractory clay, either natural or compounded, which has a softening point not lower than 1994 degrees Fahrenheit (Seger Cone 03), and shall be adapted to withstand high temperatures and flue gases. They shall be of standard commercial thickness, but not less than $\frac{3}{4}$ inch. The flue sections shall be set in mortar of quality hereafter specified and shall have the joints struck smooth on the inside. The masonry shall be built around each section of lining as it is placed, and all spaces between masonry and linings shall be completely filled with mortar. No broken flue lining shall be used. Flue linings shall start at least 4 inches below the bottom of smoke-pipe intakes of flues, or from the throats of fireplaces, and shall be continuous the entire heights of the flues and project at least 4 inches above chimney top to allow for a 2-inch wash and a 2-inch projection of lining. The wash or splay shall be formed of a rich cement mortar. To improve the draft the wash surface should be concave wherever practical. Instead of the wash, a special chimney cap or coping may be used. Wherever flue linings are specified fire brick may be substituted if desired.

13. Chimneys shall not rest upon or be carried by wooden floors, beams or brackets, nor be hung from wooden rafters. Iron brackets or stirrups attached to wooden construction shall not be used to support chimneys. In frame buildings chimneys shall always be built from the ground up, or rest on basement walls.

14. Chimneys shall be built upon concrete or masonry foundations properly proportioned to carry the weight imposed without danger of settlement or cracking. The foundation for an exterior chimney shall start below the frost line.

15. The walls of brick buildings may form part of a chimney, but the walls of the chimney shall be securely bonded into the walls of the building, and the flue shall be lined the same as an independent chimney. Flues in party walls shall not extend beyond the center of the walls, and their location shall be permanently indicated on the exposed side of the wall.

16. No wall less than 12 in. thick shall be used to support a corbeled chimney; such corbeling shall not project more than 6 in. from the face of the wall, and in all such cases the corbeling shall consist of at least five courses of brick.

17. Flues shall be built as nearly vertical as possible, but in no case shall they have an angle greater than 45 degrees from the vertical. Where flues change direction, the abutting linings at the angle joints shall be chipped to fit closely, and at no point shall the cross section area be reduced. There shall be but one connection to a flue.

18. Not more than two flues shall be

permitted in the same flue space, and the joints of any two adjoining sets of flue linings shall be offset at least 7 in. When there are more than two flues in a chimney, at least each third flue shall be separated from the others by a smoke-tight withe or division wall of brick or concrete at least $3\frac{3}{4}$ in. thick and bonded into the sidewalls. Each flue intended for a heating furnace or boiler connection, or for a fireplace, shall be separated from other flues by such a

connected with a fireplace or heating furnace of any type is required to be separated from other flues by such withes. The ideal chimney would have all flues separated by withes. See Plate IV.

19. When any single flue area within chimney walls exceeds 200 sq. in., the walls shall be built not less than 8 in. thick and shall have fire clay flue lining as previously specified, but when flues become so large as to render it impractical to secure fire

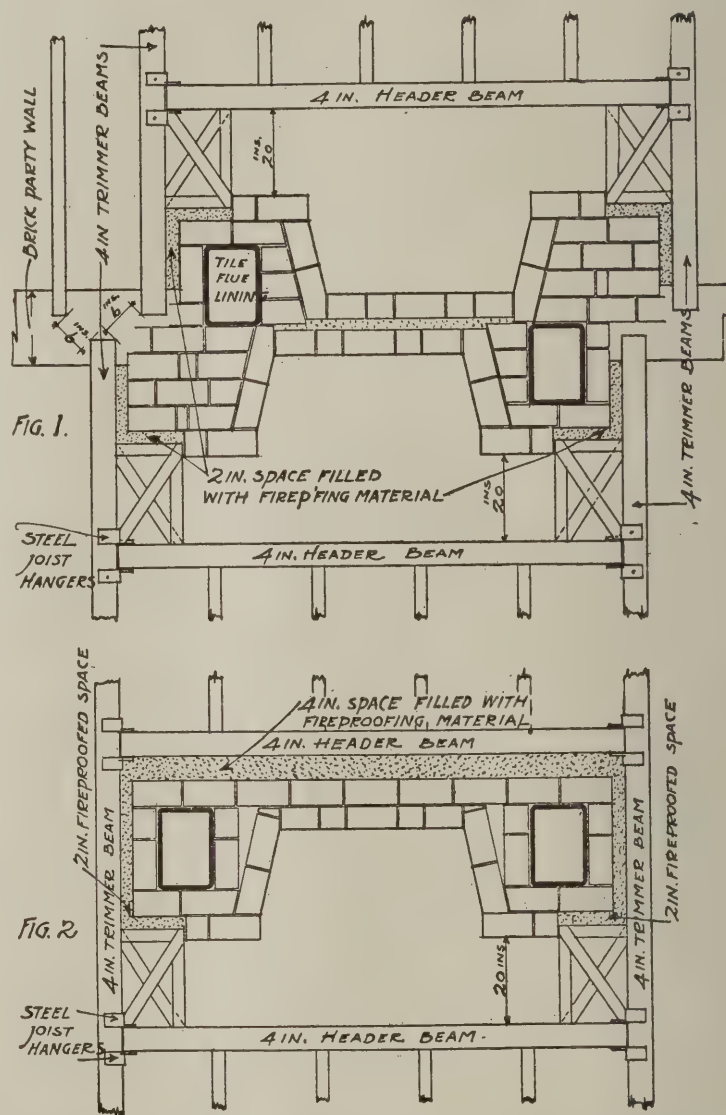


Plate III. Fig. 1—Method for building two fireplaces back-to-back in a brick party wall to secure proper spacing between ends of floor joists. Fig. 2—Floor framing around a single fireplace. Note filling between framing and brickwork, which serves both as insulator and fire-stop

withe. In hollow tile chimneys the withe may be of tile. See Appendix Note V.

Appendix Note V—Withes

A withe between at least every second and third flue in a chimney space is strictly necessary to insure stability of the chimney. A withe also aids in securing uniform temperature in a flue and prevents air leakage, thus promoting good draft and fuel economy. At the same time it prevents possibility of a fire in one flue communicating to the others. For these reasons every flue

clay flue lining, they shall be lined with fire brick for a distance of at least 25 ft. from the point of intake. Fire brick shall be laid in fire clay mortar.

20. Connections between chimneys and roofs shall be made with sheet metal counter or cap flashing (copper recommended), arranged to overlap roof flashing and allow for movement that may occur between chimneys and roofs. See Plates I and II.

21. No increase in the wall thickness of chimneys, nor any projecting masonry, shall be permitted within a distance of 12 in.

above or below the rafters or roof joists.

22. Irrespective of whether the fuel used be coal, coke, wood or oil, the minimum area inside of chimney flue linings for various heating devices shall be as follows: For warm air furnaces, or low pressure steam or hot water heating boilers, not less than 75 sq. in.; for fireplaces, not less than one-tenth the area of the fireplace opening, but never less than 75 sq. in.; for stoves.

difficult to remedy after a chimney is built.

A round flue will give a better draft than a square or other rectangular shape having the same cross-sectional area. Round flues are recommended where it is practical to obtain them, but when round flue linings are placed inside rectangular chimney walls, care must be exercised to insure complete filling of the corner spaces, otherwise there is liable to be air leakage into the vacant

guide in all cases. The other endorsers of the ordinance have not expressed an opinion on this matter.

When gas is the fuel used in a heating furnace, boiler or automatic hot water heater, the flues shall be of the same size and construction as required for stoves and ranges using other fuel. Vent flues where required for other domestic gas burning appliances may be of smaller size, but not less than 10 sq. in. Such flues shall be made of fire clay or its equivalent not less than 1 in. thick with joints properly designed to effect a permanent seal, and the surrounding masonry walls may be omitted. Metal vent flues are not permitted.

23. Smokepipe intakes to flues shall always enter the chimney through the side and shall consist of fire clay or metal thimbles securely set in the chimney wall with mortar, or the intake may be cast in concrete. Such openings shall be at least 18 in. below wooden lath and plaster or other combustible ceilings, or open joists. Neither the intake pipe nor thimble shall project into the flue. No woodwork shall be placed within 6 in. of the thimble. The thimble shall be surrounded by metal lath and plaster for a space of at least 6 in., or an open space of that width shall be provided on all sides. See detail sketch Plate I.

24. All mortar used in chimney construction, except as specified for fire brick in paragraph 19, shall be cement mortar proportioned as follows: Two bags of portland cement, not less than 188 lb., and one bag of dry hydrated lime, 50 lb., thoroughly mixed dry. To this mixture shall be added three times its volume of clean, sharp sand with sufficient water to produce proper consistency. When dry hydrated lime is not available, 1 cu. ft. of completely slaked lime putty may be substituted for 50 lb. of dry hydrate. In case of such substitution, the mixing of lime and cement shall be very thorough. Dry hydrate should always be used in preference to lime putty.

25. After a chimney has been completed, all flues shall be thoroughly cleaned and left smooth on the inside.

26. All flues to which heating furnaces or boilers are to be connected shall be subjected to a smoke test before acceptance, but the test shall not be made until the mortar has thoroughly hardened. The method of test is to build a smudge fire at bottom of the flue and while the smoke is flowing freely from the flue close it tightly at the top. Escape of smoke into other flues or through the chimney walls indicates openings that shall be made tight before the chimney is accepted. The test shall be made by the contractor in the presence of the building inspector or other official having jurisdiction, and of the owner or his representative.

Section II—Woodwork Around Chimneys

1. No wooden beams, joists or rafters shall be placed within 2 in. of the outside

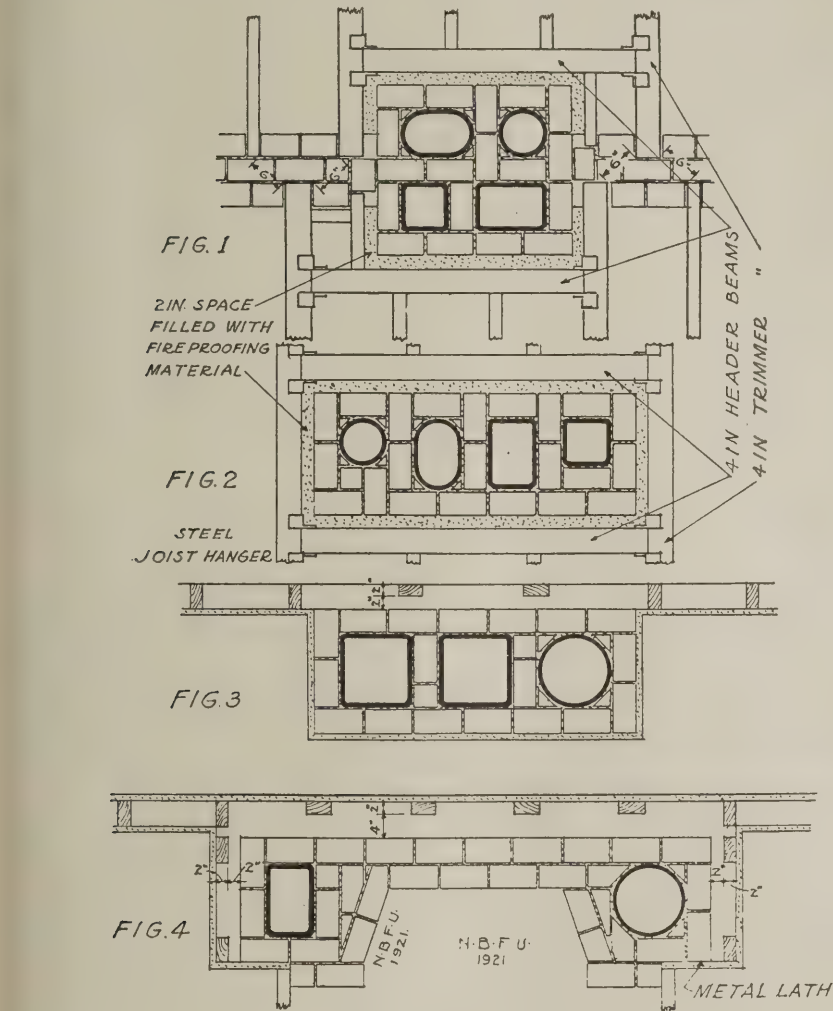


Plate IV. Fig. 1—Floor framing around chimney in a party wall, to secure proper space between ends of floor joists. Fig. 2—Ordinary floor framing around a chimney. All timbers 2 in. clear of brickwork and space filled with fireproofing material. Fig. 3—Stud partition across back of a chimney showing proper methods of arranging studs. Fig. 4—Stud partition across back of a fireplace and around the ends of the chimney breast, showing proper arrangement of studs. Method of fire-stopping this space is shown on chimney section, Plate I, also in Fig. 2, Plate III

ranges and other forms of room heaters, 49 sq. in. for rectangular flues, or an inside diameter of 7 in. for round flues. In no case shall the short cross section dimension of a rectangular flue be less than two-thirds the greater dimension. See Appendix Note VI.

Appendix Note VI—Area and Heights of Chimneys

To secure the most satisfactory draft conditions, the area and height of a chimney should be proportional to the size and character of heating appliance attached to it. A poor draft is a great annoyance, and is

spaces, which injures the draft and increases the fire hazard.

The Table of Minimum Chimney flue sizes gives the approximate area and height of chimneys recommended by the furnace and boiler manufacturers' associations as suitable to produce proper draft for heating equipment of different kinds and varying sizes when coal or coke is the fuel used.

The American Institute of Architects and the American Society of Heating and Ventilating Engineers have withheld approval of this table on the ground that it is not yet a sufficiently recognized standard to warrant its being accepted as a satisfactory

face of chimneys, whether the same be for smoke, air or any other purpose. No wood-work shall be placed within 4 in. of the back wall of any fireplace. See Plate III, Fig. 2, and Plate IV, Fig. 4.

lath set into the brickwork and nailed to the wooden beams, forming a buckled flex-ible joint between, as indicated in Plate I; or by similar strips of metal nailed to the woodwork with the inner edge close to the

furring strips placed around chimneys to support base or other trim shall be insulated from the masonry by asbestos paper, at least $\frac{1}{8}$ in. thick, and metal wall plugs or approved incombustible nail holding devices attached to the wall surface shall be used for nailing. See Plate V.

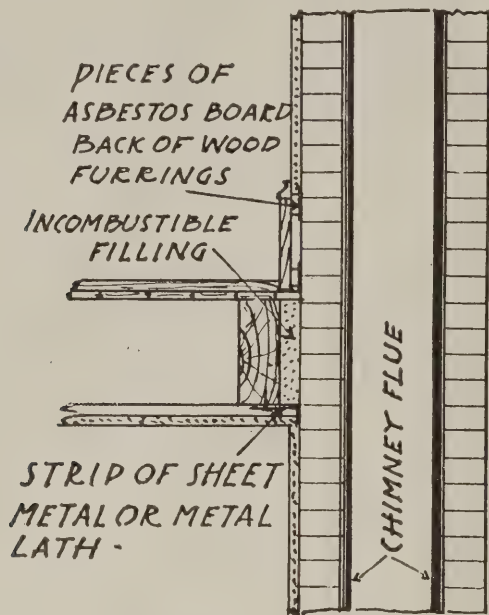


Plate V—Detail showing support for fire-stopping around chimney, and protection for woodwork placed next to plaster on chimney brickwork

2. All spaces between chimneys and wooden joists or beams shall be filled with loose cinders, loose mortar refuse, gypsum
- chimney. See Plate V.
3. No wooden studding, furring, lathing or plugging shall be placed against any
6. No coal burning heater shall be placed in a fireplace which does not conform to the foregoing requirements and have an incombustible mantel.
7. No wooden mantel or other wood-work shall be placed within 8 in. of the side or within 12 in. of the top of any open

MINIMUM CHIMNEY FLUE SIZES AND HEIGHTS RECOMMENDED FOR FURNACES AND LOW PRESSURE STEAM AND HOT WATER BOILERS

Area dimensions given are inside measurements of the masonry walls of the chimney

Warm Air Furnace Capacity in Leader Pipe Sq. In.	BOILER CAPACITY		NUMBER OF HEATERS ATTACHED TO FLUE							
	Hot Water Rating Sq. Ft.	Steam (Direct) Rating Sq. Ft.	1		2		3		4	
			Dimensions Inches	Height Feet	Heaters cross-connected forming a battery and attached to one flue opening					
To 450	To 700	To 450	8 x 12	35						
800	900	600	8 x 12	35	Dimensions Inches	Height Feet	Dimensions Inches	Height Feet	Dimensions Inches	Height Feet
1000	1100	700	8 x 12	40						
	1500	1000	12 x 12	35						
	2500	1500	12 x 12	40	12 x 16	45	16 x 20	50	20 x 20	55
	4000	2500	12 x 16	40	16 x 20	50	20 x 24	55	24 x 24	60
	5800	3600	16 x 16	45	20 x 24	55	24 x 28	60	28 x 28	65
	7300	4500	16 x 20	50	24 x 24	60	28 x 32	65	30 x 30	70
	8700	5400	20 x 20	55	24 x 28	65	30 x 30	70	30 x 36	80
	10000	6400	20 x 24	60	28 x 28	70	30 x 32	80	30 x 36	90
	12000	7400	24 x 24	65	30 x 30	75	32 x 32	85	36 x 36	90
	14000	8400	24 x 28	65	32 x 32	75	30 x 36	85	36 x 42	100
	15000	9400	28 x 28	70	30 x 36	80	36 x 36	90	42 x 42	100
	17000	10400	28 x 32	70	30 x 36	80	36 x 42	90	42 x 48	100
	19000	11400	30 x 30	70	36 x 36	80	42 x 42	90	48 x 48	100

Where round tile flue lining is used in place of rectangular, the nearest corresponding area shall be taken.

- block or other porous incombustible material to form a firestop. See Plates I, III and IV.
- The incombustible material shall be supported by strips of sheet metal or metal
- chimney or in the joints thereof. Wooden construction shall either be set away from the chimneys, or the plastering shall be directly on the masonry or on metal lathing or on incombustible furring material. Wood
- fireplace. No combustible summer piece or fire board shall be used.
8. Any person or persons, whether owner, builder or mechanic, who shall build a chimney or flue in violation of any re-

quirement of this ordinance, shall be deemed guilty of a misdemeanor and shall be fined not less than \$10 nor more than \$..... for each offense; and any chimney or flue which is built in violation of any requirement of this ordinance shall be immediately demolished or rebuilt. It shall be the duty of the building inspector or other duly authorized official to enforce this ordinance.

9. All ordinances or parts of ordinances in conflict with this ordinance are hereby repealed.

10. This ordinance shall take effect upon being approved by the.....

Appendix Note VII—Suggestions for Repair of Old Unlined Chimneys

A chimney in any existing building that becomes too hot to hold the hand against comfortably is dangerous if there is wood-work touching it. Have it carefully inspected by a reliable mason and apply the protection prescribed by this ordinance as far as is possible.

The smoke test as described in Section I, paragraph 26, is strongly recommended as the best method for discovering defects in chimney walls which always indicate danger. If smoke escapes through the chimney walls at any place the chimney should be repointed or rebuilt as conditions may warrant.

Where soft coal is used it is often necessary to rebuild unlined chimney tops every few years, and all unlined chimneys, irrespective of fuel used, are very liable to become defective through disintegration of the mortar joints. In order to ascertain if chimneys need rebuilding, climb to the top and look inside. If mortar has begun to fall out from between the bricks it will soon do so all the way through the wall. Take an ice pick, a table knife or other sharp implement and try to push it through the mortar; if you can do so, rebuild at once as follows:

Tear the chimney down to a point where mortar joints are solid, but at least 18 in. below the roof, get fire clay flue lining of the same size as the inside measurement of the chimney, set it in the top of the flue and build up with good brick and portland cement mortar. This will make a solid chimney through the roof where there is great danger, and is the best that can be done unless the chimney is completely torn down and rebuilt. Preserve a clear space of at least 1 in. between the woodwork of the roof and the chimney wall and connect the chimney with the roof by metal flashings. Build a height above the roof as specified in Section I, paragraph 11, of the ordinance.

Appendix Note VIII—Cleaning Chimney Flues

For efficient and safe operation of heating apparatus it is extremely important that both the flue and the smoke passages in the heating device be free from soot. When

bituminous coal is used for fuel, soot accumulates quite rapidly and frequent cleanings are necessary.

Accumulation of soot in a chimney introduces the risk of a chimney fire with the consequent danger of sparks being thrown upon the roof or penetrating cracks in the chimney walls. *This is a very great hazard and is the reason why chimneys should never be purposely burned out to clean them.* The burning out of a tile lined flue is liable to crack the lining.

A common and efficient method of cleaning a chimney is to sweep it with a properly weighted bundle of rags or a bush attached to a rope and worked from the top, but because this operation is troublesome, chimney cleaning is frequently neglected.

Other methods of chimney cleaning recommended as simple and efficient are as follows:

The U. S. Fuel Administration has strongly advocated the use of salt. The fire should be put in good condition with a substantial body of hot fuel. Well dried common salt is then scattered over the incandescent fuel in quantity depending upon the size of the furnace. For a household furnace, a pound at a time is ample. The dampers should be kept open to maintain the furnace temperature until the fumes entirely disappear. This usually takes about half an hour. The soot is disintegrated by the action of the salt fumes. Repeat the application as necessary.

This method is highly endorsed for cleaning boiler tubes and furnace passages. It does not interfere with the operation of the plant and neither brickwork nor metal is deteriorated.

It is known that a layer of tarry soot 1/16 in. thick on boiler tubes or furnace passages will decrease their heating efficiency 20 per cent, hence the necessity of keeping them clean. It is claimed that an occasional use of salt as described will keep both heating apparatus and flue free from soot.

An ex-fire chief recommends firing a revolver loaded with one or two blank cartridges up a chimney flue to remove soot. He asserts it to be very effective and that no injury to the flue results. Precaution should be taken to shut off the flue opening or fireplace with an old blanket or piece of burlap to prevent the soot flying back into the room when it falls following the shot. This method requires that the fires be extinguished before it is applied.

Scrap zinc thrown on a hot fire is recommended as a soot remover. The zinc fumes are said to disintegrate the soot.

Zinc compounds are also sold for this purpose, but as several pounds of these zinc materials are recommended to be used at a time, they would be somewhat expensive.

Appendix Note IX—Extinguishing Chimney Fires

A handful or two of powdered sulphur

thrown on a fire is claimed to be effective in extinguishing a soot fire in a chimney. It produces sulphur dioxide, which extracts the oxygen from the air supply and so prevents combustion.

A few pounds of salt thrown in the flue at the top is an old and excellent remedy for a soot fire. Even a pail of sand earth or ashes is helpful. Such materials, however, should be used with much care, if at all, when a fireplace connects with the chimney flue, for they would be liable to scatter the burning soot into the room where the fireplace is located.

Letters in reference to this ordinance should be addressed to Ira H. Woolson, Consulting Engineer, National Board of Fire Underwriters, 76 William street, New York City.

Prepared Roofing Makers' Plan to Solve Slack-Season Problem

TO stimulate winter buying of roofing material, the leading manufacturer in the prepared roofing industry, as the owner of patents covering asphalt strip shingles produced by some forty factories, proposed to cut prices to the bone, and give the greatest possible publicity to the action. He proposed to encourage dealers to stock up during the winter by convincing them that it would be profitable to buy with borrowed funds, if necessary, while quotations were at bed rock.

It was the expected that happened. Manufacturers of asphalt roofing generally fell in line with the reasoning of the leader; and throughout the industry prices were cut not only on the patented strip shingle but on every other important line of asphalt roofing. The new prices were 40 per cent lower than high quotation for 1920, and below pre-war, or 1913, figures if pre-war freight rates prevailed. Forty-eight hours after the announcement of the reductions orders poured into the factories in excess of the most optimistic predictions.

Manufacturers are running full time, and expect to carry on full handed during the entire period of normally slack production. The first small increase in quotations failed to check the flow of orders; and the activity of the roofing plants has been reflected in abnormal winter production of felt mills and other producers of the raw materials of prepared roofing.

A state of mind favorable to the immediate forwarding of residential building and roof repairing (rather than patching) has been created. Manufacturers in this industry are cordially recommending this courageous, surgeon-like cure for the winter depression which comes from decreasing output and dishearteningly continuous "overhead."

Heating Houses of Various Wall Constructions

Wood Houses Are Economical to Heat as Well as to Build—How Concrete Block and Monolithic Walls May Be Made to Retain Heat and Keep Out Cold

THE many generations of popularity of wood houses in this country is not entirely due to their relative cheapness and ease of construction. It has always been believed that they were easier to keep warm. Recent scientific research work by a large construction company in northern Minnesota, in co-operation with the American Society of Heating and Ventilating Engineers, shows that wood houses are the most economically heated of any type tested except one with double monolithic concrete walls insulated with oiled wood shavings—a type of construction hardly practicable for small dwelling houses.

The tests were conducted in buildings $8\frac{1}{2} \times 8\frac{1}{2} \times 8\frac{1}{2}$ ft. (interior measurements) with nearly flat roofs, and having one door and one window. Each had a floor of concrete 6 in. thick laid directly on the ground. The roofs were made of 2x4-in. timbers, double sheathed with wood and overlaid with composition roofing, sealed to shut out wind and rain. The ceilings were of plaster board with the regular coatings of plaster.

These five buildings were heated by electric stoves and the amount of electricity consumed was measured. Enough current was supplied to keep the best constructed house at a temperature of 83 deg. F. The same amount of heat was supplied to all the houses and the temperatures of the various ones therefore showed which kinds of construction were the hardest to heat, or the most inefficient from the heating point of view.

Types of Construction Tested

House No. 1 consisted of a framework of 2x4-in. wood studding, sheathed on both sides by $\frac{1}{4}$ -in. plain gypsum plasterboard and one thickness of building paper; stuccoed with cement plaster on the outside and faced with wood fibre plaster upon the plasterboard on the inside. Pieces of boards 4 in. wide are placed horizontally between the studding at the height of $3\frac{1}{2}$ ft. above the floor level in order to shorten the free air columns contained therein. This wall contained by far the least material per square foot of wall surface of any of the types, as is shown upon the accompanying chart of wall sections all drawn to the same scale. The cost of heating this building was \$1.12 per month.

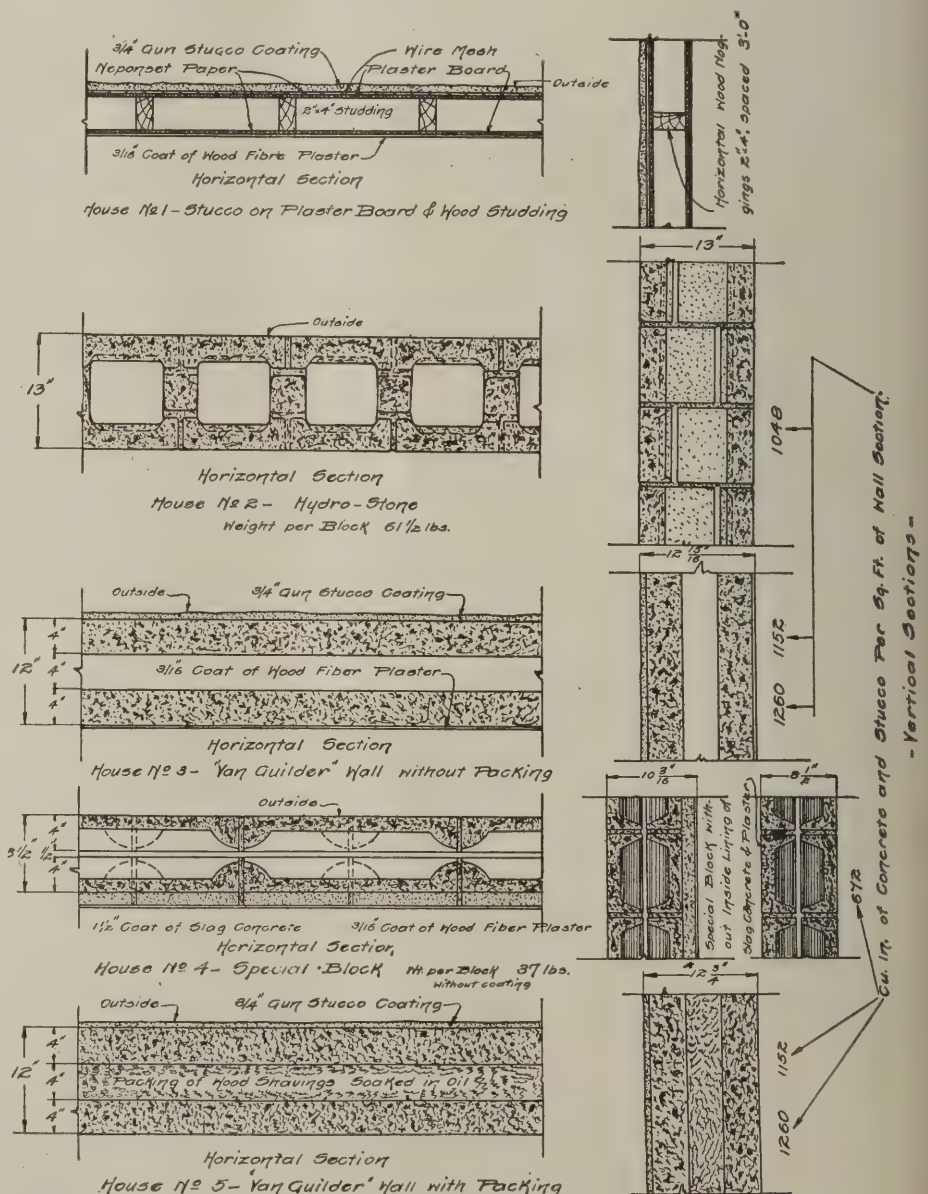
House No. 2 had a double-wall of pressed

concrete blocks (hydrostone type M-24) dry mix, so shaped that these blocks have a partial integral bond of concrete formed by interlocking lugs. This type of wall has an uninterrupted vertical air space from floor to ceiling, and contains 1048 cu. in. of concrete per square foot of wall surface. The cost of heating this building was \$1.29 per month.

House No. 3 was a double monolith wall, each part of which is 4 in. thick and with

a 4-in. free air space between the parts. The object of this arrangement was to show the influence of uninterrupted convection currents within the wall. The mass of concrete used is 1260 cu. in. for each square foot of wall surface. The cost of heating this building was \$1.20 per month.

House No. 4 was a double wall of hollowed-out (trough shape) concrete blocks pressed with the hollow sides facing each other and having a minimum space of about



Details of wall construction in five houses used in Minnesota heating tests

$\frac{3}{4}$ in. between opposing rims, arranged to partly retard convection at every course. Convection is completely interrupted at a point one-half way of the height of the wall by a layer of tar paper across the joint. These blocks are poured (not pressed) with a wet mix to insure a maximum density of concrete. The upper surface of the block as poured constitutes the exterior wall surface and is therefore highly resistant to rain by reason of the accumulation of laitance on the surface. There is no integral bond of concrete between the front and rear block. This wall contains 672 cu. in. of concrete per square foot of wall surface, or about half as much as No. 3. This house cost \$1.39 per month to heat.

House No. 5 had a double monolith concrete wall of the same dimensions and arrangement as No. 3 except that the air space was filled with oiled wood shavings. This filling arrested convection and assured a dead-air insulation. The concrete was a dry mix in order to give the necessary strength with the least density, and was stuccoed on the outside with a cement gun to seal the pores. This wall contains the same amount of concrete per square foot of wall surface as No. 3—1260 cu. in. This house cost 84 cents per month to heat.

The cost of heating was calculated from the amount of electricity actually used and the amount estimated to maintain a uniform temperature in each house of 70 deg. F. This was converted to an equivalent amount of coal at \$10 per ton as burned in a heater of ordinary efficiency.

To apply the results to a six-room house the relative cost of heating would be about as follows: No. 1, \$18.00; No. 2, \$20.30; No. 3, \$19.20; No. 4, \$22.15; No. 5, \$13.50 per month. Take the life of the house as 30 years and number of months per year heated as five and we have the heat cost as follows: No. 1, \$2700; No. 2, \$3100; No. 3, \$2880; No. 4, \$3350; No. 5, \$2010. In other words, the saving in fuel during a generation in the case of a wood house, with coal at \$10 per ton, is from \$180 to \$650 over the other types except No. 5, which is materially more economical in heat saving.

The figures given throughout are estimates only for the purposes of rough comparison. The tests are being repeated this winter with more accurate heat-measuring instruments. The data given above is from a paper by L. A. Scipio, Pittsburgh, Pa., in the September, 1921, "Journal" of the American Society of Heating and Ventilating Engineers.

The most important fact brought out is the necessity of breaking up the air space between the double walls to prevent convection or circulation of the air in this space. Any fillings, or projections, that retard the circulation are helpful.

"THRIFT" is doing the best possible with what you have, in yourself, in money and in materials.

Magnesite Compositions

THE accompanying illustrations indicate the wide range of artistic purposes which are being served by magnesite compositions now being produced by a Los Angeles concern. The firm has done important pioneer work in the matter of scientific research into the properties of magnesite and believes that it has advanced further along this line than almost any other commercial institution.

The aim of the manufacturers is to produce tiles, art figures, statuary, friezes, etc., of this material in a fashion so superior that it will be regarded as preferable to



Detail of a store front decorated with the new magnesite, the design executed in bright colors. The sunburst effect on either side is not part of the design, but cloth screens behind the windows

terra cotta. The photographs taken at the plant in Los Angeles give a suggestion of the large variety of articles produced.

It is claimed by the makers that being unbaked and having no brittle glazed surface it will withstand wear longer than terra cotta. Floors tiled with this "Plas-tone," as it is called, show their original smooth, unbroken surface after more than a year of hard office wear, including the constant rubbing of steel rollers on office chairs.

Another superior characteristic claimed for this composition is that a greater variety of color effects and much finer shading of colors can be produced than with terra cotta or other baked, glazed products.



Artist designing panels for fireplaces, mantels, etc., samples of which are shown on the wall



The new magnesite product is successfully used in the making of statuary and bric-a-brac as shown in the studio which is a part of the factory where the product originated

Homes That Buy Themselves

THE idea of planning homes "that buy themselves" is ascribed to R. H. Leavell in a handsomely prepared brochure of elevations and plans of such houses issued by the Southern Pine Association Housing Ser-

as follows: Taking 6 per cent annual interest on unpaid principal, determined monthly, how long will it take for payments of \$10 a month to pay off a principal of \$1,000?

End of Month	Int. Paid	Paid Acct. Principal	Balance Principal
1	\$5.00	\$5.00	\$995.00
12	4.72	5.28	938.36
72	2.88	7.12	568.27
139	0.06	9.94	.51

The balances shown in this outline of the tables are abbreviated to cover the end of



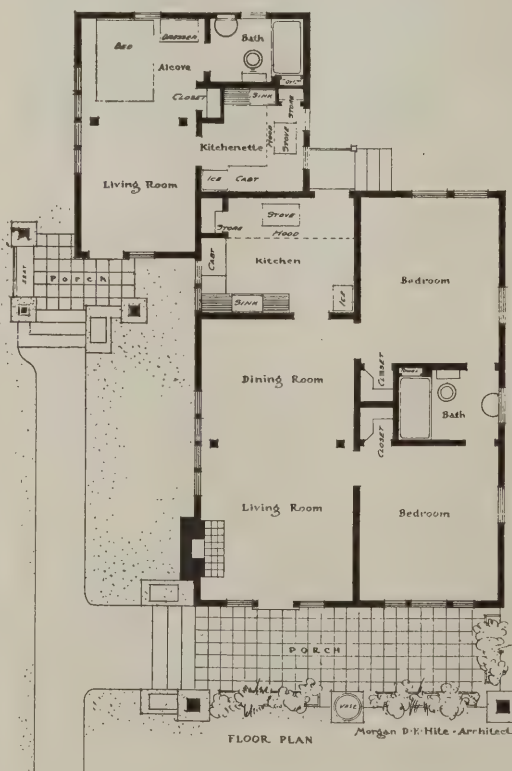
The first of the "bungalows that buy themselves" constructed in New Orleans, La., in the spring of 1921. One additional apartment only is provided in this plan

vice. This work is the third move in the association's housing campaign. The first was "Homes for Workmen," compiled by King H. Pullen, and was followed by "How to Plan, Finance and Build Your Home," published for the association by the Architects' Small House Service Bureau of Minnesota, Inc.

The present work is based on the conception of building on a scale necessary for the real and permanent requirements of the family, but so planned that convenient and rentable apartments may be utilized to "make the home buy itself."

How the privacy of all who may be concerned in owning or in renting apartments in such a house may be preserved; how it may be made to yield an income and how the purchase be made within a reasonable time are questions that are answered, first, by the types of houses and sketch plans shown in the brochure (a few of which are shown herewith), and secondly, by examining the tables, showing how long it will take \$10 a month at 6, 7 and 8 per cent interest to pay off a loan of \$1,000.

Convenient tables are shown in the brochure covering these interest rates, planned



the first month; the end of the first year; the end of the sixth year, and the end of the eleventh year and eight months. The interest decreases, and the credit, on account of principal, increases.

The third computation is based on what the cost of building may be in the community.

The fourth is to ascertain the rate of rent on small heated apartments furnished for light house-keeping.

The fifth, the rate on unfurnished houses and apartments having from four to seven rooms.

Sixth, by making a reasonable allowance for the slow decline in rentals in the next eight or ten years, as the demand for houses is gradually met.

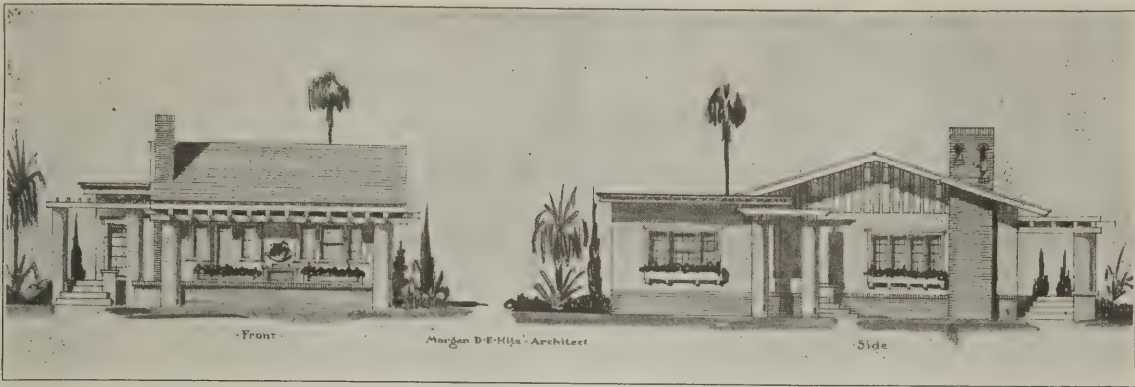
In general, the association book says, when the net interest rate on long-time investments is 7 per cent, when the rental on each small furnished apartment averages \$45 a month, when the amount available for rent by the owner amounts to \$35 or \$40 a

month, and when the cost is lowered by building a number of these houses at the same time, the total net income will pay

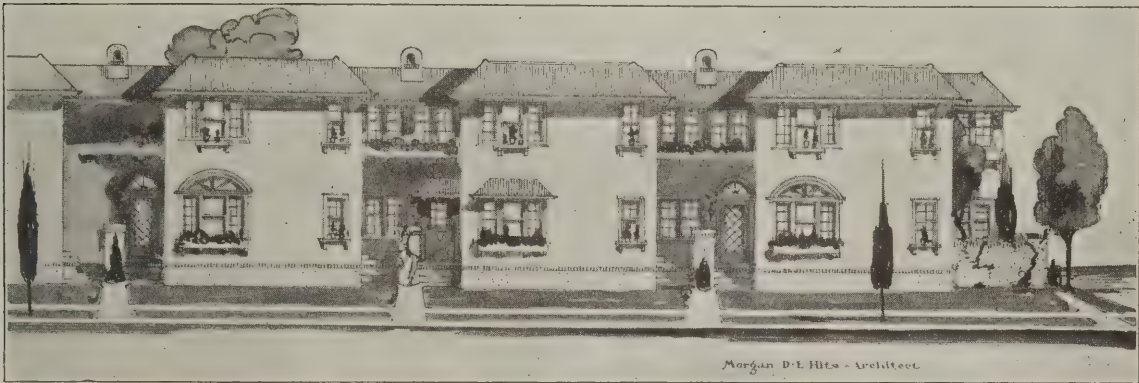
that would command otherwise a monthly rental of \$65 or \$70.

The cost per cubic foot for two small

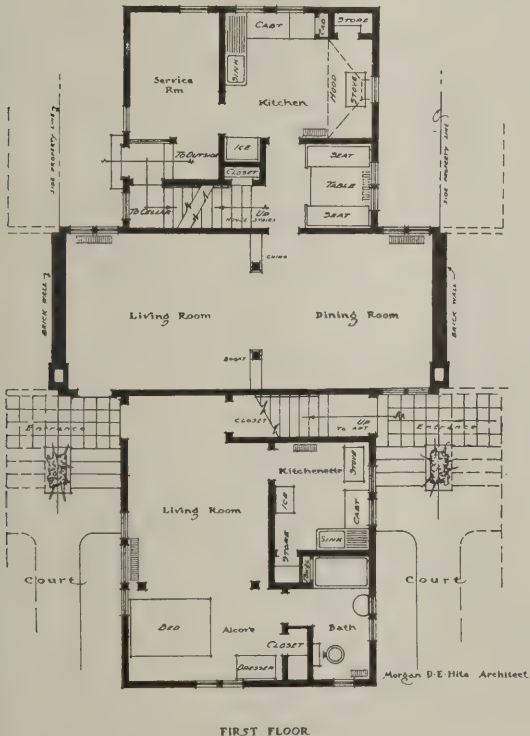
lower than for such a house, because the building materials can be used more economically.



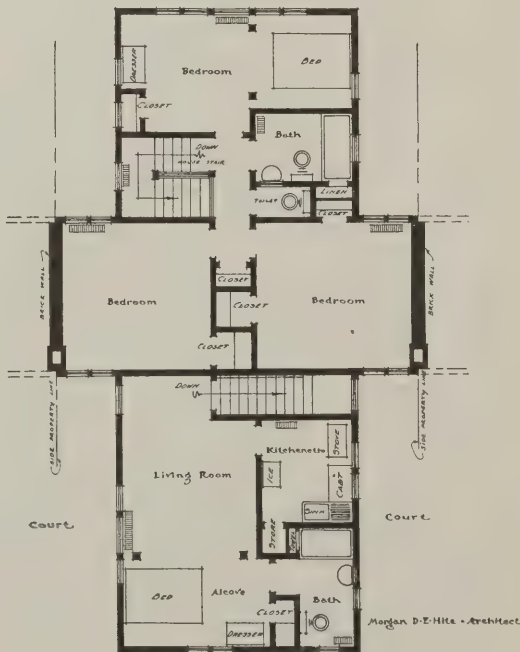
Another bungalow with an added apartment. Same plan as No. 1 adapted to Southern conditions. Lots of ordinary width are large enough for this bungalow



The multiple residence. All of the principal rooms have a front outlook and cross-ventilation. The exterior design lends itself to many variations



FIRST FLOOR



SECOND FLOOR

within 12½ years the entire cost of lot and house, and the family of the purchaser will have the use of living quarters

apartments added to a five-room family apartment, equivalent in comfort and privacy to a detached five-room house, is

This may be seen in the sketch plans which show an addition to bungalow houses, and in other types place one small apart-

ment over the other, the party walls between them and the large apartment representing a distinct saving. In other cases where the two small apartments occupy the whole of the second floor, the roof which might otherwise have covered a one-story

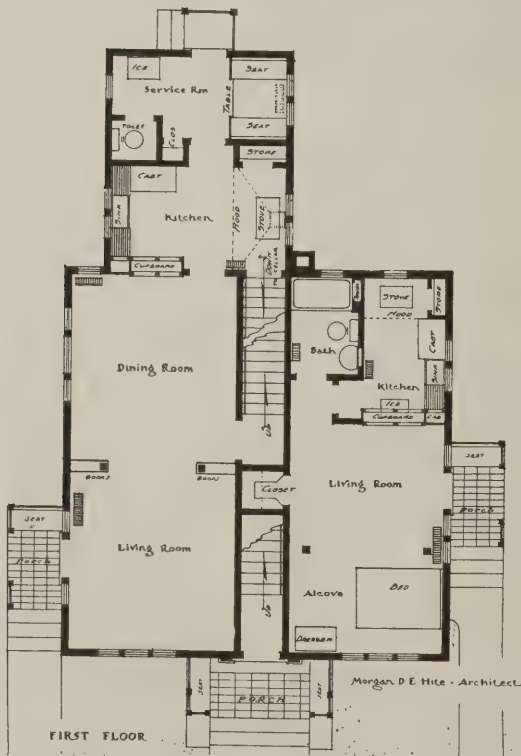
equal to a five-room apartment or house increases the total outlay not more than 75 per cent. Thus—

Comparative cost of five-room detached house plus lot equal 100 per cent:
Lot 29

Total cost of "home that buys itself".....175
As the two small apartments have a combined floor space equal to the detached house, the gross rental from the two apartments should be at least as great as the detached house would command. But the



Two-story home with two small rental apartments placed one over the other. Privacy secured by separate porch and entrances



five-room dwelling does double duty without a corresponding increase in cost.
In addition to the advantages noted, there is the advantage of the same lot and the same cellar, so that the addition of two small apartments having a combined area

Cellar	7
Building proper	73
Total	100
Extra for building additional unit of equal area plus plumbing.....	75

annual operating costs, when provision is made for depreciation, form in each case practically the same percentage of the respective investments. Even when the annual savings in upkeep of ownership over rental are included in the calculation, the

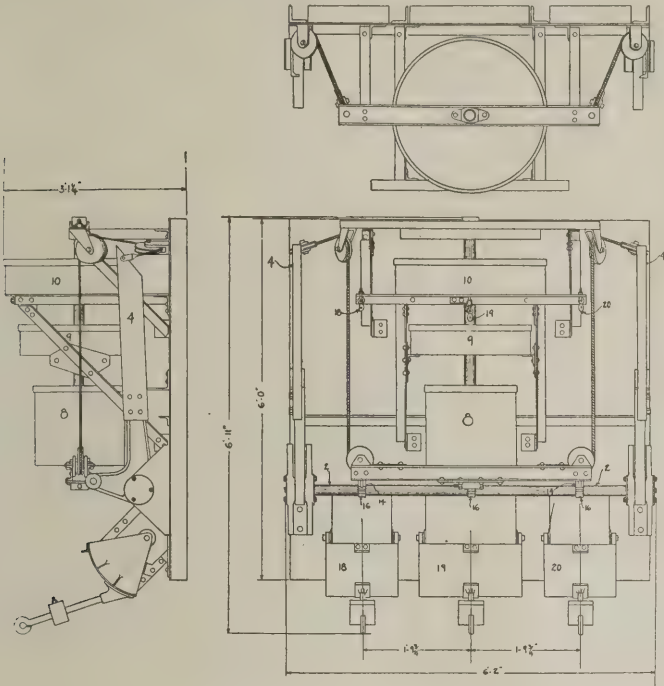
net earnings on the additional investment are more than 33 per cent greater than on

volume, contending that even with laboratory apparatus such measurement is inac-

fact 10 to 12 per cent less than their apparent bulk. In fine materials volume measurement is particularly uncertain. Sand "fluffs" or bulks, according to its degree of fineness and moisture content, and the larger aggregates have other obvious qualities that cause variation in their proportioning.

Apart from the defects inherent in the measurement of aggregates by volume, for the reasons described, measurement by volume is at all times dependent on human judgment, in itself a variable quantity, and any mechanism that might be contrived based on volume measurement to stabilize such judgment with like material must necessarily prove both costly and inadequate, whereas measurement by weight insures accuracy of proportioning and economy in operation.

One man, skilled or unskilled, is all that is necessary to operate the mixer and proportioner, and materials can be measured so accurately that the error per 1-yd. batch will rarely exceed 50 lb. The device replaces human judgment, and its many errors, with machine precision. It has no concealed springs or parts to get out of order and is always open for checking by the inspector. It enables an accurate change of proportion to be made in two minutes. It insures a batch of uniform



THE LAKEWOOD JOHNSON PROPORTIONER.
GENERAL ASSEMBLY FOR OPERATION

the amount invested in a lot and a detached house with a cellar. This assumes that the two small apartments are let unfurnished.

The net earnings on the additional investment may well be calculated at a higher figure, for the reason that the rent on small heated apartments, especially if furnished for light housekeeping, is usually at a higher net rate on the total investment than is the rent on the larger, unfurnished ones.

The foregoing, liberally quoted from the brochure, indicates the worth of this contribution in furnishing the builder facts and figures for the preparation of literature to send to prospective customers whose circumstances make these proposals of special interest.

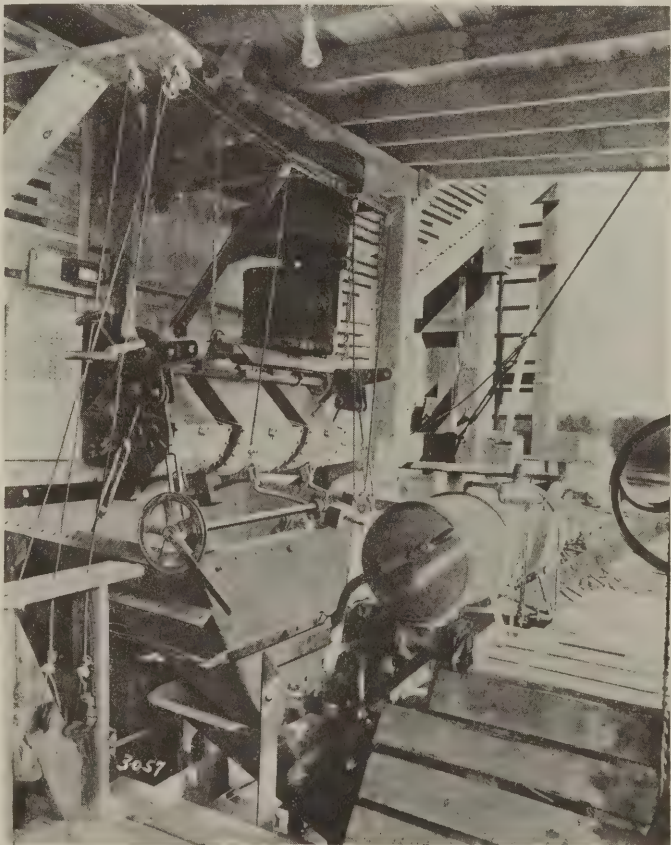
Detail working plans of the houses described have not been made. The purpose of the book is to suggest plans to be developed by the builder's architect.

Measuring Concrete Materials by Weight Insuring Stronger Concrete and Greater Economy

INTRODUCING the Lakewood-Johnson Proportioner, illustrations of which are shown herewith, the Lakewood Engineering Company, Cleveland, Ohio, points out very plausible reasons for the varying strength of concrete to be due to the prevailing practice of measuring material for concrete by

curate and in the field with the means usually available the materials may be in

composition every time. It gives a definite consistency, batch after batch, with a fixed



One of the two machines in use by the Parklap Construction Co., Sherman Island Hydro-Electric development on the Hudson River for the International Paper Company

quantity of water. It makes the plant a truly one-man plant, thus saving in labor cost. By giving a definite yield per batch it does away with the cement over-run that is inseparable in volume proportioning, and it also allows the use of bulk cement if desired, with its proportionate saving.

The Proportioner is a steel panel of $\frac{1}{4}$ in. plate so constructed that it can be framed into any standard bin. At the bottom of the panel are three openings fitted with bin gates. A center gate 18x12 in. is for stone. The 12x12 in. gates at each side are for sand and cement.

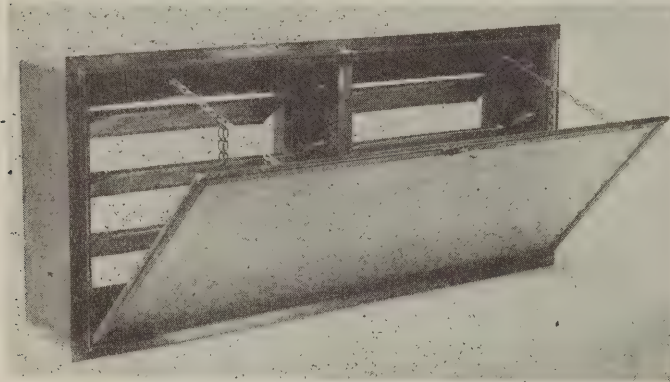


Fig. 1—Automatic ventilator with balanced louvers, with shield

A shaft extending the width of the plate is supported by double ball bearings mounted in dust proof split brackets. On this shaft are three cams, one operating each gate. These cams are adjustable so that they may trip their respective latches when the proper balance is obtained. Keyed to this shaft and mounted in the split brackets are bell cranks forming the scale beams. To the upper ends are attached cables running over pulleys to the counterpoises. From the lower ends is hung an auxiliary hopper discharging into the batch hopper of the mixer. The bell cranks being keyed to the shaft and connected together through an endless cable at the upper point of the crank act as a unit. The top channel, with its braces extending outward from the channel face, supports the guide for the counterpoises and the pulleys for the cable. Two of the counterpoises are normally seated on these angle braces, while the third rests on the channel cradled in the cable. By means of ropes leading from eye bolts fastened to the gates up through pulleys supported in the top brace, thence to one side of the panel and thence to the operator, the latter is able, from one position, to open the various gates and operate the Proportioner.

Three pans of sufficient size to take care of the counterweight necessary for weighing the sand, stone and cement ride on a vertical shaft. The bottom pan is for stone, the middle pan for cement and the top for sand. The ratio between the weight in the pans and the weight of the material in the auxiliary hopper is one to five. Therefore,

if it is desired to use 1,000 lb. of stone in the batch, a counterweight of 200 lb. is placed in the stone pan. Similarly, the weights of the upper two pans may be adjusted to give the correct weights of cement and sand desired.

To measure a batch the stone gate is opened and as the weight of the stone in the auxiliary hopper balances the weight in the bottom pan, the pan rises and a cam on the horizontal shaft automatically closes the gate on the stone bin. The cement gate is then opened. When the combined weight of the stone and cement in the auxiliary

hopper balances the weight of the two lower pans, the pans rise and a second cam closes the gate. The same cycle takes place in operating the sand gate except that the weight of the material in the auxiliary hopper must counterbalance the weight of the material in all three pans. The batch is then complete and is dumped into the mixer. As the material leaves the auxiliary hopper the pans automatically drop to their original positions and the Proportioner is then ready for another batch.

The company is manufacturing the Proportioner under the patents of Nathan C. Johnson, of Hool & Johnson, New York City.

Fifteen Hundred Five-Story Tenements Proposed for New York

A PLAN to solve the housing shortage by the immediate construction of 1,500 five-story tenements, to accommodate 45,000 families of 225,000 persons, at an expense of \$100,000,000, was outlined before the Free synagogue on January 22 by Samuel Untermyer, counsel to the Lockwood committee, in an address on "Government Responsibility for the Housing Crisis."

The plan is to amend the state insurance law so as to permit insurance companies to invest up to 10 per cent of their total admitted assets in tenement houses for the period of the emergency, provided the investments yield a fair return, the rooms to be rented at not more than \$9 a room.

though it is contemplated renting the apartments for \$8 a room.

The plan and methods proposed are an interesting contrast to the plans being carried out in London, England, as described on page 30 in this issue.

A New Automatic Ventilator

VENTILATING economy is represented in a new system to "make rooms breathe" designed and manufactured by the

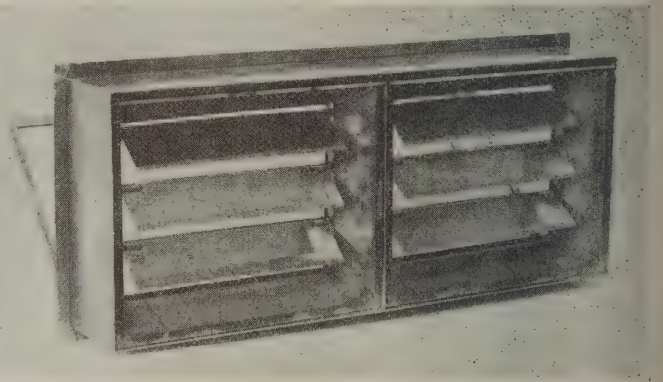


Fig. 2—Exterior of automatic ventilator, screened with non-corroding wire mesh

Automatic Ventilator Co., Inc., 1003-5 Park avenue, Baltimore, Md. The theory of the system is based on window ventilation as opposed to mechanical ventilation applied to apartments, school buildings, hospitals, office buildings—and barns and dairies. As represented by the company, the objection to window ventilation being drafts, the mechanisms of the system consists of sensitive balanced louvers which close instantly against a gust of wind, carrying its load of dust, rain or snow, reopening immediately as the wind subsides. The louvers when closed are not air-tight, but allow the entry of sufficient air to maintain a constant circulation. The ventilators are preferably placed at the top of the windows or in the upper part of the wall and exhaust the used or vitiated air as well. The ventilators are made of solid copper, with wings of similar non-corroding material or aluminum, with adjustable balancing arms. They are made in various sizes from 6 in. to 1,600 sq. in.

Lower Freight Rates on Southern Pine Coming

REDUCTIONS in freight rates on Southern pine lumber equal to the reductions on hardwoods, which were ordered by the Interstate Commerce Commission in its decision announced recently, are expected to be made simultaneously with the hardwood decreases which are to be effective prior to March 6 next, according to a statement made by A. G. T. Moore, traffic manager of the Southern Pine Association.

Consolidated Rural Schools

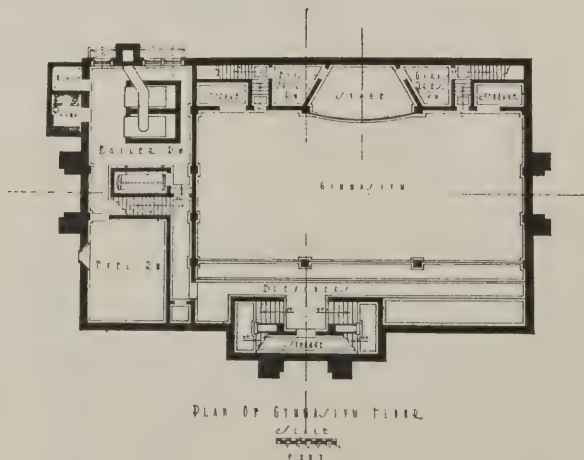
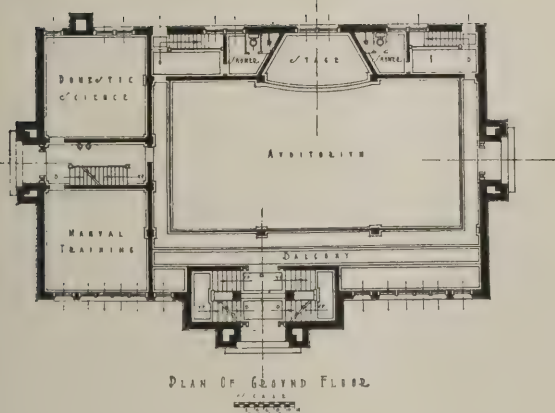
TYPES of schools now being constructed in the West are shown herewith. One of the most recent, Ralph O. Beattie & Co., architects, Hutchinson, Kan., is a consolidated school for Zook, Kansas. Zook is a

to and from school in motor busses, which are purchased and operated by the consolidated school districts. The same plan of consolidation is being followed in the East, and types of schools being erected in

Kan., has 10 class rooms, study hall, library, office, teachers' rest room, and other necessary auxiliary rooms. The building also contains a combined auditorium and gymnasium with a total seating capacity of 450



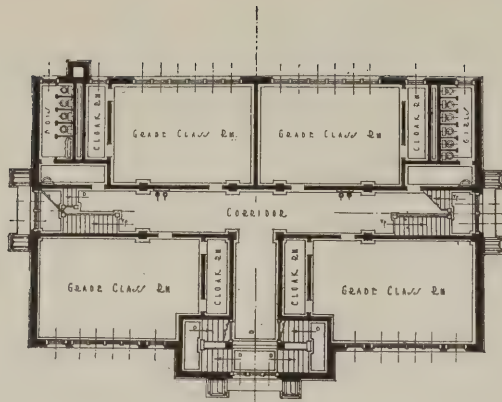
Consolidated rural school, Zook, Kan.



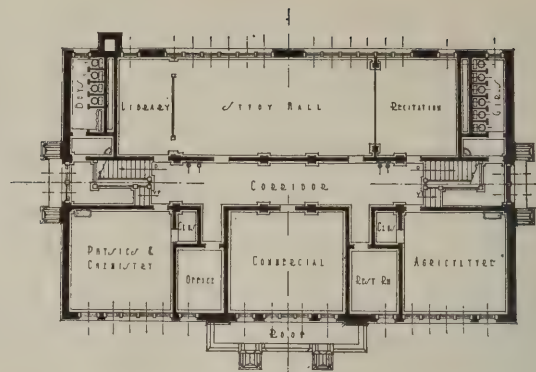
rural community, that following the modern trend is combining the outlying school districts and their resources into one modern building, providing for both grade and high school students. The pupils are transported

Pennsylvania are shown on page 47 of the December, 1921, issue of NATIONAL BUILDER. Consolidated School Building, Zook, Kan. The consolidated school building of Zook,

persons. The clear gymnasium floor space is 30x90 ft. The building is three stories in height, and of fireproof construction, with exterior walls of rug surface brick in two colors, trimmed with stone. The in-



PLAN OF FIRST FLOOR

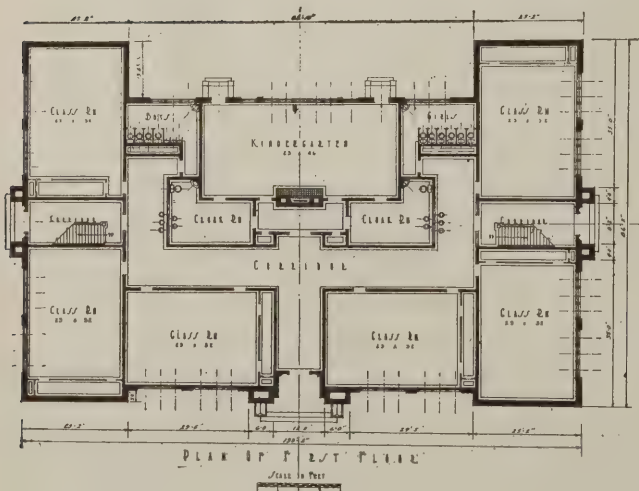


PLAN OF SECOND FLOOR

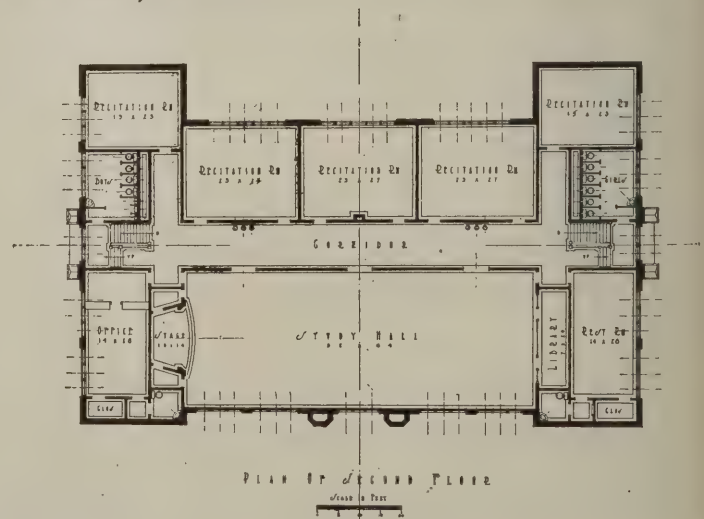
Plans of first and second floors of school at Zook, Kan.



Consolidated school at Larned, Kan.



PLAN OF FIRST FLOOR



PLAN OF SECOND FLOOR

(Continued on page 64)



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(Continued from page 62)

terior fireproof construction is of reinforced concrete and steel frame. The partitions are metal studding, covered with metal lath and plastered.

The cost of this building is \$60,000, including all mechanical equipment and vapor vacuum system for steam heat. All plumbing fixtures throughout the building are of the highest quality solid porcelain or vitreous china, and are the ventilated type of fixture, venting directly into a utility chamber at the back of all fixtures, the utility chamber being ventilated through the roof of the building.

Junior High School and Grade School Building, Larned, Kan.

This building, also by Ralph O. Beattie & Co., is to be 86 by 133 ft., two stories high, and of strictly fireproof construction. The exterior walls are of mingled shade rug

brick, trimmed with stone. The Gothic style of architecture is being carried out in the exterior design as far as is consistent with modern school building construction.

The interior fireproofing is reinforced concrete and steel frame, all interior partitions are of steel studding, covered with metal lath and plaster.

The grade rooms and the junior high school rooms are on the first and second floors respectively, and the entrances and stairs are so arranged that the junior high school and grade school pupils may each use the building independently.

On the first floor, six standard size grade rooms are provided, and a large kindergarten with fireplace and separate cloak rooms for boys and girls, a teacher's closet and supply closet and cabinet. The kindergarten also has its own entrances and exits to and from the building. The plumbing

in connection with the kindergarten is separate from and entirely independent of the toilet rooms, and corridor drinking fountains provided on this floor for the grade school pupils.

The junior high school department on the second floor has five average size recitation rooms and large combined study hall and assembly room with a seating capacity of approximately 225 pupils, with library in rear, and small stage and dressing rooms in front. This department also includes a principal's office and teacher's rest room with the necessary coat and supply closets, private toilet and lavatory rooms in connection.

The total cost of this building is \$85,000 including all mechanical equipment and like the Zook school is heated by a system of vacuum vapor steam heat. The plumbing and fixtures and ventilation are of the same type as the Zook school.

Announcements and Publications

The Seventeenth Edition, enlarged, of the Kidder-Nolan "Architects' and Builders' Handbook" is announced by the publishers, John Wiley & Sons, Inc., 432 Fourth Ave., New York City. In this edition the name has been changed from Pocket Book to Handbook. The work has been revised, some chapters rewritten, new chapters added and a new index made. Many cuts have been re-engraved. This old friend of the contractor and builder is too well known to need further comment. 1,907 pp.; 4¼x7; flexible back; \$7.

"Basic Specifications for Tilework and Related Documents," Publication K-300, is a very interesting contribution to the building arts, recently issued by the Associated Tile Manufacturers. Members of the architectural profession, engineers, government representatives, other technical experts, tile manufacturers, contractors and tile setters throughout the country have contributed toward the realization of this publication, which has been in preparation for two years. D. Knickerbacker Boyd, as consulting architect, directed the compilation of the basic specification, prepared the related documents and index and acted as collaborating editor of the publication. The impelling force which instigated the effort has been, we are told, the desire on the part of the Associated Tile Manufacturers "to assist to the utmost in securing satisfactory installations of tilework. . . to offer to all architects, contractors and users of tiles a set of specifications which, while providing a standard of procedure, will afford each the fullest opportunity to modify it according to individual desire, and will in a helpful manner present data and reminders relating to all other trades concerned with the successful installation of

tiles. . . . All users of these documents will confer a favor upon the compilers if they will report any omissions or deficiencies, or make suggestions for better methods or means of stipulating them, which may develop through their experience in the use of this specification." Copies of the publication may be had free of charge by members of the architectural profession, by writing to the Associated Tile Manufacturers, Beaver Falls, Pa.; a charge of 25 cents a copy is made to contractors and others.

"Fire Prevention and Fire Protection," by Joseph Kendall Freitag, is now available in its second edition, revised. A number of changes have been made in the effort to keep the treatment up to date, especially as regards approved design, construction and equipment. Quite extensive revision has been made in the chapters dealing with theaters and garages, as recognized practice in these classes of buildings has advanced materially since the publishing of the original edition. Numerous tests of materials and devices, with descriptions of past experiences of value, have been added in some detail. The book contains 1,038 pages, 4¼x7, 395 figures, and sells at \$5 a copy. John Wiley & Sons, Inc., 432 Fourth Avenue, New York City, are the publishers.

"Lime in Construction" is the title of *Bulletin 306* issued by the National Lime Association. It is compiled by Tyrrell B. Shertzer, C. E., and consists of five parts as follows: Part I—Synopsis of the Uses of Lime in Construction. Part II—Exposition of the Uses of Lime in Construction: Sec. 1—Hydrated lime in concrete; Sec. 2—Lime mortar; Sec. 3—Interior plaster; Sec. 4—Exterior plaster or stucco. Part III—

Clauses Suggested for Inclusion in Building Codes and Specifications: Sec. 1—Definitions; Sec. 2—Materials; Sec. 3—Mortar; Sec. 4—Hydrated lime in concrete; Sec. 5—Maximum allowable compressive working stresses; Sec. 6—Mortar for masonry construction; Sec. 7—Laying masonry in freezing weather; Sec. 8—Plastering; Sec. 9—Exterior plaster or stucco. Part IV—Data Derived from Tests, Showing Properties of Lime in Its Various Applications in Construction: Sec. 1—Permeability tests of mortar; Sec. 2—Test data, brick masonry with various mortars; Sec. 3—Comments by reliable authorities; Sec. 4—Hydrated lime in concrete; Sec. 5—Beam action; Sec. 6—Permeability of concrete with hydrated lime; Sec. 7—Conclusion. Part V—Tentative Specifications of Committee C-7 on Lime of the American Society for Testing Materials: Sec. 1—Quicklime for structural purposes; Sec. 2—Hydrated lime for structural purposes. Part VI—Resolution Passed by Labor Union Regarding the Use of Lime in Construction. The book, 80 pages, 6x9, paper back, may be obtained from the National Lime Association, 918 G St., Washington, D. C., for 50 cents.

"High Humidity Dry Kilns" is the title of catalogue No. 282 recently issued by the B. F. Sturtevant Company, Hyde Park, Boston, Mass. Part I of this catalogue, which contains 50 pages, 8½x11, and is indexed, is devoted to a discussion of the Sturtevant High Humidity Kiln. Part II consists of several publications, of the United States Forest Products Laboratory at Madison, Wis., quoted verbatim, having to do with the requirements of the completely successful lumber-conditioning kiln and represented in the Sturtevant method of air-conditioning and control.

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No. 3

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NATIONAL BUILDER

Volume 65

Chicago, March, 1922

Number 3

The Situation

WINTER CONSTRUCTION in the North continues to show unprecedented activity. It is evident that much headway has been made in overcoming the seasonal character of building operations. Also many contracts have been let already for public work, to start as soon as the spring season opens. These things give the construction industry unusual stability and assure at least six months of generally active construction. On the other hand, business as a whole has continued to show declines.

In the East, particularly in the New York metropolitan district, there are signs that a saturation point in housing construction is being approached. At a recent meeting of the Associated Builders of Kings County, reported in the *Dow Service Daily Building Reports*, Frank Bailey, who as loaning executive of the Title Guarantee and Trust Company of Brooklyn, has placed hundreds of millions of dollars in Brooklyn building loans, is quoted as saying that while there would be plenty of money available for housing construction he believed that the "housing horse," as it has been ridden of late, was due for an early retirement, and that inside of six months there would be a change in demand for money for this kind of investment.

These builders heard it stated that the real boom for building in Brooklyn would come when houses could be profitably erected for people whose annual incomes were less than \$2,500. No philanthropic enterprise, said Mr. Bailey, could turn the trend of events in this regard while building materials remain at present levels or thereabouts.

It was said that the type of speculative home-building construction calculated to meet the requirements of the buyer whose income exceeds \$2,500 a year is now proceeding in such quantity as to be in actual danger of passing the saturation point before next autumn. The same applies to apartment house construction, according to the same financial authority. If, therefore, the supply should exceed the demand for this type of habitation this year, and there should be no great shrinkage in building material prices or construction cost next year, a period of arrested building construction activity for habitation building erection in the forthcoming season beyond 1922 is all that lending authorities can now foresee.

Demand for Cheaper Types of Housing

The condition stated by Mr. Bailey, as applying to Brooklyn, appears to have general application to many cities where construction work was active in 1921. The editor's own observations, during a recent trip through Houston and Dallas, Tex., show that the demand for houses of the better class—\$12,000 to \$25,000—has apparently been fairly met, but that with shrinking incomes and decreasing business in many lines, the man of modest income still has unfilled housing needs.

The activity in house building in these cities continues unabated, but it is tending more toward types that the man with \$2500 or less annual income can finance. There is also a growing demand for apartments of the one, two or three-room variety.

If speculative builders will procure the income-tax statistics of their localities and determine the number of persons whose incomes are above \$2500 as compared with the number below \$2500, they can readily form some estimate of the saturation point for houses of the better class.

This does not mean that housing construction as a whole is due for any let-up, but its character is obviously changing. This is logical because those with higher incomes were naturally the first to buy or build; and with them high prices were not so serious a consideration, but those with more limited income must nevertheless be provided for.

More Commercial Building in Sight

The encouraging thing in the East where new housing construction is admittedly nearing the saturation point is the large amount of commercial building, which is beginning to come to architects. Not only is this encouraging in itself, but it is evidence that the increasing stability of building material prices and building trades wages is being recognized by business men.

This year will undoubtedly see very great activity in school-building construction. The fact that hotel prices remain up and hotels are generally filled, in spite of the falling off of business generally, is pretty good foundation for believing that much new capital will flow in that direction. Also, in nearly every city, there is said to be shortage of office space, and new leases continue to show increases.

Prices of Materials

The index figure for building materials generally, according to various authorities, has decreased appreciably during the last few weeks. Also reports from many localities show price declines, particularly in cement, brick and lime. Producers nearly everywhere are making extraordinary efforts to further reduce costs. In considering "index" price figures it is well to bear in mind the following quotation from a New York State builder:

"Building materials index figures are generally not based upon competitive prices. They are obtained by getting quotations from material dealers all over the country and averaging the prices in each material. Then the various materials are properly weighted and combined and a single index figure, referred to some pre-war year as a base, is obtained each month. Quoted prices obtained in this way from dealers are not indicative of the true market in times like these. When business is poor a material dealer will make very much closer prices with the man who has real spot cash than with one who is merely collecting general market information. He may even sell at a loss to move his stock or raise cash."

Wages and Labor

News items from all parts of the country show gratifying progress in the settlement of labor disputes and the acceptance of lower wage scales, voluntarily, in numerous localities. Possibly the recent conference between the Builders' Exchange and the building trades unions of Waterville, Me., is not typical of current happenings elsewhere, but it is at least one of the straws which show the way the wind is blowing. This conference is described as follows:

"It was a spirited meeting that took place at the city council rooms when the Builders' Exchange and the journeymen of the various trades met to discuss the matter of a decrease of 20 per cent in wages, which was launched at a meeting of the Builders' Exchange recently. There was plain talk on both sides, and a general airing of opinions that will eventually make for good, as it allows both the employers and employees a better understanding of the other's viewpoint.

"Before the meeting was over, it was decided that the contractors of each class should get together with the journeymen

of each trade and try to come to some understanding among themselves, and that at a subsequent meeting a committee from the Builders' Exchange and representatives from each trade or union should have a general discussion and try to arrive at a basis for a wage scale."

From Fargo, S. D., comes the following: "The bricklayers, masons and plasterers of Local No. 2 officially announced that effective March 1 there will be a 10 per cent cut in prices of their labor, this action being taken voluntarily upon the recommendation of the Master Builders' Association of South Dakota. This action, it is believed, together with the recent reduction in the prices of lumber and other building material, will have a tendency to stimulate building operations in Huron and vicinity this spring. It is believed the carpenters' union will take similar action shortly."

A summary of conditions early in February was reported in the Philadelphia *North American* as follows:

"The impartial wage board of San Francisco has standardized the building trades wage scale for that city and will keep the present schedule in effect until December 31, 1922. This board has taken into consideration the fact that while a craftsman must be paid in accordance with his skill and the amount of risk involved, his employment is not continuous and that drastic wage reductions will net him an annual income entirely disproportionate to the cost of living. Bricklayers and structural iron-workers have been reduced from \$1.16 to \$1.12½; carpenters, hoisting engineers and piledrivers from \$1.03 to \$1 per hour. Skilled laborers receive 62½ cents, and common laborers 45 to 56½ cents per hour for a six-day week.

"Bricklayers have been reduced from \$1.12½ to 95 cents in Cincinnati; hodcarriers from 87½ to 85 cents in St. Louis and structural iron-workers from 55 to 50 cents per hour in Montreal.

"Pick and shovel men in New York City are quoted at 60 cents, as against 75 cents per hour, or \$4.80 per eight-hour day, at excavating work.

"Twenty-six communities were represented at a convention of the Minnesota Building Employers' Association in Minneapolis recently. The association instituted a 20 per cent wage reduction last spring, which has applied to the bulk of building construction in the state since. It was decided to keep the current wage scale in force through 1922.

"Los Angeles reports considerable unemployment among unskilled laborers, due principally to the same condition that affects New Orleans—the influx of transients from the colder sections of the country.

"Building construction is practically at a standstill in both Denver and St. Louis. In Denver the shutdown is mostly seasonal, and local contractors are preparing for the resumption of spring building activities of considerable proportions. In St. Louis the

Building Trades Council and the Master Builders' Association are arbitrating the proposed wage reduction, without having yet reached an agreement.

"Cincinnati reports 28,000 unemployed. The skilled building trades mechanics, however, do not comprise a very large percentage of this total.

"The wages of five building trades have been determined by the Builders' Exchange of Syracuse and several more are under arbitration. Hodcarriers and building laborers now receive 30 and 50 cents per hour. Bricklayers still receive \$1.12½, painters 90 cents, and sheet-metal workers \$1 per hour. These three trades have thus far successfully resisted reduction. Lathers and plumbers, receiving \$1 per hour, have not yet been asked to accept a cut. Electrical workers demand renewal of \$1 per hour agreement."

Chicago Labor Situation

The building situation in Chicago remains little changed in spite of many happenings of country-wide interest. Early in the month the Building Trades Council was in control of radicals, who succeeded Thomas Kearney, a conservative, as noted in the February issue of *NATIONAL BUILDER*. Strikes, slugging and disorder generally were the ordinary events of the day in the fight certain labor unions, headed by the carpenters, had decided to make against the forced acceptance of the Landis award. Considerable pressure was brought to bear upon Judge Landis to resign and rescind his now famous "award." He absolutely refused to abandon the fight, although he has since quit his office as a federal judge.

On February 18, the more conservative element of the Chicago labor unions again gained control, or at least caused a change in front of the radical group, for Fred Mader, business agent of the Fixture Hangers' Union, was elected president. The new president immediately tried to make peace with the Citizens' Committee for the enforcement of the Landis award and announced that the various unions had agreed to accept the award. The Citizens' Committee, however, is still in a fighting mood and maintains its attitude for open shop in those trades which originally repudiated the Landis award.

The chairman of the Citizens' Committee contends that the "insurgent unions" have agreed to accept the award only in hope of preserving former closed-shop conditions. These insurgent unions are the carpenters, plumbers, hoisting engineers, cement finishers, lathers, fixture hangers, sheet metal workers, composition roofers, slate and tile roofers and laborers. Individual members of these unions who sign pledges to abide by the Landis award and not to strike are now being placed on jobs by the committee's employment office. The committee's action has been endorsed by the contractors and builders belonging to the two building trades employers associations. Much new

building work is progressing in spite of these conditions.

To End Jurisdictional Disputes

A national agreement heavily penalizing unions which refuse to abide by decisions has been reached by the Associated General Contractors of America, the American Institute of Architects, the Engineering Council, the National Building Trades and Employers' Association, and the building trades department of the American Federation of Labor through the national board for jurisdictional awards, which has just concluded its regular quarterly meeting in Washington.

A resolution adopted provides that local building trade councils of union labor shall suspend unions and refuse to recognize or support those unions which refuse to abide by decisions of the national board.

It also provides that general contractors and sub-contractors who employ only union labor shall incorporate in their agreements with labor a provision that will secure compliance with all the decisions of the board, and that they shall refuse employment to members of local unions which do not abide by such decisions, and further that architects and engineers shall insert in all their specifications and contracts a clause that such decisions shall be followed.

"This resolution," says a statement issued by the national board, "is of far-reaching consequence to settle jurisdictional disputes, which in the past have constituted the majority of the causes for strikes and resulting delays and economic losses.

"It is the most effective co-operation between workmen, employers and professional men interested in construction looking toward the settlement of these jurisdictional disputes without resort to strikes.

"This action has been taken as the result of the report of a special committee of the national board appointed to outline the procedure to be followed in clearing up the situation created by the refusal of the United Brotherhood of Carpenters and Joiners to conform to the decisions of the board in the case of settling the dispute between the carpenters and the sheet metal workers which was decided in favor of the latter."

Freight Rates

Up to this writing no decision had been reached by the Interstate Commerce Commission as a result of the general freight rate hearings in Washington during January and February. However, very strong pleas and arguments were made for reductions in building material rates, even by the Secretary of Commerce himself. The points made by William B. King, general counsel for the National Federation of the Building Industries and the National Association of Builders' Exchanges were so thoroughly driven home by him and other witnesses for the various construction industries that some reduction in rates seems inevitable.

What the U. S. Department of Commerce Is Doing for Housing

Mobilization of Capital for Home-Building Now the Big National Issue

IN ADDITION to many local conferences on the housing problem in various cities throughout the country, the U. S. Department of Commerce under Secretary Hoover's direction, is doing a great deal of other work which will result in more lasting benefit to contractors, builders and architects in the house-building industry. These activities are outlined in a recent letter of Secretary Hoover to the President as follows:

"We have created a number of agencies, mostly voluntary, for the purpose of securing constructive solution to some of the more general problems that cause the blockade on housing. Various committees have been established and are engaged in sincere efforts in the following fields: The General Situation in the Construction Industry, Simplification of Municipal Building Rules, Simplification of Plumbing Requirements and Practice, Standardization of Contractors' Specifications, Expansion of Small House Design Bureaus, Simplification of Clay Products, Lighting Fixtures, Lumber, Paint and Varnish, and in many other directions. By all these agencies much good has been accomplished in a quiet and efficient manner.

As an example of problems of national scope it was strongly emphasized in the investigation of the Senate Committee on Reconstruction that the disordered and expensive requirements of our municipal building rules are estimated to impose a 10 to 20 per cent unnecessary cost upon housing. In this matter, the committee appointed comprised: Ira H. Woolson, Chairman, Consulting Engineer, National Board of Fire Underwriters, New York City; Edwin H. Brown, Architect, Minneapolis, Minn., Chairman, Committee on Small Houses, American Institute of Architects; William K. Hatt, Professor of Civil Engineering, Purdue University, Director, National Research Council; Rudolph P. Miller, Ex-Superintendent of Buildings, N. Y. C., Chairman, Building Officials Conference; J. A. Newlin, Forest Products Laboratory, U. S. Dept. of Agriculture; Ernest J. Russell, Architect, St. Louis, Mo., Chairman, National Board of Awards for Jurisdictional Disputes in the Building Industry; Joseph R. Worcester, Consulting Engineer, Boston, Mass.

"This committee is drafting a simplified set of municipal building rules embracing the best practice of the art, and this work is well advanced. It has involved a large amount of co-operation with municipalities,

with different trades and professions. Arising out of this we have also appointed a committee which is hard at work upon plumbing questions: George C. Whipple, Chairman, Director, School of Sanitation, Harvard University; William C. Groeniger, President, American Society of Sanitary Engineering; William J. Spencer, Secretary-Treasurer of Building Trades Dept., American Federation of Labor; H. Y. Carson, Research Engineer, American Cast Iron Pipe Company, Birmingham, Ala.; A. L. Webster, Sanitary Engineer, 112 East 40th street, New York City; A. E. Hansen, Sanitary Engineer, 2 Rector street, New York City; Thomas F. Hanley, Chairman, Standardization Committee, National Association of Master Plumbers.

"This committee is making good progress and much experimental work is being done at the Bureau of Standards in the direction of simplification of plumbing requirements.

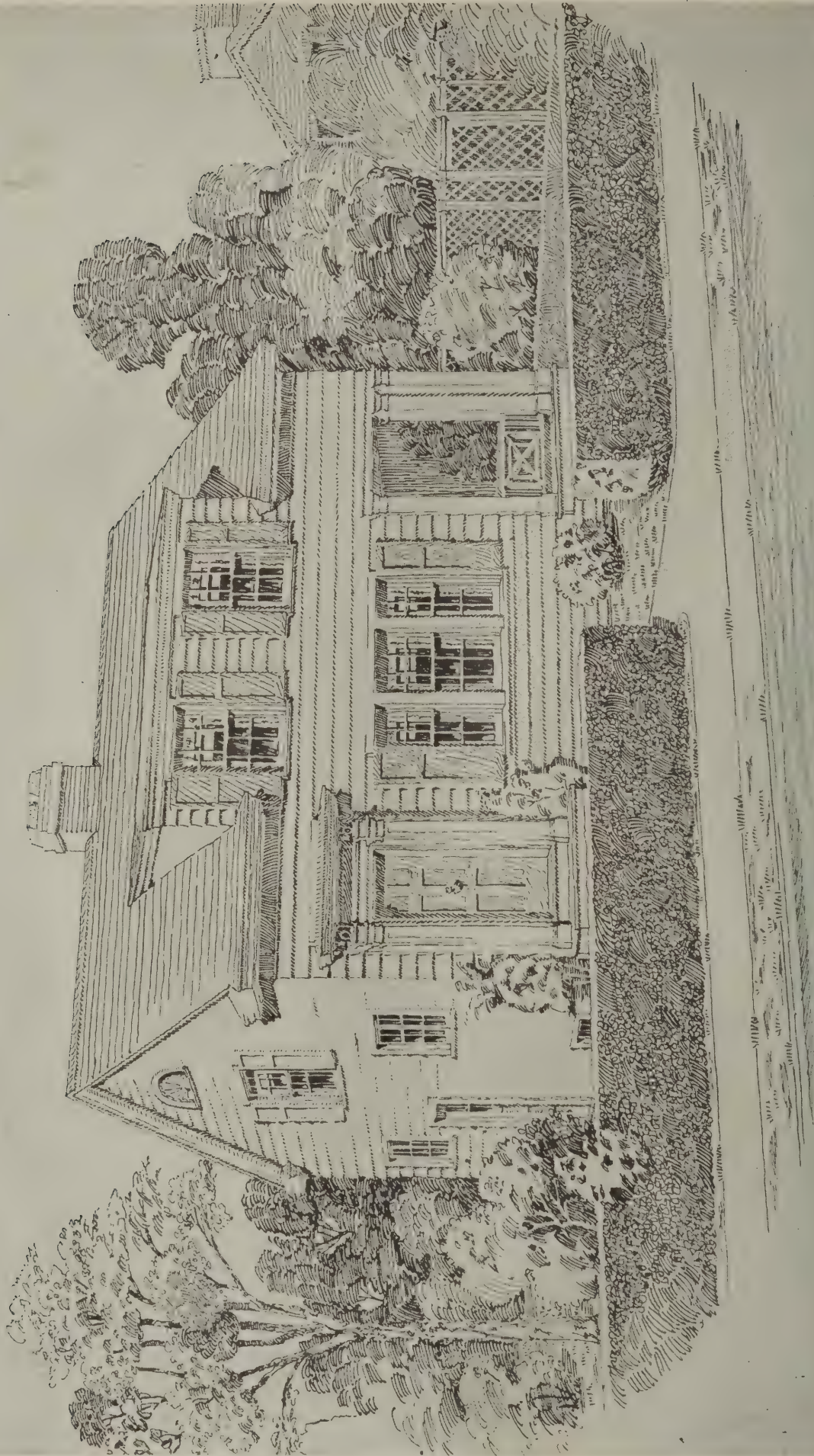
"I appointed a national committee in the matter of city zoning in response to the urgent request of many interested national associations with a view to development of larger vision and more uniform legislation upon this subject. The committee comprises: Louis A. Moses, Cleveland, Ohio, representing the National Association of Real Estate Boards; J. Horace McFarland, Harrisburg, Pa., representing the American Civic Association; Nelson P. Lewis, New York City, representing the National Municipal League and the National City Planning Conference; Lawrence Veiller, New York City, representing the National Housing Association; Morris Knowles, Pittsburgh, Pa., of the United States Chamber of Commerce; Edward M. Bassett, New York City, Chairman of the Zoning Committee of New York; Frederick Law Olmsted, Brookline, Mass., President of the Society of Landscape Architects; John Ihlder, Washington, D. C., of the United States Chamber of Commerce.

"At the recent Unemployment Conference a subcommittee was appointed on construction industries, and to all intents acted as a national conference. This committee brought in a very valuable report and recommendations. Members of this committee were representative of all the different national elements in the problem and the committee recommended the further development of local conferences and again urged the necessity of higher moral standards, the reduction of costs by materials, capital and labor. This committee has been expanded into more permanent form by the

appointment of additional members and is engaged in promoting local action. This committee comprises: Ernest T. Trigg, President, National Federation of Construction Industries; Joseph H. DeFrees, President United States Chamber of Commerce, Washington, D. C.; John Donlin, American Federation of Labor, Washington, D. C.; Alexander M. Linnett, President U. S. League of Building and Loan Associations, Newark, N. J.; Irving B. Hiatt, President, National Real Estate Board, 612 Madison avenue, Toledo, Ohio; William Stabler, Comptroller, Metropolitan Life Insurance Company, New York City; John H. Kirby, Houston, Texas; Dr. J. T. Duryea, New York City; Charles Warner, Wilmington, Del.; Richard E. Schmidt, Chicago, Ill.; Gen. R. C. Marshall, Washington, D. C.; C. F. Lang, Cleveland, Ohio; Daniel Crawford, Jr., Philadelphia, Pa.; William L. Monroe, Pittsburgh, Pa.

"Generally, I have the feeling that a national conference on the housing problem would be likely to split upon prices of materials and wages and, in any event, have no power to affect either one. Such questions can be better settled by local conferences such as those already held. I have held generally that we are or should be a country of local community action, and that the province of the federal government was to stimulate and assist local action and to avoid every suggestion of nationalizing these questions. The blockade was due to high levels of materials, wages, railway rates, and shortage of home building capital. Prices and wages are slowly receding, efficiency of labor is increasing and the volume of building is gaining.

"There is one problem that has distinctly national character and upon which national thought could be advanced by conference; that is, the mobilization of finance of home building. We have mobilized the commercial capital of the country through the Federal Reserve banks. We have mobilized the farm mortgage capital through the Farm Loan Bureau. We are considering mobilizing production capital for the farmers through another organization. The country badly needs a mobilization of the home building capital based upon our building and loan associations, insurance companies, and savings banks. We have a sound foundation upon which to build some sort of structure that would cheapen home building capital, give it more mobility to all regions and afford greater security. A conference to consider this problem would be of great value."



A Five-Room Frame House

Braun & Nitsche, Architects, Chicago. Designed for the National Lumber Manufacturers' Association. Working drawings on transparent paper from which blueprints may be made are shown in the detachable insert in this issue. Description and quantities in the following pages

Small House Design

Complete Working Drawings of this House are Given in the Detachable Insert in this Issue

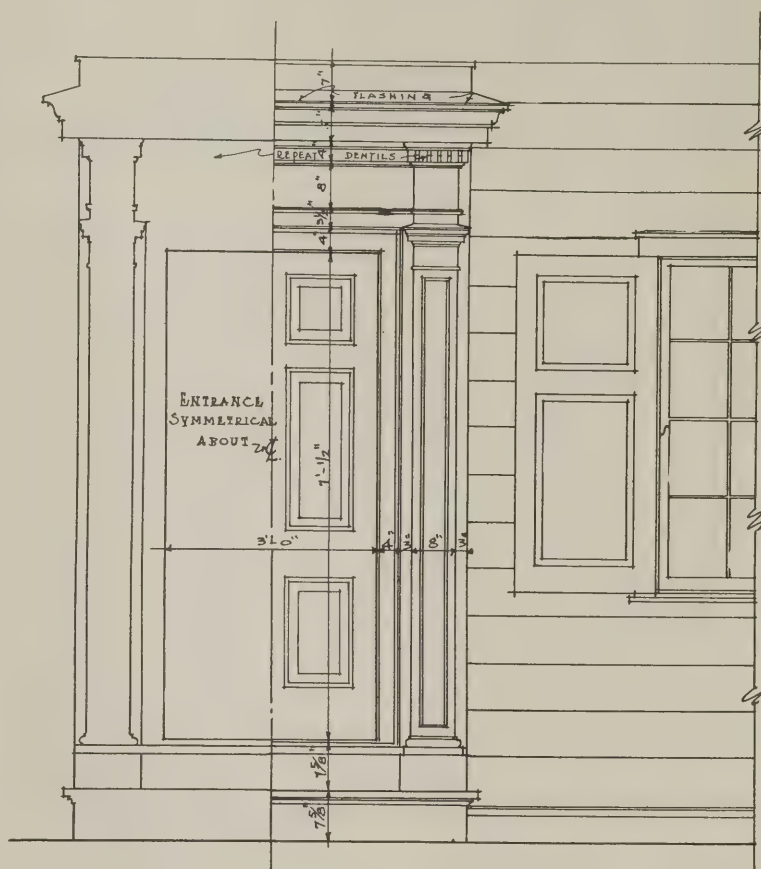
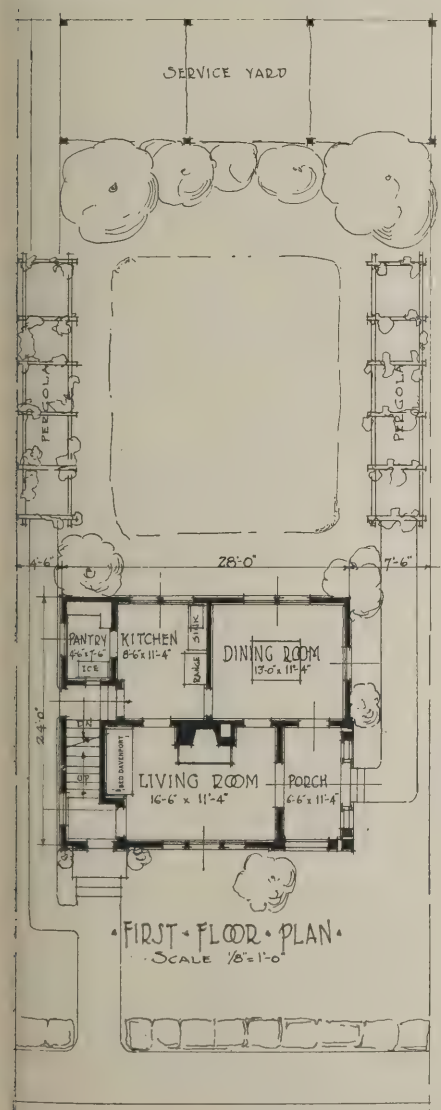
THE working drawings presented in this month's supplement show a five room house of moderate size, designed in the colonial style of our forefathers. The exterior is simple, dignified, and refined in detail. What little ornamentation there is indicates careful study and is concentrated about the porch and the entrance. Every moulding counts and, moreover, the architect has in every part shown the delicate sense of proportion that is so characteristic of early colonial work.

The wall covering is of wide channeled siding and the whole design is reminiscent of the early New England homes of typical wood architecture.

The first floor shows an unusually large living room, for a simple home of this kind,

which may either be entered from the front porch or side entrance. From the latter a stairway leads to the second story. The living room is of good proportion with a large nook for a bed davenport which may

The dimensions of the building are 28x24 ft.—675 square feet. The cubical contents are 16800 cubic feet from which the approximate cost may be figured. Residences of this type cost from 30 to 35 cents a cubic



ENTRANCE DETAIL.
SCALE = $\frac{3}{8}$ " = 1'-0"

be used in cases of emergency—the modern substitute for the guest room. The wide fireplace adds to its cheer in winter while the French doors leading to the porch give an abundance of light.

The dining room leads off the living room and opens directly into the kitchen. Connected with the kitchen is a pantry amply supplied with shelves and a wide space for the refrigerator, which can be iced from the outside.

A convenient feature is the side entrance and the stairway leading to the basement which may be approached without passing through any other part of the house.

On the second floor there are two bedrooms and a large bathroom.

foot, depending on locality and the details of construction. The lower figure is for a location in which the labor scale is less than in most of our large cities and provides for simple trim and hot air heating instead of hot water.

One of the most important things often neglected by a builder in the construction of a house is the provision for fire stops at points where gases of combustion or the flame may spread from one part of the building to another. Such stops are simple and inexpensive and may be constructed of heavy planking. It is, also, desirable to cut between studs what is known as bridging, that is, a block of wood the size of the stud midway between the floor and the ceil-



Two elevations showing house modified to comply with proposed requirements of small house construction within the fire limits

ing. Thus if a fire starts in the basement it does not readily spread through a concealed channel to the upper story. Likewise, it is desirable to extend the under floor to the outside of the studding.

If one but remembers that combustion cannot take place without air, and that fire spreads rapidly where a draft occurs and that this draft is increased in intensity as the fire progresses, one can readily devise stops of a simple nature at various points of the building that will add but a few dollars to the original cost but may be the result in the saving of many thousands.

The National Lumber Manufacturers Association has prepared a diagram which shows the weak points, regarded from this point of view, in a balloon frame building which has been used in the construction of this building by the architects, Braun & Nitsche of Chicago, who designed the building and through whose courtesy the National Lumber Manufacturers Association is permitted to present the working drawings and the details of construction to the readers of NATIONAL BUILDER.

Improved Frame Construction for Fire Prevention

The following illustration points out many of the ways to make a wooden house fire resistive. Other means that suggest themselves are the use of zinc coated nails to hold the shingles on the roof, painting the house with a fire resistant paint, especially at points of greatest fire hazard, use of a fire resistant stain on the shingles, and the use of metal lath in places subject to especial fire risk.

- 1—Fire stopping at all intersections of walls and partitions with floors, ceilings and roof.
- 2—Herring bone fire stopping in partitions midway between floor levels.

- 3—Partition and wall corners frame solid.
- 4—Wall between porch attic, and house sheathed solid.
- 5—Header beams 20 inches from the fireplace breast. Incombustible hearth.
- 6—Wood members 2 inches from chimney, space between filled with loose incombustible material.

flushed, permitting free movement of chimney.

- 12—Top of heating plant 15 inches from ceiling.
- 13—Furnace 8 feet from warm air riser.
- 14—Smoke pipe $1\frac{1}{2}$ times its diameter below the ceiling.
- 15—Heat pipes 6 inches below ceiling.

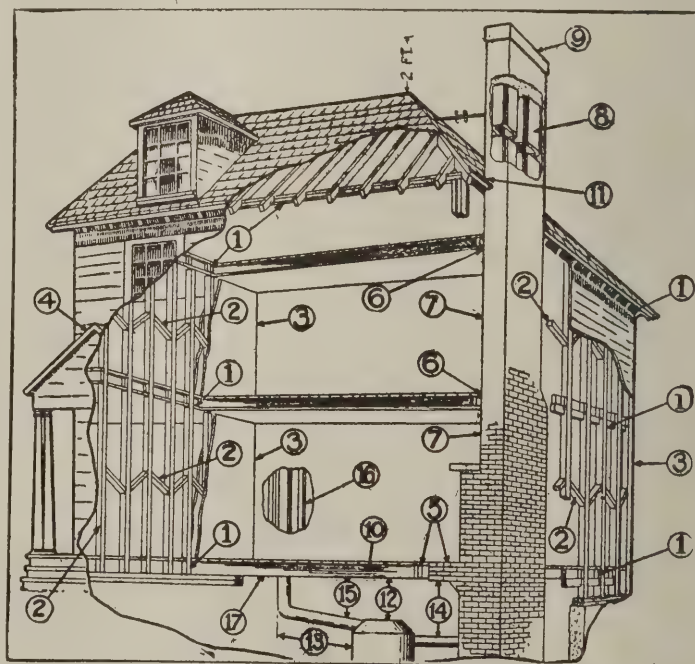


Diagram of fire protective construction

- 7—Plaster applied directly to chimney breast.
- 8—Flue lining in chimneys.
- 9—Top of chimney 2 feet above peak of roof.
- 10—Protection over heating plant.
- 11—Roof framing 2 inches from chimney,
- 16—Doubled tin pipes, $\frac{1}{2}$ inch air space between in partitions, kept 1 inch from all woodwork. Steam and hot water pipes 1 inch from woodwork.
- 17—Heat pipes running through floors, fire stopped with loose incombustible material.

Adaptation of this Design to Localities Within Fire Limits

The house as presented in the working drawings requires a 40-foot lot which, while not unusual in suburban or rural communities, is 10 to 15 feet wider than is usual in most of our cities. In all of our cities the congested district is placed within the fire limits which are extended as the city grows. The extension of such fire limits is a matter which affects greatly the interests of the home builder. Recently some cities, without considering the effect of such legislation, have extended their fire limits to the city limits, which generally took in a large area of practically suburban territory, and which in the ordinary growth of the city would take years to become so congested as to require fireproof construction or even semi-fireproof construction to insure the safety of life and property.

The undesirable reaction from such ill-advised legislation was that it placed a check upon home building and forced people into tenements within the congested districts, enabling the profiteering landlord to take advantage of the situation and forcing people, who had looked forward to acquiring a home of their own, to remain renters at the mercy of the rent hog.

In an effort to overcome this condition some cities, of which Chicago is a conspicuous example, have taken steps to revise their building codes as applied to houses of small area and of not more than one and one-half to two stories. In this connection the recommendations of the Joint Committee appointed by the American Institute of Architects and the Illinois Society of Architects, representative bodies of the architectural profession, are under consideration by the sub-committee of the Building Committee of the Chicago City Council whose work and the work of the architectural committees cannot be too highly commended.

If this ordinance is passed the small home owner, whose needs can be fulfilled by a house not more than one and one-half stories high and of an area not to exceed 1200 square feet, will be permitted to build either of brick, hollow tile, or concrete blocks, or wooden studs and sheathing protected by metal lath and portland cement plaster on the outside, or studding with metal lath and portland cement plaster, back plastered, instead of being required to build with a 13-in. brick exterior wall.

In order to conform with these proposed requirements a modified design is shown of this building which may be constructed within the fire limits of frame and stucco, on a 30-foot lot which is the unit prevailing in the majority of outlying divisions within the city limits of Chicago.

In order to leave the required space of three feet on each side, which is a provision of the proposed code, the construction of a house more than 24 feet wide will not be permitted. By turning the house

around and facing what was formerly the side to the front the plan as shown may be used on a 30-foot lot. For a new design showing the possibilities of a stucco front in Italian style, we are indebted to Mr. T. F. Laist, Chicago representative of the National Lumber Manufacturers Association.

That this form of wall construction will be regarded as acceptable, for small house construction within the fire limits of cities, seems to be indicated by the action of the Building Construction Committee of the National Fire Protection Association in New York, at its meeting in the early part of February of this year. At that time a vote was taken on the following provision, the majority voting in favor of the type of construction suggested:

"That stucco on metal lath and masonry veneer residences be permitted within municipal fire limits except in strictly congested districts."

The advantages of a two-story house are many. One of the most obvious being economy of construction, particularly in the construction of the basement and the roof. The popularity of the flat, and almost everyone has at some time or other been forced to live in a flat, through which women have become accustomed to having all rooms on one floor is responsible for the bungalow. While this arrangement undoubtedly saves steps and occasionally climbing the stairs it does so at the sacrifice of a certain amount of privacy and convenience.

QUANTITY SURVEY

Note:—Kind and quality of lumber and finish is not indicated. This is left to suit the individual taste and local conditions.

Excavating, Concrete and Brick

Excavation for basement—155 cu. yds.
Trenches for footings—5½ cu. yds.
Concrete for foundation (8" wall)—17 cu. yds.
Concrete for footings, walls and chimneys—5½ cu. yds.
Common brick for chimney and rough fireplace—1500.
Concrete—basement floor, 4"—490 sq. ft.
Concrete steps—exterior—14 lin. ft.
9x13 flue lining—45 lin. ft.
Thimbles—2 pcs.
Mantel bar, angle irons, 2½x3x3'8"—2 pcs.
Fire brick for lining of fireplace—125.
Face brick for facing and hearth of fireplace—160.
Waterproofing outside of basement wall—23 sq. yds.
12"x12" cast iron clean-out door for ash pit—1.
Ash pit door for fireplace—1.
Cinders 6" thick for basement floor—37 cu. yds.

Lumber—Material

Size	Length	In.	Ft.	
6x 8—12	Basement girder—1 pc.			
6x 8—4	Basement girder—1 pc.			
6x 6—6	Basement posts—1 pc.			
2x 8—	Wall plate—106 lin. ft.			
2x10—24	Joists—1st floor—10 pcs.			
2x10—12	Joists—1st floor—12 pcs.			
2x10—12	Joists—1st floor—16 pcs.			
2x 8—14	Joists—porch—5 pcs.			
2x 8—24	Joists—2nd floor—22 pcs.			
1x 3—	Cross bridging—200 lin. ft.			
2x 6—16	Rafters—main—20 pcs.			

2x 4—12	Rafters—dormers—20 pcs.
2x 4—20	Ceiling joists—22 pcs.
2x 4—14	Studding—exterior—24 pcs.
2x 4—18	Studding—exterior—44 pcs.
2x 4—22	Studding—exterior—16 pcs.
1x 2—	Furring for chimney—200 lin. ft.
1x 4—	Rough Ribbon—56 lin. ft.
2x 4—	Plates—exterior—312 lin. ft.
2x 4—16	Studding—interior—1st floor—40 pcs.
2x 4—16	Studding—interior—2nd floor—45 pcs.
2x 4—	Plates—interior—400 lin. ft.
1x 6—	Flooring—under 1st—600 sq. ft.—750 ft. b. m.
	Flooring—under 2nd—460 sq. ft.—550 ft. b. m.
1x 2½	face flooring—finished—1006 sq. ft.—1450 ft. b. m.
	(Less bath 7½x7'4"—3'x2'4")
1x 2½	face porch—78 sq. ft.—120 ft. b. m.
1x 2½	Kitchen and pantry—154 sq. ft.—220 ft. b. m.

Roofing—Material

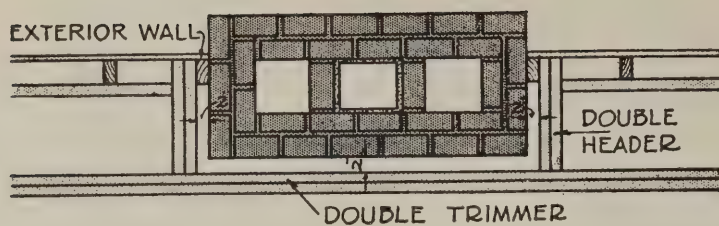
Size
1x4 Roof boards—7 M. bd. ft.
Shingles—9½ squares.
Siding—14 squares.
Siding—14 squares.
Paper—14 squares.
Ceiling over porch—66 sq. ft.

Mill Work

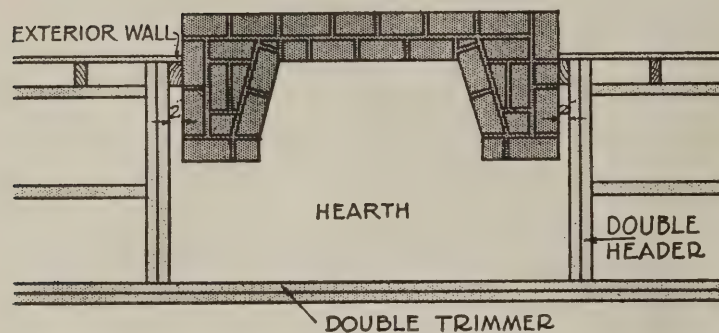
Front porch columns, with architrave—3.
Front porch pilasters—2.
Front porch 2 posts and rail—8½ lin. ft.
Front door, architrave and pilasters—1.
Basement windows, plank frames—1½x28x14—5.
Windows—complete with trim and frame—1st floor—double hung—1½" sash—(sizes marked in plans)—10.
Shutters—solid paneled—pairs—10.
Shutters for triple window—set—1.
Windows—complete with trim and frame—2nd floor—double hung 1½" sash (sizes marked in plans)—6.
Shutters—pairs—6.
Outside doors—complete with trim and frame—French doors—pair (sizes marked)—1.
Outside doors—complete with trim and frame—solid paneled doors—single (sizes marked)—2.
Outside doors—complete with trim and frame—French doors—single (sizes marked)—1.
Cornice moulding—gable—60 lin. ft.
Cornice moulding—returns—48 lin. ft.
Cornice moulding—dormers—32 lin. ft.
Cornice moulding—dormers—rake—42 lin. ft.
Base.
Trim—interior for doors, both sides—1st floor—6.
Trim—interior for doors, both sides, 2nd floor—6.
Trim—interior for doors, one side—1st floor—4.
Trim—interior for doors, one side—2nd floor—2.
Trim—closet doors—2nd floor—2.
Chair rail bath room—32 lin. ft.
Closet fittings—shelves, hook strips—2 sets.
Front stairs—with handrail on brackets—1.
Basement stairs—with handrail (plank treads—open risers)—1.
Medicine closet—1.
Pantry fittings, shelves, etc.—special design—1.
Base—complete—265 lin. ft.
Base—closets—20 lin. ft.
Picture moulding—300 lin. ft.
Inside doors—1st floor—solid paneled—6.
Inside doors—2nd floor—solid paneled—5.
Coal room—2x4x16' studding—8 pcs.
Coal room—fencing—120 ft. b. m.

Sub-Bids for Other Trades

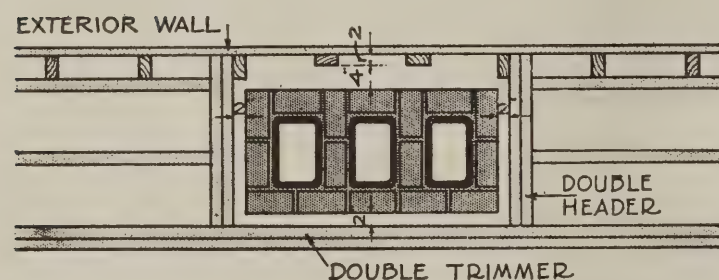
Plumbing.	Painting.
Heating.	Papering and decorating.
Electric work.	Hardware.
Sheet metal work.	Lathing and plastering.
Electric fixtures.	
Tile floor in bathroom—60 sq. ft.	
Terracing, landscape gardening, sodding and walks.	



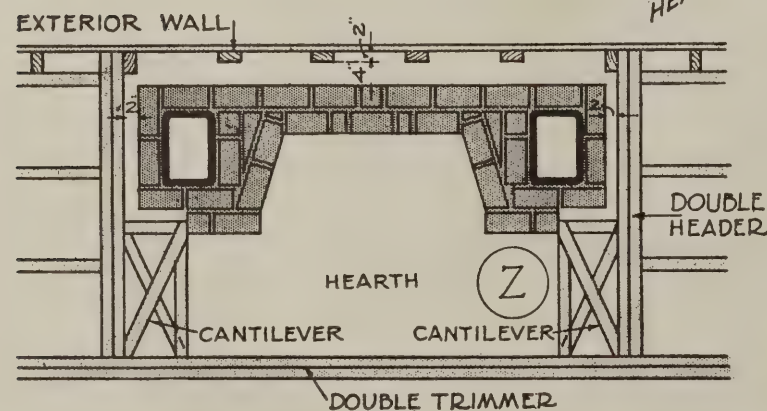
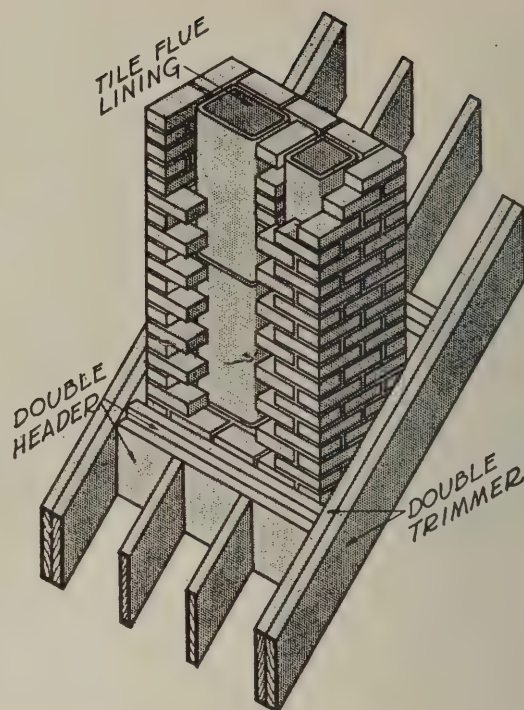
CHIMNEY ABOVE FIREPLACE



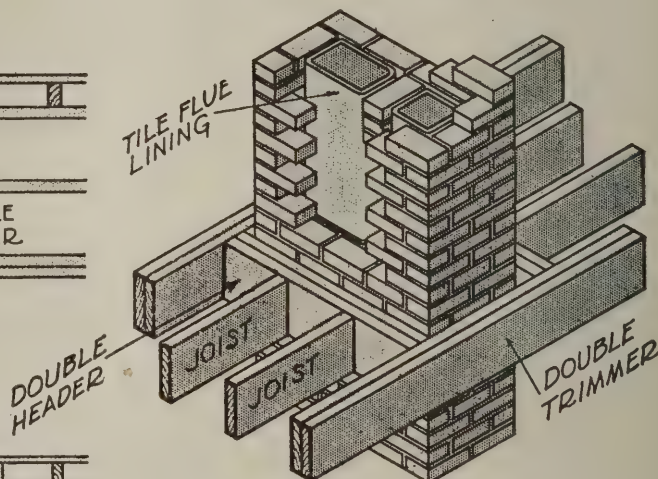
PLAN OF FIREPLACE



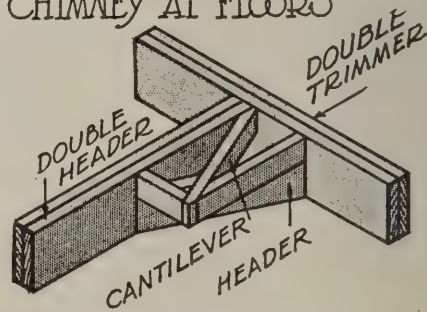
CHIMNEY ABOVE FIREPLACE

ALTERNATE PLAN OF FIREPLACE
WITH ADDITIONAL FLUES SHOWN

CHIMNEY AT ROOF

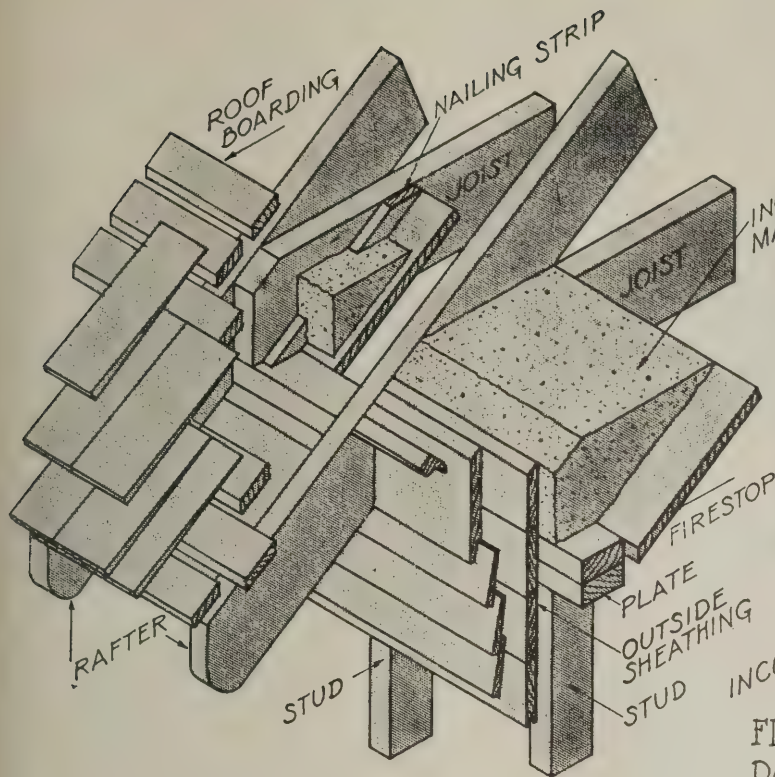


CHIMNEY AT FLOOR

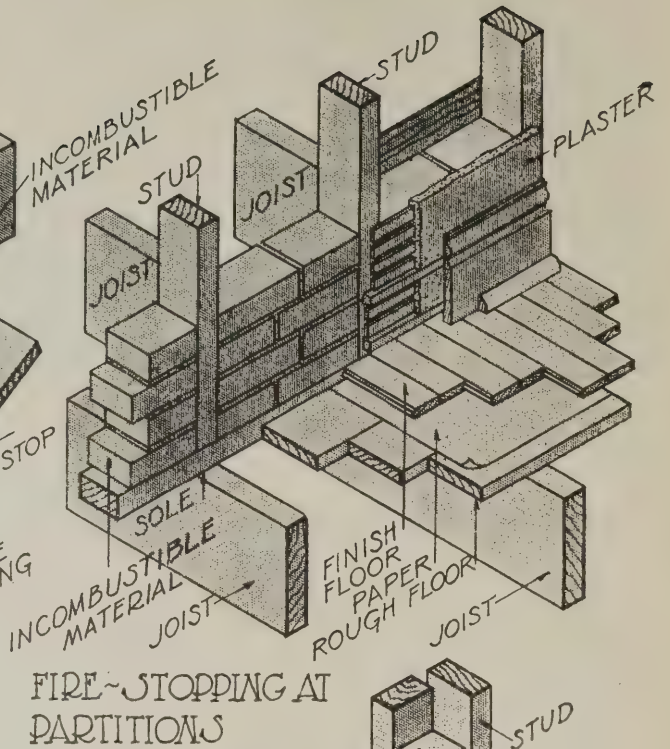


DETAIL AT Z

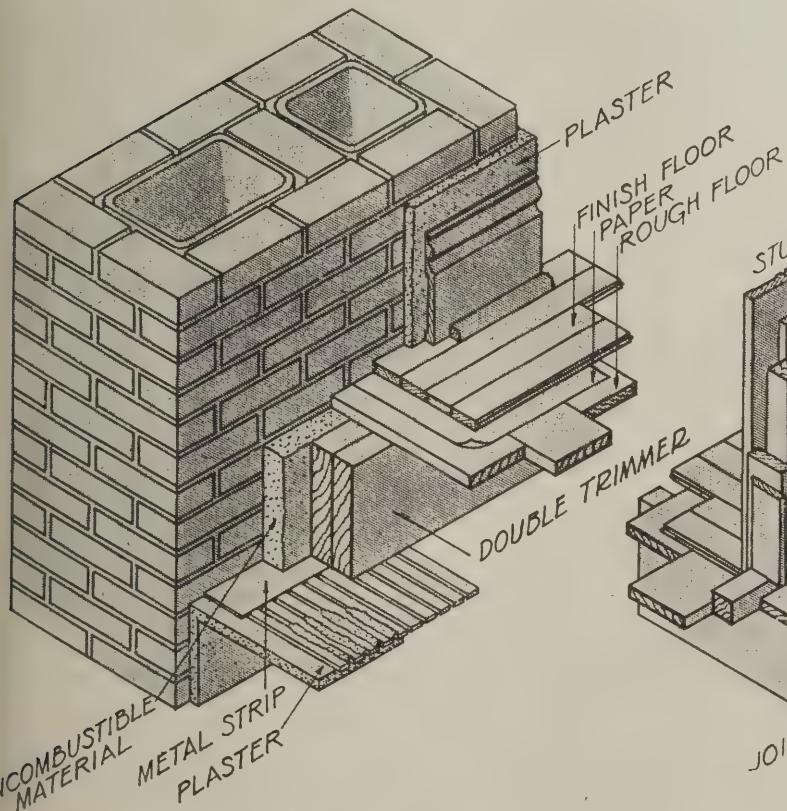
Showing framing around fireplaces. Reproduced by permission from "Frame Construction Details," published by the National Lumber Manufacturers' Association



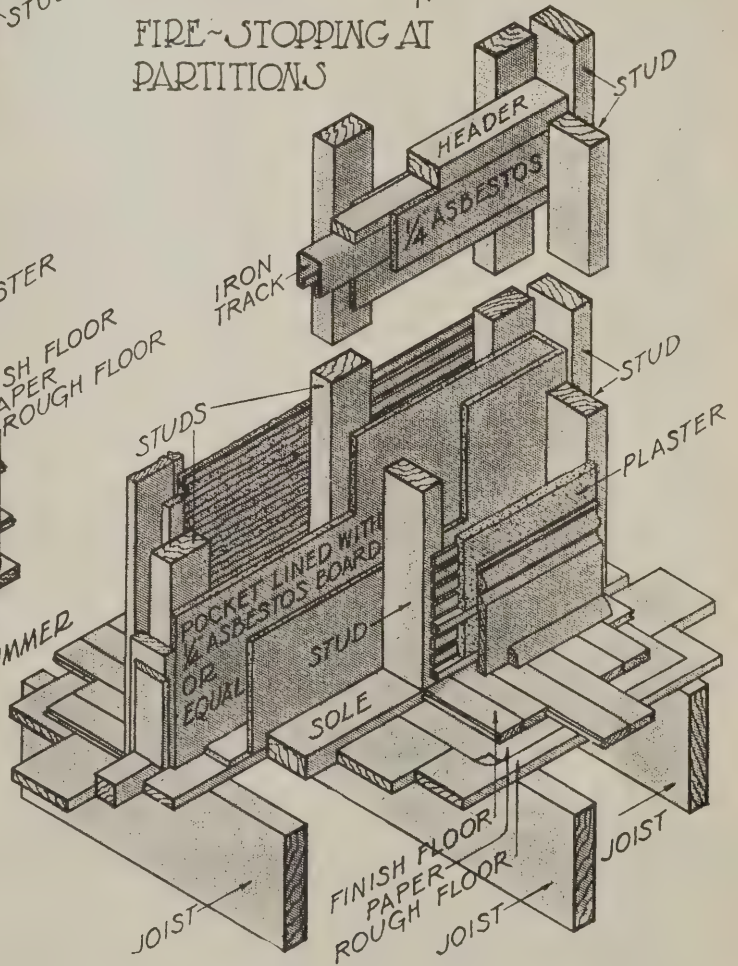
FIRE-STOPPING AT CORNICE



FIRE-STOPPING AT PARTITIONS



FIRE-STOPPING AT CHIMNEY



FIRE-STOPPING AT SLIDING DOOR

Showing large scale fire stops and cornices

A Small Bungalow with Alternate Plans

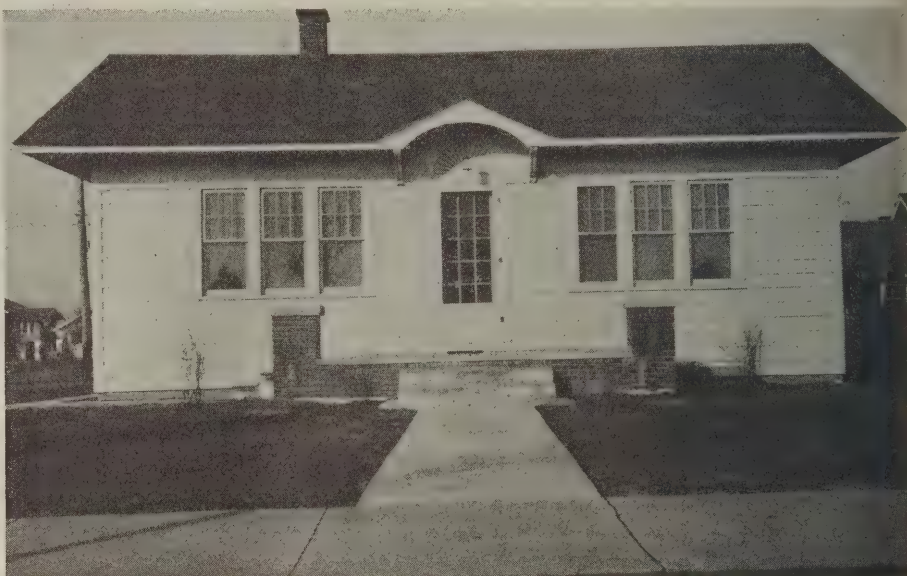
Hutchinson House that Can be Built and Sold Profitably at \$3500

THERE is a great demand for plans of very small bungalows which have neat and attractive exteriors as well as cheapness in their favor. The bungalow illustrated herewith seems to fill the bill. Its designer and builder, Oscar E. Young, Hutchinson, Kan., states that this little bungalow has attracted more attention and more favorable comment than any other house he ever built, and he has done considerable construction work as a speculative builder.

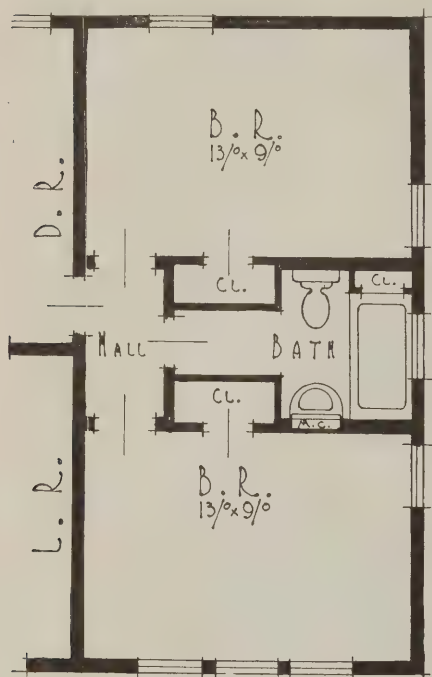
The pleasing effect comes from the proportions, for the house is simplicity itself,

both in lines and construction detail. It is about 34x26 ft. over all, with five rooms and a bath. The studding is about 11 ft.

high, giving a height from floor to ceiling of 8 ft. 4 in. The floor is about 1½ ft. above the sills.

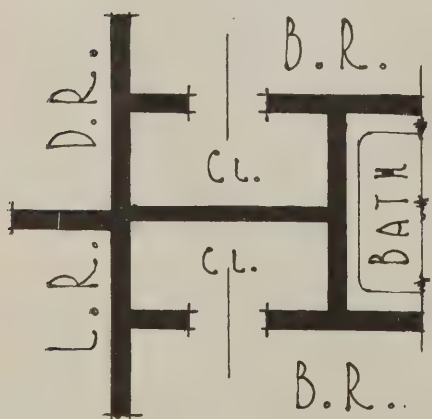


A small bungalow, Hutchinson, Kans.



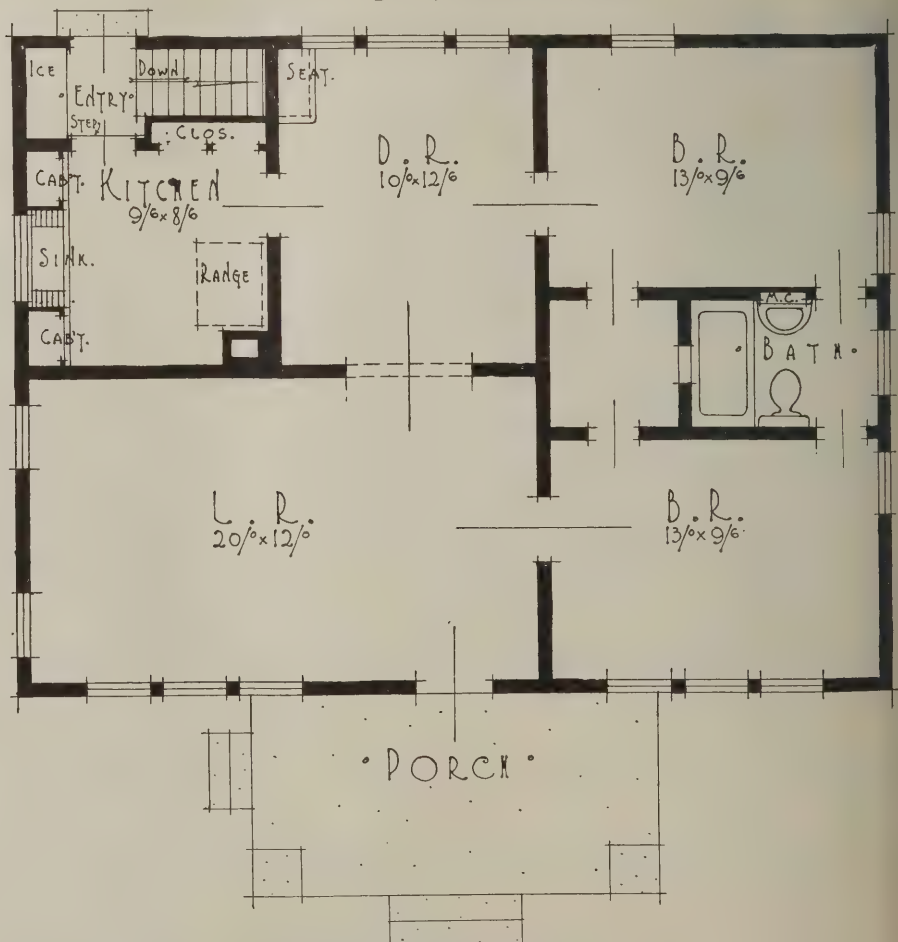
ALTERNATE "A"

Suggested variations in plan



ALTERNATE "B"

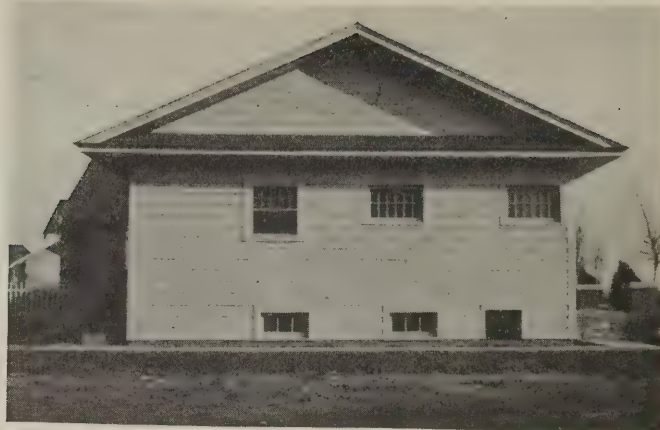
Another variation



Sketch plan of small bungalow



Corner elevation



Side elevation



A variation of the same type

In order to provide headroom in the stairway from the back entrance to the cellar a built-in window seat was placed in one corner of the dining room. Over the seat are shelves or racks for magazines, books or chinaware, as the case may be.

The finish throughout is yellow pine with oak floors. The color treatment, in this case, is cream, with a green stained wood-shingle roof. The heating equipment is a "pipeless" furnace, with one pipe to the bathroom. The price for which the house was sold, without the lot, was \$3500.

The accompanying plans show the house as built and two modifications which might be made in the interior, as suggested by a Chicago architect.

The accompanying view shows a bungalow of about the same size, with somewhat different exterior treatment. This bungalow is also a Hutchinson product.

Rule for Mixing Oil Paint

FOR each gallon of oil used take as much pigment as four times the specific gravity of the pigment.

Checking and Shrinkage in Interior Woodwork

L. M., of Carroll, Neb., writes us as follows: "I put up a house this summer that was supposed to be good. The doors are one-panel, veneer oak and the floors are all oak. Now the panels in the doors are checking; they have hundreds of little checks in them. They were evidently containing sap. The floors also are drying badly. They even slack up end-wise. I am going to build another house in the spring on somewhat the same lines. How can I guard against such lumber? Is there any way of telling these things before the lumber is put in the building?"

The Forest Products Laboratory, Madison, Wis., by Mr. Rolf Thelen, in charge of the section of lumber physics, to whom the above inquiry was referred, answers as follows:

"Although the more progressive manufacturers are becoming more and more careful with the drying and handling of their stock, it is still, unfortunately, true that a great deal of flooring and interior

finish is delivered on the job with too high a moisture content, that is to say, not sufficiently seasoned.

"The average conditions inside of the house, especially in the winter time, are drier than those outdoors, with the result that the lumber dries out after having been put up and shrinks accordingly. The enclosed mimeographs entitled 'Information for Dry Kiln Operators on Drying Hardwoods and Softwoods' and 'Drying of Plywood Panels' contain considerable information bearing upon your particular problem and show simple means for making moisture determinations on wood.

"The means of preventing a recurrence of this trouble in future construction is, of course, to assure yourself that the wood is thoroughly dry when you receive it and that it remains dry afterwards. The usual precautions concerning the storing or laying of interior finish in freshly plastered houses should, of course, be observed.

"If I can be of any further help, please be sure to let me know."

Editorial Comment

The character of service, it is worthy of note, that the Forest Products Laboratory is giving to builders and others has been evidenced in these pages in various ways as well as in the above instance. Whoever has profited by these services will be interested in knowing that the appropriation for carrying on the work of the laboratory is not sufficient to meet the growing demands upon it. The appropriation so far is \$325,000. At least \$100,000 more is required. Those interested in the economic work of the laboratory should write to their congressmen and impress them with the importance of sustaining the needs of the woodworking and lumber industries and builders generally by actively supporting the movement for an adequate appropriation for the effective continuance and extension of the laboratory's research work and dissemination of its information.

The Hon. Sidney Anderson of Minnesota is chairman of the House sub-committee on agriculture, which includes the Forest Service.

Four Small Bungalows

THE four designs presented here were contributed by Floyd A. Dernier, of the Lumbermen's Service Association. A choice of floor plans is offered with Figs. 1, 2, and 3, and while there is some similarity in

minor details each bungalow has a distinct character of its own.

Fig. 1 shows a remarkably neat and conveniently arranged little house. The corner porch, besides offering entrance to the liv-

ing room, affords a comfortable and sheltered retreat on warm days. Another door may be made to open from it into the dining room or bedroom, according to the floor plan chosen. The interior is finished in old



Fig. 1—A four or five room bungalow

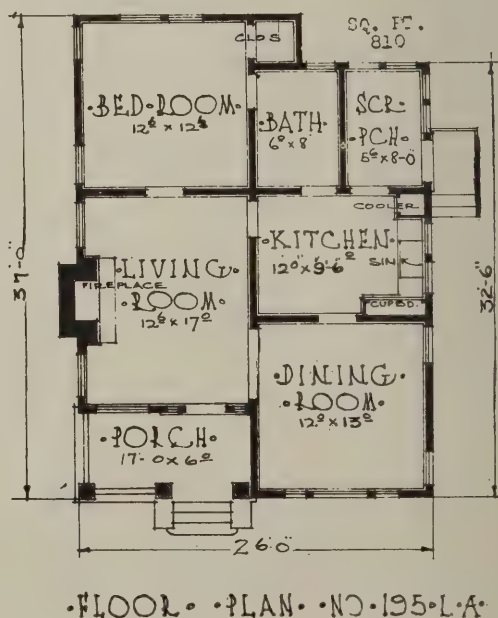
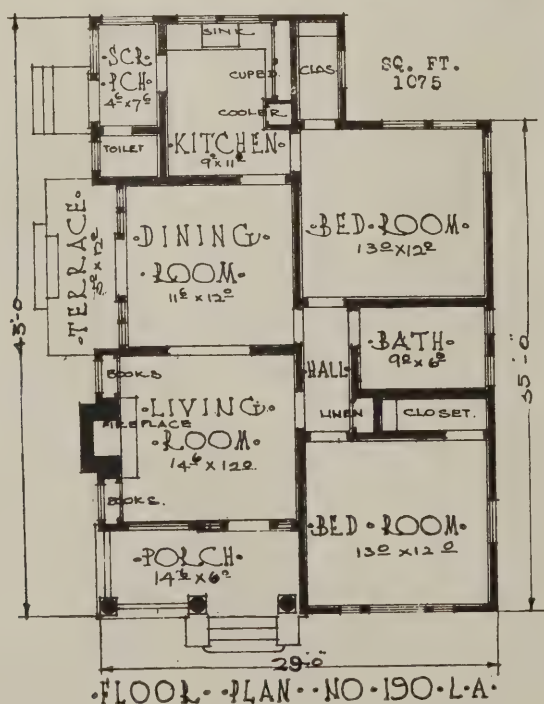
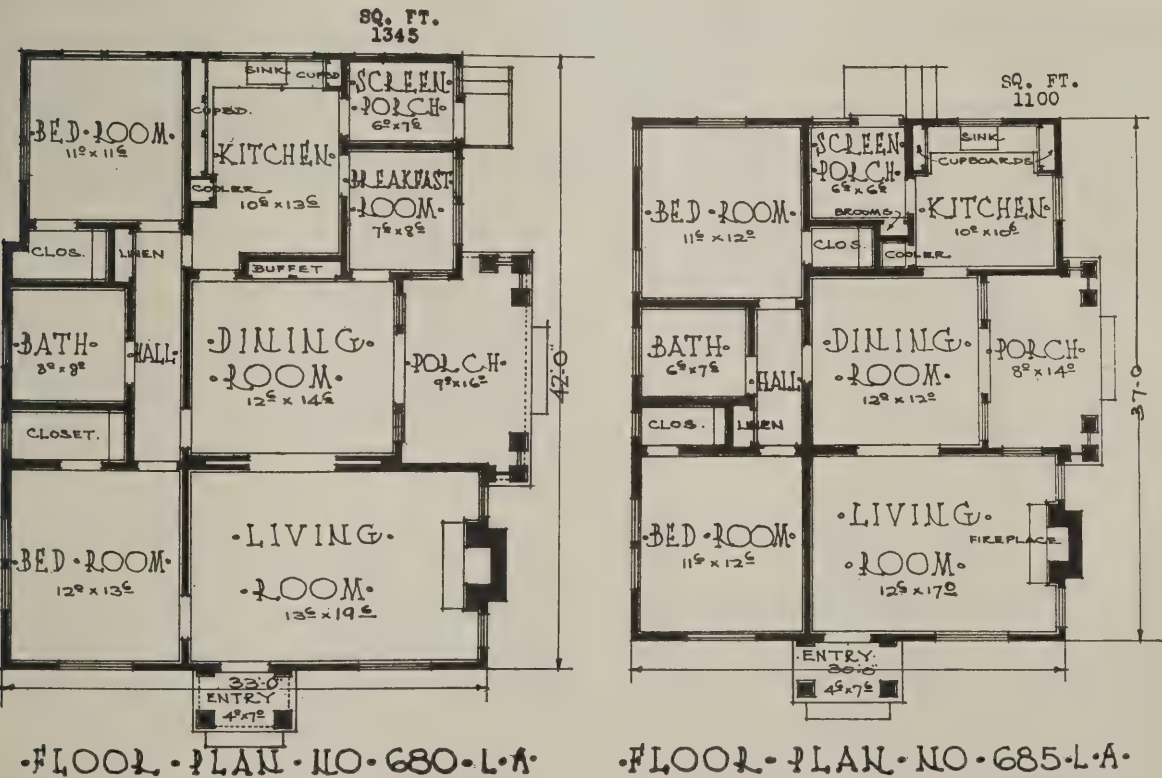




Fig. 2—A five or six room bungalow



ivory enamel, with mahogany-stained trim. The exterior of the particular house shown in the photograph was painted white, with a green-stained roof and mahogany trim, which combination is especially striking. Light yellow, light brown, or cream color, however, may be used with excellent effect, making the vine trellises of a darker tone.

The long line of the roof is broken by eyebrow details which afford ventilation to the garret. Simplicity and distinction mark the little semi-colonial house shown in Fig. 2. The foundation is of concrete. As in Fig. 1, the walls are of siding painted white, with a moss-green roof, but a strong note of color

comes in the dark red brick of the fireplace chimney, laid in light mortar and with raked joints. During the summer this color note can be repeated with splendid effect if crimson climbing roses are chosen for the trellises. These well-designed trellises about the windows, and the solid shutters, are very important items in the completed design.

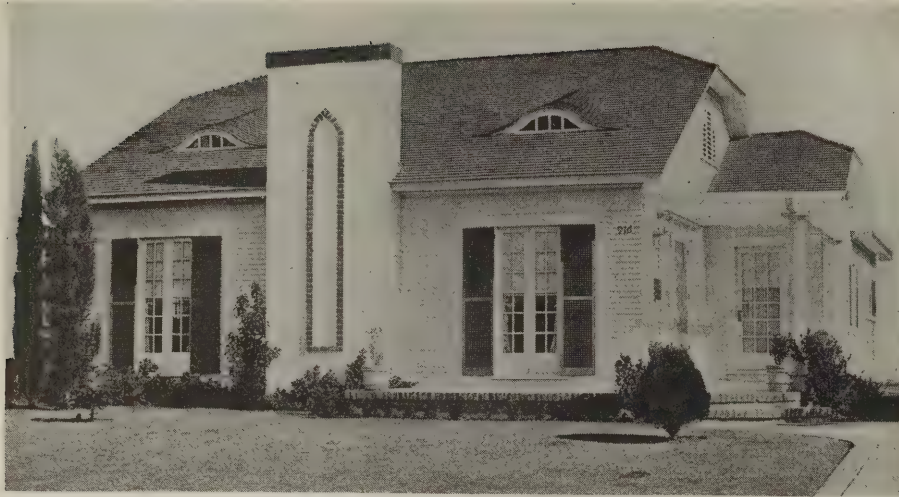


Fig. 3—A four or five room bungalow

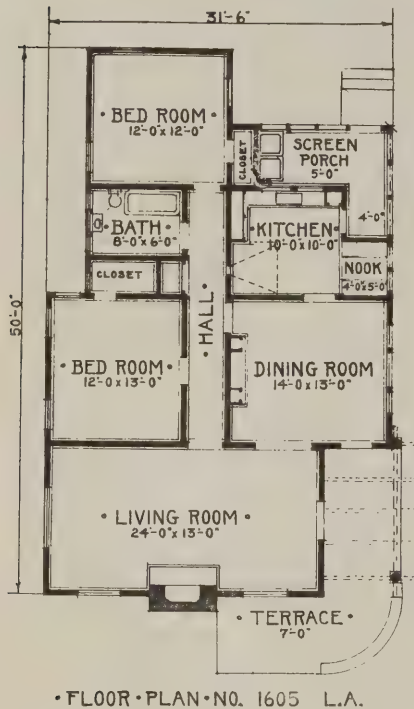
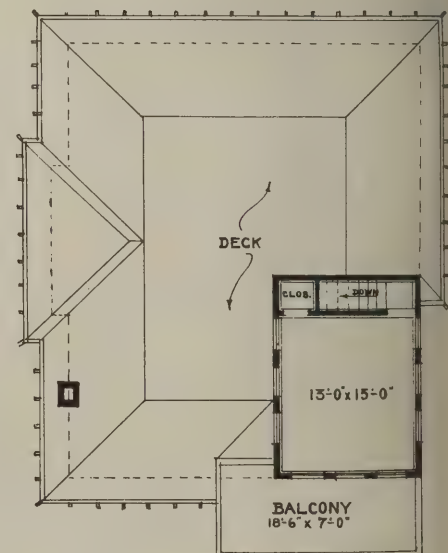
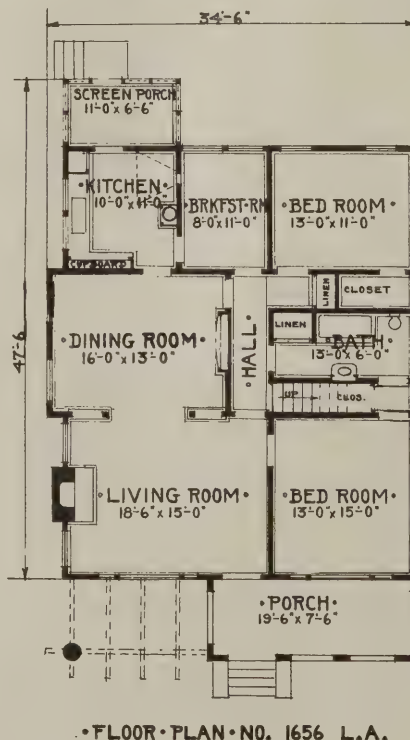
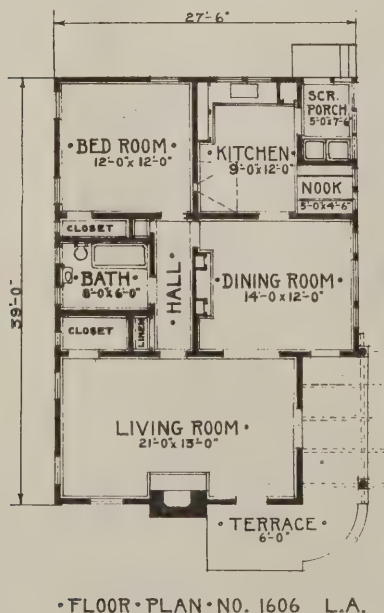


Fig. 4—An "aeroplane" bungalow of Spanish type



be substituted for the French windows shown in the original design.

Fig. 4 illustrates a popular and practical Spanish type of house. Tile, brick, metal or wood lath, or any of the different plaster boards, may be used as bases for the stucco, while for the exposed part of the roof

either tile, metal, composition or wood shingles may be used, with a roll or built-up roofing on the deck or flat part of the roof. All of the rooms are spacious and well arranged. The living and dining rooms are separated by a cased opening or colonnade, and should have finish and trim to harmon-

ize. The room on the second floor may be used as a living room, a sunroom or sleeping porch; the windows should be both glazed and screened. This type of house is very practical for any state in the Union, for it is both warm in winter and cool in summer.

Differentiating Duplicate Houses

By G. E. McDonald

Giving Two Identic Houses a Slightly Different Treatment Avoids Sameness and Makes Each One an Aid to the Setting of the Other

FLOOR plans were not available for the presentation of the small houses shown in these notes, the object of which is given

mode of living of any particular community.

Fig. 1—These colonial cottages are of a

the gable of one faces the street and its entrance is from the driveway and porch half hidden by flower box and trellis. The



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6

in the sub-title. The variation in exterior design is the main purpose—the floor plans are a matter for considerations based on individual requirements or on the habits and

type that will never go out of style. They are alike in their floor plans and exterior color treatment—both being straw color with white trimmings and brown roofs; but

pillared porch, front-facing steps and colonial doorway of the other has an attractive and quiet dignity.

Fig. 2—These twins, both dressed in

brown and white and with a strong family resemblance, nevertheless have distinct personalities. The one porch, well inset under the house roof and reached by direct-front-facing steps, is distinguished by reason of its ample arch with properly proportioned terminals. The other porch, while in reality a built-on feature with extended roof, yet has a secluded effect because of the side steps and ivy screen.

Fig. 3—The simple lines of the unassuming cottage to the right has enduring attraction. The classic roof, the sparing lines of white about the inset porch balancing the white framed window and the bracket to the left, and the white of the ventilator frame low down to the right—all indicate accurate taste. The house of duplicate floor plan to the left is differentiated by its built-out and gabled porch, with support of square pillars and appropriate awning. Its round ventilator is given the necessary touch of squareness by the Maltese cross arrangement.

Fig. 4—These newly constructed cottages, each with garage reached by a common driveway, will in time stand out as separate properties. In the one house-entry is had to the living room from the front, and a glass door opens from the south bedroom on a side porch. The other house is entered from the side, giving opportunity for the placing of triple window and effective flower box in the front place of honor. Note the rose trellises, porch lights and bracketed hoods over the front doors.

Fig. 5—The floor plans of these two houses are the same, the building contract for the two being placed at one time. By facing one to the side and the other to the street, however, and differentiating the exteriors in the matter of front platforms, and window and door types, they now stand out as distinct and individualized properties, whose value will be increasingly enhanced as the shrubbery and arbor are grown.

Fig. 6—The colonial cottage to the right is painted in white, screen frames and all, and has shutters on the front windows. The one to the left is painted in olive green, that harmonizes well with its twin, and has a different shaped canopy over the front door and rose trellises rounded on top. Both have green-brown roofs and stand out well among larger buildings on a new street.

Rustproofing Iron

A NEW method of rustproofing, which has been applied especially to small parts, consists in boiling the articles in a solution of hydrophosphate of iron. An attractive dark-gray finish is produced, and this is practically proof against all attacks of rust. The process is more rapid than others, and there is no effect upon the strength or temper of the metal.—*Popular Mechanics*.

Building With Woven Wire Fencing and Cement Mortar

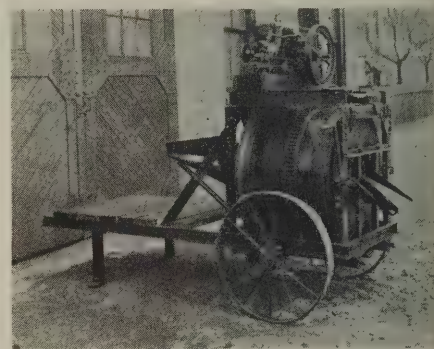
A. E. of Lakota, N. D., describes as follows a novel chicken house which he built of woven wire fencing and cement mortar on a form of 2x4s or 2x6s. "The house was about 12x18 ft. and 8 ft. high. For the foundation I bored holes 8 ins. in diameter, 4 ft. deep and 4½ ft. apart. These holes I filled with concrete to about 2 ins. above the ground. On these I ran a sill 6 ins. wide and 8 ins. high of concrete, with a couple of barbed wires in the bottom for reinforcement. My idea was to prevent the frost from heaving the building by having the concrete sill or foundation rest on the piers formed by the concrete, which filled the holes. The frame was then put up just the same as for a building which is to be sheathed with boards, but instead of boards I stapled on to the studdings some woven wire fencing with a mesh not over 4½x4½. *The corner studding should be covered with tar paper on the outer two sides before the fencing is stapled on, to prevent the wood from swelling from the moisture of the mortar.* Temporary boards were tacked over the fencing and on the outside of the studdings. The first coat of cement mortar was then applied, put on from the inside between the studdings and against the fencing and temporary boards. The mortar was allowed to set for two days, then the boards were removed and two more coats were put on, this time from the outside, and a finish coat of rough cast was applied. Pebble dash, or any other stucco finish may be used instead if desired.

"I have built several small garages and one big one about 50x100 ft. on this same plan, except for the foundation, which I have since laid on top of the ground, and they all seem to be good and strong. I use 1½ in. mesh poultry netting for stucco work over old shiplapping on old buildings or over sheeting for new buildings, always putting tar paper on the siding or sheeting before stapling the poultry netting on. Porch ceilings may be made with poultry netting as a base. With the ceiling joist 2 ft. or 16 ins. on center, I use diamond mesh poultry netting stapled underneath the ceiling joist (staples about 6 ins. apart). I tack boards underneath the netting for a temporary backing, and then from the top I go over the netting with a pair of pliers, crimping it where it does not lay flat on the boards. Then I spread the mortar on the netting and boards between the joist to a thickness of about ¾ in. This mortar can be made from unsifted sand if there is not too much coarse gravel in it. I use one part cement for sand and 10 per cent

hydrated lime and a little plaster hair mixed in. In a day or two the boards can be taken down and one or two coats of cement plaster put on in the ordinary way where the boards were taken off. The work as outlined above has to be done before the roof or floor is put in, of course."

A New Junior Concrete Mixer

AN addition to the line of concrete mixers manufactured by the Archer Iron Works, Western avenue and 34th place, Chicago, is a "Junior" mixer for the use of small crews, with a rated capacity of 3 cu. ft. of wet concrete per batch, though the drum is said to have sufficient capacity to take care of a half-bag mix on almost



A mixer with its own platform

any proportion of materials. The materials are wheeled onto the low loading platform and dumped directly into the hopper. In many cases the mixer can be backed up to the forms and the wet mix spouted directly into place without handling the concrete. The machine is equipped with a 1½ h.p. engine and Bosch magneto.

Jet Black and Colored Stucco Dash

A JET black stucco dash, said to have a permanently brilliant shine and color, is a new product being placed on the market by the Stucco Products Company, 95th and Colfax Avenue, South Chicago, Ill. The product is non-porous and will not deteriorate with age, washes clean with the rains or artificial application of water.

More About Steel and Gypsum Houses in Canada

FURTHER developments in the use of gypsum blocks and gypsum plaster in connection with both steel and wood members as reported on page 29 in our January issue are submitted herewith.

The same style of house, though consid-

the middle of January showed that the hot water heating system kept the rooms at a temperature of 70 or 72 in the most severe weather, and that this was accomplished with a very light fire in the furnace and at no time, according to the statement of the

The company is now constructing an all-steel and plaster house in Toronto, Canada, and states that it believes this to be the first all-steel and plaster house ever constructed. A description of the work by the company is subjoined.



Front and rear view of gypsum block house built in Montreal, Canada



Fig. 3

Fig. 3—Applying stucco on gypsum block with 2-in. netting stapled directly to block. Hardwall plaster applied with Pozzo exterior stucco, first coat, doubled in. Pozzo finish coat applied later. Gypsum board is used on the porch columns, stuccoed in the same manner as the blocks



Fig. 4

Fig. 4—Showing gypsum block laid up on exterior wall and roof being framed. The wall is constructed of 4-in. solid block on interior, a 2-in. air space, and a 3-in. hollow block on outside, making a 9-in. wall

erably larger, shown in our previous article was built in Montreal last year. The severe cold in that section gave an interesting test to the success of the aim sought, the construction of "warm houses," a warm house in winter also indicating a cool house in summer. The Ontario Gypsum Company reports that inspection of the house about

tenant, was it necessary to run the furnace at full blast. The builder also stated that a hot-water boiler two sizes smaller than the one installed would have been sufficient to heat the house, illustrations of which are shown together with another fire test house showing the incombustible character of the construction.

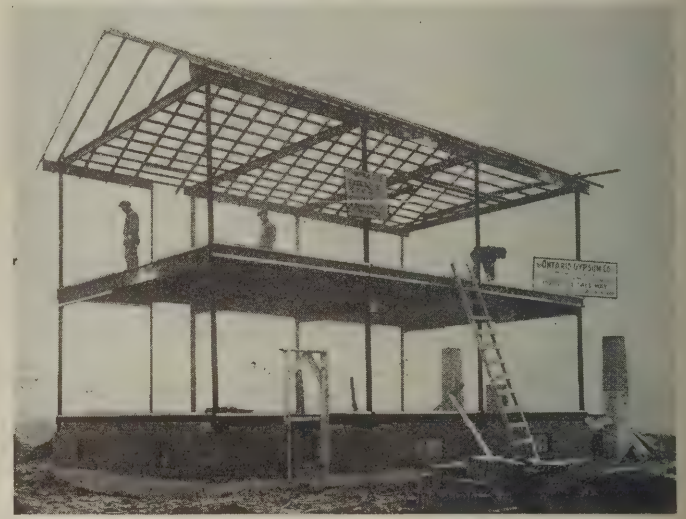
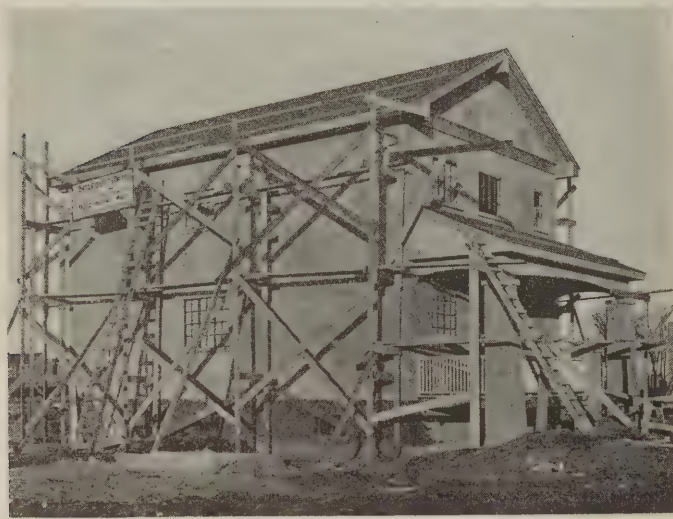
Steel and Plaster House, Nealon Avenue, Toronto, Canada

Steel lumber has been used to some extent in various types of construction, but we believe our company was the first to utilize it on a dwelling from the cellar to the roof.

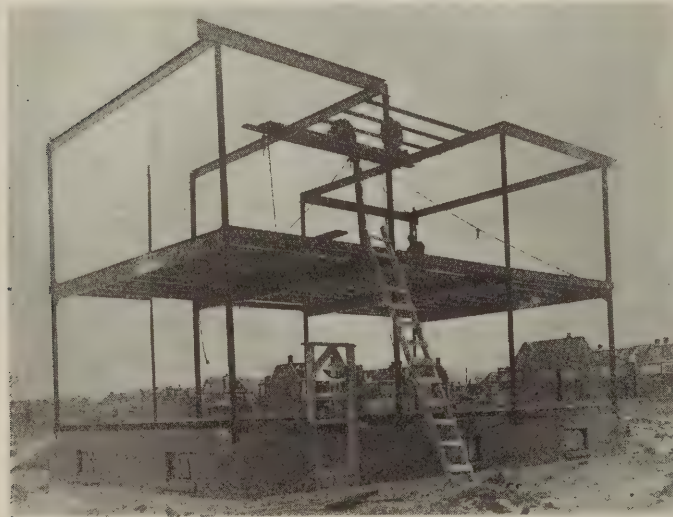
Our idea in constructing this house is to



Another view of the house in process of construction and a fire-test in public to show the incombustible character of the materials



Steel-and-gypsum-board house being built in Toronto, Canada, and the steel framing



Progress of the steel framing

demonstrate beyond a doubt that a house built of steel and gypsum could be constructed at a reasonable price and to convince the authorities interested that such a house would be ideal to live in on account of the insulating qualities of the gypsum,

would be fireproof and would possess none of the disadvantages commonly associated with frame or brick houses.

In the first place we were handicapped through our inability to secure in Canada what is commonly known as steel lumber.

We had to do the next best thing and secure from the steel company standard size I-beams and channels which we utilized to the best advantage in the framing.

The corner posts were 4x4½ L, as were the stair well posts. The intermediate posts

were 3x3x5/16 L. The joists were 9-in. steel I joists 7.7 pounds. The supporting frame was made up of 6-in. and 9-in. channels, and the roof frame was made of 4-in. steel I joists. Metal cross bridging was used in the floor construction.

It can be readily seen that framing of this heavy steel would be sufficient to carry probably four times the load considered necessary in house construction, and consequently on other dwellings of this character the steel cost could be reduced probably 40 per cent by utilizing regular steel lumber instead of standard steel.

The steel on this particular house, the

the same character could be to a large extent eliminated owing to the fact that we, ourselves, would have more experience and would know better how to direct our employes in the application of the material required.

Applying the gypsum board and the reinforcing wire on the roof cost 64 cents per yard. There was a considerable amount of labor entailed, and as we pointed out before, our method was entirely new to the men. Plastering the roof two coats to a thickness of 1¼ in. cost 42 cents a yard, and plastering the outside walls on top of the gypsum board with one coat of neat pulpstone hard-

Strapping floors	.16
Plastering between strapping	.25

We cannot possibly make it too emphatic when we say that these costs do not truly represent what could be done on buildings of this character when the mechanics became more used to it.

The utilizing of Simplex steel studs on the outside wall is an innovation, and we are positive that this will prove to be a decided success. When the gypsum board is applied on both sides of the studding and a heavy coat of exterior stucco put on the outside and the inside plastered with hard-wall plaster, it forms a wall, which, in our opinion, is unequalled. It is very strong, rigid and incombustible. There should be absolutely no expansion or contraction, and as a matter of fact we examined the wall on January 31, 1922, and could not find a hair crack in the whole building either on the outside or on the inside.

The floors were constructed of gypsum board laid down on top of the steel; wood sleepers were put on and plaster put in between the sleepers. The finish will be hardwood flooring nailed to the sleepers.

The roof was built up of gypsum board on top of the steel, heavy poultry netting on top of the gypsum board and then 1¼ in. of hardwall plaster put on in two coats, troweled smooth, and asphalt plate shingles laid on top of this.

All the partitions were constructed of Simplex steel studding, gypsum board and hardwall plaster.

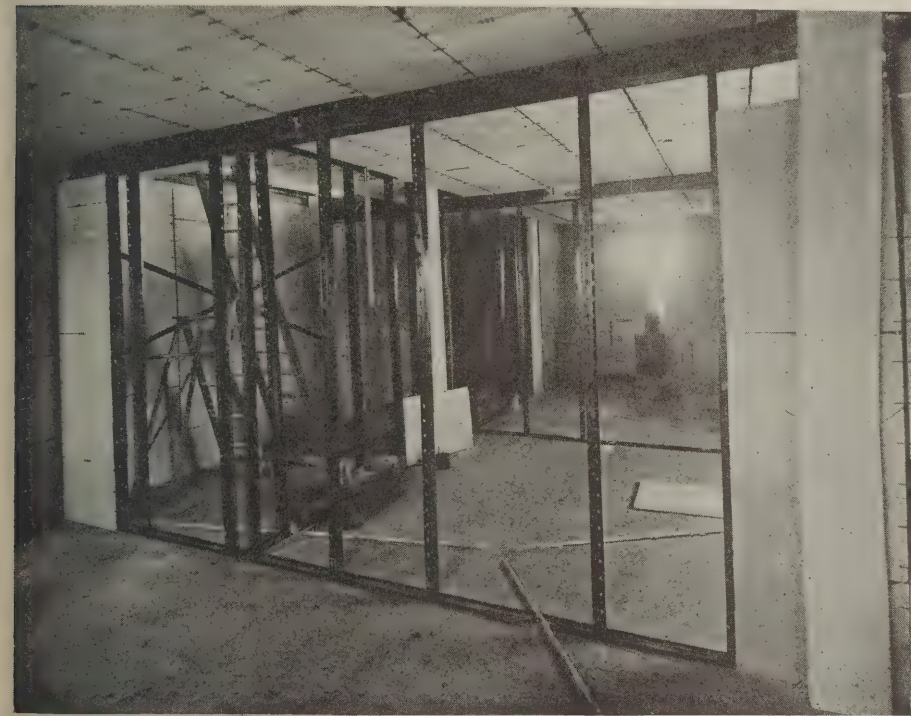
Another innovation in this house was the elimination of lime mortar for finish. We used Gyproc finishing plaster and achieved beautiful results. The consequence is that this house can be decorated immediately and the damp, cold wall commonly associated with lime mortar is done away with.

The photographs give a good idea of the construction both on the outside and on the inside.

The method of applying waterproof cement and magnesite stucco to gypsum board or gypsum blocks over exterior walls of buildings is in brief as follows:

First, apply a coat of gypsum mortar, which everyone knows will bond perfectly to either gypsum board or gypsum block. Then before the gypsum mortar has set apply a coat of waterproofing cement of magnesite stucco. Then after this coat of cement or stucco is thoroughly hardened, apply finishing coat in any manner desired. By this method both a chemical and mechanical bond is secured and we have numerous practical demonstrations in Canada where this stucco has gone through three Canadian winters now without any signs of deterioration.

This method of applying exterior stucco is protected by United States Patent No. 1,355,667, issued to Mr. Robt. E. Haire, general manager, The Ontario Gypsum Co., Ltd., October 12, 1920. "Wall Construction and Processes."



Interior view of steel-and-gypsum house, showing Simplex steel studding on ceilings, walls, and partitions, with gypsum board. The floor is of hardwall plaster laid on gypsum board with wood sleepers embedded to take finish hardwood flooring

size of which is 25x35 ft, cost erected \$1176.26. The brick work and excavating, which includes the walls of the cellar which are all of brick, \$585. The lot cost \$1200; hardware, \$55; lumber, \$200; steel sash, \$193.55; furnace, \$180; electrician, \$90; plumber, \$500; Simplex steel studding, \$230. The concrete floor in the basement, walk, etc., \$250; painting, \$130; tinsmithing, \$55, etc.

This house will cost us when complete \$8782.65. In the city of Toronto at the present time when building costs are very high, this is considered a very reasonable price. The house is located in a splendid district and we would have no trouble at all selling it for at least \$9500 any time we wanted to put it on the market.

Naturally, the mechanics we had working on this job were handicapped to a considerable extent owing to the fact that they had never worked on such construction before. This resulted in a high labor cost on the dwelling which on future constructions of

wall plaster sanded and one coat of Pozzo base pebbled into the first coat of hard-wall plaster cost 28 cents per yard. The applying of the Simplex studs, gypsum board and netting on the outside walls cost \$1.10 per yard. Scaffolding on the outside walls 13 cents per yard. These are all labor costs. Labor costs per yard on the Nealon Avenue house might be interesting to study:

Net Labor Costs Per Yard—Nealon Avenue House	
Fixing board and fence wire on roof.....	.64
Plastering two coats 1½ in. thick on roof ..	.42
Fixing Simplex studs, board and chicken wire on outside walls.....	1.10
Plastering outside walls—one coat neat material, one coat pozzo base.....	.28
Scaffolding outside walls.....	.13
Fixing ceiling runners and board.....	.27
Fixing interior studs and board.....	.13
Plastering interior base coat.....	.14
Fixing board and wire on floor.....	.22
Plastering two coats on floor.....	.43

An Arena of Wood Frame Construction Roofed and Fireproofed with Gypsum Board and Plaster

AN interesting method of constructing an arena has been developed by the Ontario Gypsum Company, Ltd., at Paris, Ont., Canada, in which a large skating rink of wood frame has been roofed with plaster board and fireproofed with the same mate-

rial. The company describes the construction as follows:

The Paris Arena

The contractors started operations on October 25, 1921, but the actual construction work was not started until October 31. The

building which occupied part of the site had to be torn down and removed and the ground leveled, all of which took time. Taking into consideration the fact that all the work was done under winter conditions and that the contractors were delayed con-



Arena at Paris, Ont., Canada—Wood frame, and plaster board and stucco



Corner of arena at Paris, Ont., showing truss arrangement

siderably through bad weather, it is a matter of congratulations that on December 31 the building was practically completed and that on January 2, 1922, it was thrown open to the public.

The dimensions of the building are: The main building is 106 ft. wide by 196 ft. long. The ice space is 77x107 ft., which gives one of the largest ice surfaces in this part of the province. The curling rink, which is built on the south side of the main building but directly connected, is 43 ft. wide by 170 ft. long and contains three sheets of ice for the curlers.

To the right and left of the main entrance on William street are the dressing rooms. These are divided into four rooms, one a training room for the local hockey club which contains every convenience, including shower baths, etc. There is a boys' room, girls' room and visiting clubs' room. The curling rink has also a large rest room and provides the spectators the opportunity of watching the progress of the curling matches without going out into the cold.

All the dressing rooms, band room, curling club room are steam heated.

Another innovation is the lunch room, situated in the east end of the building directly under the bandstand. This, in our mind, will prove to be very valuable and an appreciated adjunct. Hot tea, coffee, light lunches, etc., will be served for the convenience of skaters and spectators.

The seating capacity is in the neighborhood of 3000, but under extraordinary conditions the rink will contain considerably more than this.

We have carried out during the past few years repeated fire tests on various types of buildings and have proved beyond a doubt that it is entirely feasible to absolutely fireproof wood frame construction. The same method applied on these buildings was applied on the Paris Arena.

The entire roof of the building was covered with two layers of gypsum board and a roofing applied over this. The dressing rooms were lined with gypsum board. All partitions were constructed of this material. Gypsum board is used under the seats and under the flooring and in fact every place where there would be any danger of fire.

This material is cheap and economical to apply, is readily cut with a saw and has the effect of speeding up the work of this character. The sheets are large and 1000 ft. of gypsum board can be laid much quicker than 1000 ft. of lumber.

It might be interesting to state at this point that during the course of construction and while the roof was still uncompleted, we had a very severe blizzard. It rained for 24 hours and then froze, followed by a 50-mile gale and snowstorm, but as soon as the storm was over the men were able to go to work just as if nothing had happened.

The outside walls of the building are all covered with gypsum board which will be the foundation for the application of exterior stucco. The stuccoing will not be done until springtime.

More About Magnesite in Southern California

REFERRING to the article in our January issue on "Magnesite Cement as Used in Southern California," by Mr. G. E. McDonald, Mr. Max Y. Seaton, technical director of the National Kellastone Company, writes:

"We are particularly interested in the article by Mr. G. E. McDonald, occurring on page 62. Mr. McDonald outlines, in a very interesting fashion, some of the modern uses for oxy-chloride cements. We would like to call your attention, however, to one or two statements in the article, which we feel do not exactly represent the facts.

"Near the top of the first column on page 63, the question of magnesite quality and of variation in quality is discussed. It is perfectly true that in the past wide variations in the quality of commercial plastic calcined magnesite occurred. The producers of this material have been by no means inactive, however, and they are developing at present tentative specifications for this product. At least one producer operating under modern heat controlled methods of calcination is turning out a product which shows far less variation from car to car than do the average shipments of commercial portland cement.

"The statement that 2½% of lime is injurious is incorrect, if by this statement the total lime content in the magnesite is referred to. Marble dust is frequently used as an aggregate, and the introduction of any amount of calcium carbonate is not injurious to the quality of oxy-chloride cements. A determination of the amount of total lime in a magnesite is totally misleading. Only free or active lime can possibly exert any influence on cement quality and only this constituent should be considered in a discussion of the presence of lime impurity in commercial magnesites.

"We are rather surprised at the prices on calcined magnesite quoted near the bottom of the first column on page 63. If Mr. McDonald has been purchasing magnesite at any such prices as these, there is no doubt but that he has been obtaining very erratic and non-uniform material. A high grade powdered plastic calcined magnesite commands a price of at least \$45.00 f.o.b. producers plant at the present time.

"Near the bottom of the last column on page 63, Mr. McDonald makes a rather severe criticism of the permanency of color in oxy-chloride cement mixes containing wood filler. It should be realized in this connection that the composition floors installed throughout the Middle West and Eastern sections of the country almost invariably contain a larger or smaller proportion of fine wood fiber in their finish coat. In spite of this, history of a great

many years has indicated that if the colors used are of satisfactory quality, no fading of color in the finish floor need be feared."

An Explanation from Mr. McDonald

A copy of Mr. Seaton's letter was sent to Mr. McDonald who replies in effect that his statement that *more than 2½% of lime* is injurious to magnesite cement is correct—lime being understood in its popular and accepted sense as "free and active."

Mr. McDonald explains that his quotation of prices on magnesite referred to the raw material, and states that the average retail price for calcined ground magnesite in Los Angeles is \$60 in single ton lots and \$53.50 f.o.b. cars Los Angeles in carload lots. The calcined ground magnesite is put up in 150 pound sacks.

All of which goes to show that in discussing materials or prices misconceptions will be avoided by being particularly specific in describing just what is meant.

A Sand-Drying Stove

A STOVE for drying sand made in three sizes ranging in drying capacity respectively from 3½ to 10 tons daily is shown in the illustration with the addition of a grating designed to keep the sand from coming in direct contact with the heater



Sand-drying stove—Sectional view showing grating

surface. The stoves are designed for use by contractors, coal companies, trolley lines, railroads, foundries, industrial plants, mines and collieries. As the sand dries it trickles through a perforated ring on which the skirting rests. These "Sutton" sand drying stoves are made for drying clean, sharp sand only. They are simple in design and of massive construction to stand hard usage, and repair parts are stocked by the manufacturers, the Indiana Foundry Company, Indiana, Pa.

Washington "Movie" Theater Roof Failure

THE architect of the building, the engineer who designed the roof trusses, the city building inspector, the contractor who erected the building, his general superintendent, the superintendent of the wall construction, the sub-contractor who erected the steel work, the computer of the city building department who checked the design, and the assistant building inspector have all been indicted by a grand jury as a result of the collapse of the roof of the Knickerbocker motion-picture theater at Washington, D. C., on the night of Janu-

It is seen, therefore, that the roof design was unusual—almost unique. While according to expert analyses of the failure, the details were not the best, it does not appear on the face of it that they violated the city building code, or were essentially different from current practice generally.

The most logical theory of the cause of the failure seems to be that the main truss slipped from its diagonal seat on the curved sidewall—not suddenly, but by a steady progress during several years. This slipping may have been caused by temperature

Testing for Vibration in Buildings

IN a western city, a reinforced-concrete building had but recently been completed when the plastering began to fall from the ceilings. The owner claimed that work was not according to specifications, and the contractor asserted that the trouble was the result of vibrations, which were caused by trolley cars crossing a frog in the street just in front of the building. As none of the vibrations were heavy enough to be seen or felt in the four-story building, an engineer solved the problem and traced down the trouble in a novel manner. A shallow bowl of metallic mercury was placed on the floor of the top story, in such a manner that the mercury would be in direct sunlight. Those interested in the result of the test stationed themselves at a window and watched. A reflection from the sun was thrown onto the ceiling by the mercury and as the street cars passed it was noticed that the reflection on the ceiling moved several inches, thus greatly magnifying the movement of the building and vindicating the contractor.—J. R. Linton, *Sioux City, Ia., in Popular Mechanics.*



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The fallen roof covered the seats like a blanket

ary 28. The roof failure caused the deaths of 98 persons.

At the time of the accident newspaper accounts laid great stress on the heavy fall of snow which had just taken place, and covered the roof to a depth of possibly a foot or more. This load was only about 12 lbs. per sq. ft. and was inconsequential, as any experienced builder knows.

The building was of peculiar plan, being between two intersecting streets, one of which was curved. The plan was therefore V-shaped, with one of the legs of the V's curved outward. The stage or curtain was at the point of the V and the roof was carried on several trusses, the principal one being parallel to the straight leg of the V, so as to divide the space between the ends approximately into equal parts.

movements in the steelwork, or by the continual vibration in the building itself from passing street cars and from the operation of the ventilating fans.

It seems doubtful if those responsible for the construction of the building can be found legally guilty of taking human life. The most good that can come from their public prosecution is the bringing home to architects, builders, contractors and engineers, everywhere, their real moral responsibility to safeguard human life in every way; to recognize their shortcomings in knowledge, experience and workmanship; and, so far as possible, to make good such deficiencies by self-education and by reliance on experts of greater experience and technical knowledge.

Basement Windows in Steel

BASEMENT windows in steel are in the market with the declared advantages that they admit 40 to 60 per cent more light, afford protection from burglars; do



Steel basement window

not warp or stick; are easy to screen; provide fire protection; are easy to install; require no planing or fitting of sash; ventilators are removable; hardware is attached; save time in setting; come already painted. Manufactured by the Detroit Steel Products Co., 2218 East Grand Boulevard, Detroit, Mich.

Questions, Answers, Kinks and Discussions--V. L. Sherman, Editor

Herein is a Department of Mutual Help for the Exchange of Experiences and Ideas.
It is Not Only Well Worth Your While to Give Your Experiences for
What You Get Back from Others, but National Builder
Pays You for Doing So in Good Hard Cash

Plaster Board Fireproofing

F. M. W., a Civil Engineer of Norfolk, Virginia, writes as follows: "I was interested in your article on plaster board construction in the last (January) issue of NATIONAL BUILDER. I used gypsum plaster board for the first time in 1906, and have used more or less of it ever since. During the war I was in charge of the construc-

After two years' time none of these houses so protected has burned."

Nails to Penetrate Mortar or Concrete

R. E. J. sends this cheerful word from Philadelphia: "The following is the solution of one of my difficulties. I have always had trouble when nailing a target or

right for bracing. In the first place, no brace should be placed steeper than a 45 deg. angle. Brace from the sill to post or corner. The sill rests on the foundation, where there is no spring or give. When a brace is set from the top down, or with a spread at the top, the top can spring or bend, making the structure weak. But when it is braced from a rigid base the brace will be rigid also, holding the structure, provided the braces work with each other."

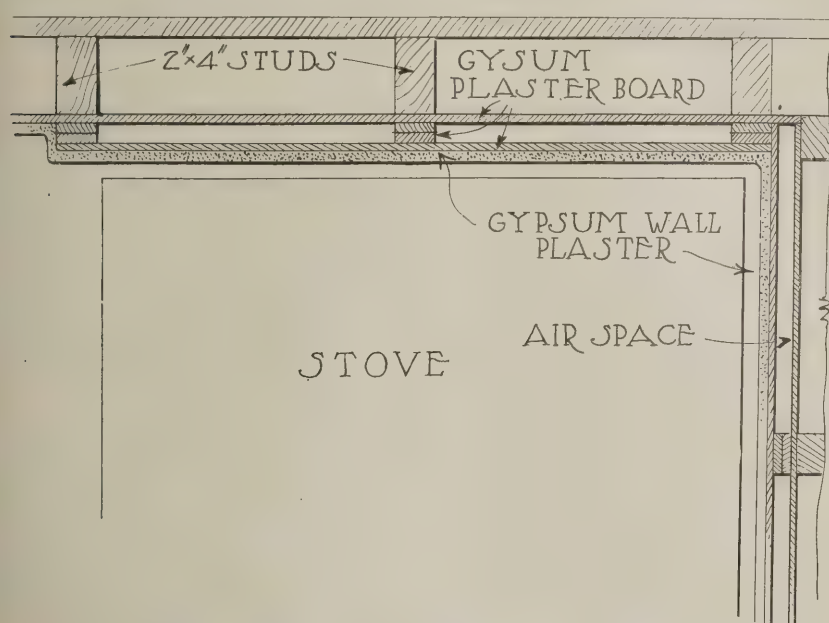


Fig. 1—Plaster board fireproof for kitchen walls

tion of several hundred houses, and in connection with them designed and built fireproofing in the kitchens as shown in the accompanying sketch. The kitchen ranges were placed tightly in the corners of the kitchens, see Fig. 1, and it was thought that some sort of fireproofing should be used to protect the walls. The method used consisted of nailing the plaster board to the studs, then nailing strips (two thicknesses) to the studs vertically over the plaster board, and then applying another thickness of plaster board. The surface was finished with wall plaster. This design protects the studs with four thicknesses of the plaster board, and the air spaces are additional protection. I doubt if any more simple, economical or

brace to brick or concrete, and when nailing down a yoke for a column base. About one nail in ten would hold, and the rest would bend before they had penetrated the mortar or concrete. We were putting down yokes the other day and were having the usual trouble, when one of the carpenters suggested the solution. Use eight penny cut nails instead of the wire nails. I tried it and found out that it worked; practically every nail could be driven home and would hold. No other size of cut nail will work as well as the eight penny."

Frame Structure

H. F. K. of South Bend, Ind., adds this to the discussion of "Frame Structure," which appears in our December issue, page 44: "I think neither Fig. 1 nor Fig. 2 is

Another Remedy for Leaky Window Sills

"Many builders of frame buildings," says A. M. J. of Canby, Minnesota, "have difficulty with leaks around the window sills and stools. I have found the following to be a very effective remedy for such leaks (See Fig. 2): When nailing together the

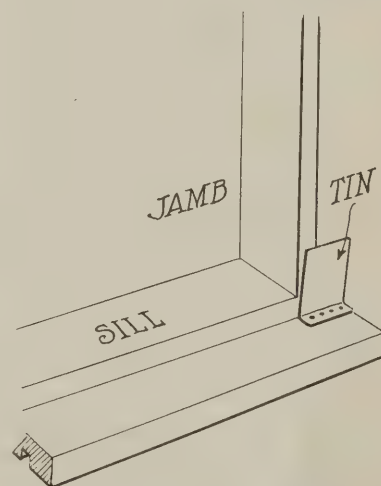


Fig. 2—Tin flashing for leaky window sills

window frames, after having nailed the jambs to the sill and head, I take a piece of tin about 4x3 inches, bend it some $\frac{5}{8}$ or $\frac{3}{4}$ inches from one edge, nail the narrow part securely on the sill and let the other part lap on the edge of the joint so that it comes between the joint and the casing. Cap and casings are then nailed in place. This keeps the water out even though the sill sags down and away from the bottom of the casing. Then, when finishing the

inside of the building I always apply a good coat of white lead between the window stool and the sill."

Reinforcing Brick Lintels

"In looking over your magazine for December," writes J. A. M., a masonry superintendent of New York City, "I found some very interesting reading and some very practical pointers, and I thought that the

"2—Layout brick- and joint-gauge size with uniform spacings.

"3—Iron or steel reinforcing rods $\frac{5}{8}$ inches diameter for reinforcing, to be cut 12 inches over sizes of window openings.

"4—Bricks for this work must be selected from the face brick supplied, so as to form clean straight work. Free from lips, etc., and in some cases the edge of holes in bricks may be trimmed of burrs.

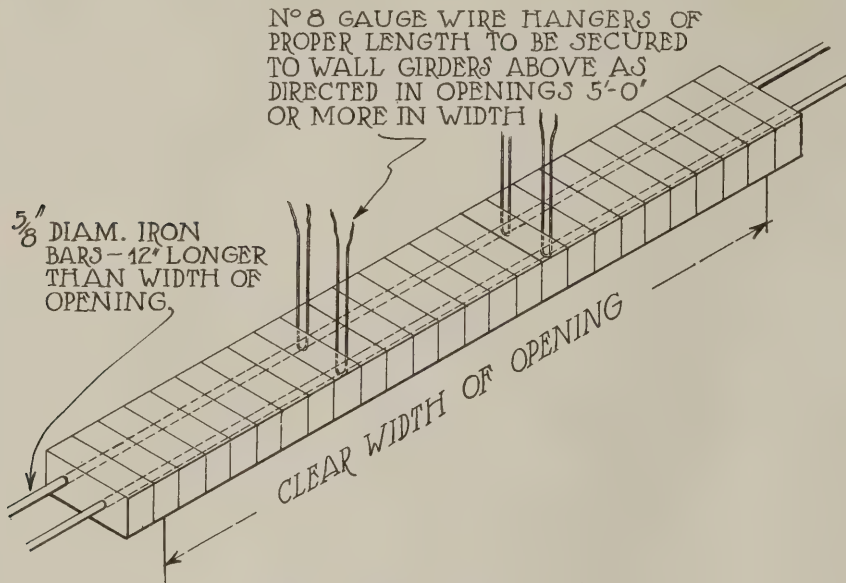


Fig. 3—Reinforced brick lintels

following little suggestion on reinforced brick lintels might be of interest to the readers of your 'Kinks' department. (See Fig. 3.)

"When, in constructing brick lintels of front brick, steel is used for the angles or carrying member of the span or arch, you will find that nothing kills more quickly the architectural perspective of even the finest front brick work, than the resulting heavy dark line over the top of each opening. On a few of my last jobs as superintendent in New York City, the question came up of how to hold the brick lines and dispense with the unsightly strip of steel, while still securing the strength necessary to carry the brick over the average flat or jack arch. I thought of the front brick with holes through them, and I made up a test lintel on the first floor. This, after being passed upon after a two-weeks' set and then after a four-weeks' set, was accepted, and I went to work to devise a system of turning them out in the field in large quantities. The following was the result:

Specification Covering Construction of Typical Reinforced Brick Lintels Preparation

"1—Provide planks of sufficient length each, to accommodate two lintels, also proper height horse or platform to support same. This to be the working bench. These to be in number sufficient to allow storage of lintels to season before final handling or setting.

Forming

"1—Rowlocks for first lintel are placed on plank by setting 4 to 6 bricks in exact position as indicated by point gauge, buttered first in lime mortar on bottom joint and front mortar on each rowlock end. (The lime mortar used thus to permit raking out as described later.)

"2—Insert the rods through these bricks, after which succeeding bricks (similarly buttered) are to be pushed along rods into their position opposite joint gauge, and all rowlocks with faces in exact alignment.

"3—Include two pairs of not less than No. 8 galvanized wire hangers looped around each rod through joints at two intermediate points of lintels to tie over extra reinforced rod (or if skeleton construction or lintel is in suspension under channels or eye beams) where window openings will be 5'0" or more in width.

"4—After each two (2) lintels are thus formed on plank, shore planks back in proper position ready for cement grouting after partial set of buttered mortar joints has taken place.

"5—Continue the making of lintels until sufficient number have been formed all ready for grouting at one time, instead of small batches used at frequent intervals. Be careful to have grout fill holes around rods.

"6—Starting in the morning, shore back the preceding day's work, with planks edge to edge, and let lintels season for a period of at least 14 days before further handling.

"7—After this period, turn lintels over to clean off soffits, rake out lime mortar joints, and repaint same with front mortar.

"There is nothing different in the handling and setting of this type of lintel from that of the stone lintels, other than to be sure that the projecting ends of the rods are solidly bedded or grouted in the wall.

"Ultimate saving of time and labor will be accomplished by this method as compared with constructing these lintels in place, where centers would be required, and after removal of centres the cleaning off and painting of soffit would require working from scaffold or bosun's chair.

"I would also suggest that the brick can be used in bonded arches any thickness or depth by turning the brick as required, as the holes will meet alike on soldier or rowlock. Also, that no wire as mentioned in paragraph 3 under *Forming* is required on an arch under 5'0".

"I should like to see this idea given a fair trial, for once used always used. But remember, at least two weeks must be allowed for the proper aging before handling."

Nailing Dimension Shingles

A. L. S., of Comer, Georgia, submits the following sketch which illustrates his method of nailing on dimension shingles. "The idea is to put the nail on the side, (Fig. 4) as in No. 1 in the drawing. Shingle No. 2 is then placed over half of No. 1 in the course above and nailed in the side, the nail thus passing through the top of No. 1 and securing it from shifting. Shingle

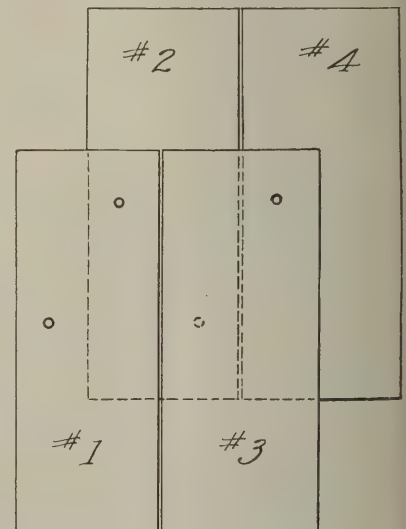


Fig. 4—Nailing dimension shingles

No. 2 also covers the nail-head of No. 3, protecting the same from rust, etc. The old way was to nail them in the center. This method affords no protection from rust, or from the shifting of the shingles in case of hail or rain storms. Also, center nailing cracks or splits the shingles underneath and the weather works them out."

Cutting Wire Glass on the Job

R. F. R., Three Rivers, Mich., writes: "It is sometimes a mighty good thing for a carpenter or contractor to be able to cut wire glass on the job. This product is being

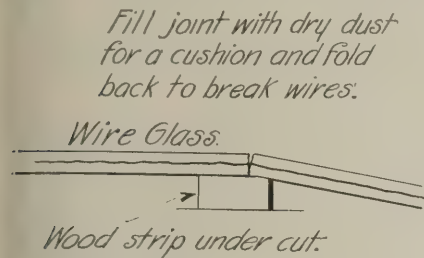


Fig. 5—How to cut wire glass

used more and more, especially in factory and warehouse construction, and I have seen lots of it wasted because it had been cracked in shipment and the contractor, thinking that to cut it required some special tools of which he knew nothing, ordered it scrapped. With a little knowledge, a large amount of it might have been salvaged and cut into smaller sizes. The following simple method will cut wire glass very easily and without risk (See Fig. 5):

"Select the smoother side of the glass and make a scratch with an ordinary glass cutter or diamond as in cutting any other glass. See that you get a good even and continuous scratch the first time, and *never* run the cutter over the same line twice—it will ruin the cutter. If the cutter does not make a good clean scratch throw it away and get a new cutter. Next, raise the sheet of glass and place a one-inch strip of wood underneath the scratch; bear down on the glass at either side of the cut until it breaks along the scratch and both ends of the glass are pressed down. The wires in the glass now make a sort of hinge at the cut, and all that remains is to break the wires without damaging the glass. To do this, bend back the glass at the break until a small crack is made. Fill this crack with any kind of fine dust, such as cement, hydrated lime, talcum powder. Then bend the glass back upon the side that has the dust in it. The dust or powder will act as a cushion and prevent the edges of the glass from chipping. With a steady pressure fold the glass back on the joint filled with dust until the wires are pulled in two. I hope this suggestion will prove as helpful to others as it has to me."

The Overhung Roof

P. J., New York City, requests information on the overhung roof, shown on page 24 of the January number, which he says is becoming very popular in the East.

The houses illustrated in the article mentioned present the appearance of story-and-a-half gabled houses with large shed-roof dormers on both sides. (Note Fig. 6.) The advantage lies in the easy framing for full

second floor head-room. The appearance of course is the aim.

False roofing seems to have become very popular indeed and the variety is great. One variety which is nearly a duplicate of the one first mentioned gives a gambrel roof which by furnishing frills puts a small house in the "nobby" class. These frills lend volume in appearance as the roof size distracts from the small ground plan.

To be perfectly frank I have had some doubts as to the future of houses built with these false frames, and, in fact, have seen more than one false roof so hung that a gale might play havoc, or a few years cause a depressing sag, which gives the appearance of a "hang-over" instead of an "over-hung." But with care they may be entirely safe. The main frame is built and sheathed in the usual way with the upper roof at the required pitch, say $\frac{1}{4}$ or even less. This roof should be substantial, with sufficiently heavy rafters for the span and well tied



Fig. 6—Overhung roofs and false roofs

with ceiling joists. Rafter angles approaching flat roofs are risky unless well built. It is a good deal like a toggle joint.

The roof line of the lower roof is chalked on with a line and lookouts spiked to the studs. If 1x4 in. is used the section is rather narrow for taking the fascia. Real brackets may be used instead of lookouts and often add to the appearance. Sheathing and shingles are then put on. In carrying the rafters out over the porch with that sweeping curve, brace near the second floor joists and spike well. The weight at the outer end of the porch rafters is carried in the ordinary way.

In false roofing for gambrel and dutch-colonial many builders are careful to carry the false roofing, which is likely to be heavy, on a wall plate at the second floor level.

One contractor has the habit of toe-nailing 1x4-in. lookouts on the sheathing after snapping a chalk line for the sweeping roof. To make sure they are strong enough he tilts the outer end like the jib-boom of a ship. He is very optimistic.

Some More About Brackets

"In recent numbers of NATIONAL BUILDER," says F. B., of Bridgeport, Pa., "I have noticed several styles of bracket used in putting on siding or shingles on sides. The following idea I got from watching a couple of painters at work. It is to use painters' ladder-brackets (Fig. 7). Have two ladders, each equipped with a ladder bracket. Place the ladders against a building, put boards

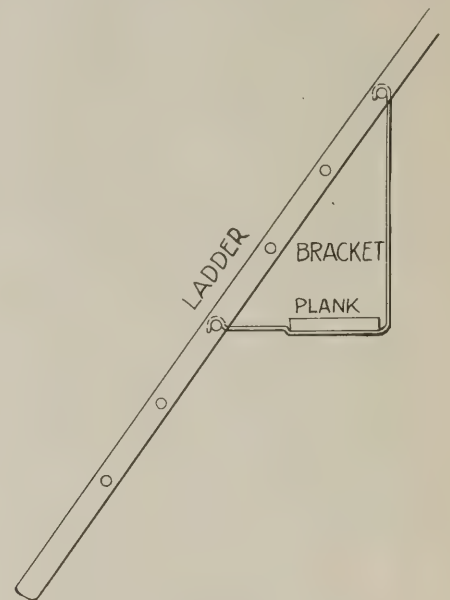


Fig. 7—A ladder bracket

or a plank on these brackets, and you have a substantial scaffold which can be used to great advantage in shingling. They are also convenient for use when the eaves or cornice need repairing. The brackets cost about \$6 for a set of two, and more than pay for themselves.

"Another thing I found useful on a repair job on a dormer cornice on the third floor was the painters' window jack, which I borrowed from the fellows at work nearby."

Carpenter's Square and Compasses

Dwight L. Stoddard, Indianapolis, Ind., submits a 50-page liberally illustrated analysis of the carpenter's square and compasses, his third attempt, as he says "on the square." Mr. Stoddard is a practical builder and has been a prolific writer on carpenter work, the steel square, and other more or less technical matters related to construction work. While it is true that the manufacturers of steel squares publish more or less elaborate descriptions of the uses of that remarkable tool and calculating chart it is also true that the resources that lie within it can hardly be exhausted, and what Mr. Stoddard has been able to accomplish with it is recapitulated in his new work. The price of the booklet is 75 cents. Mr. Stoddard's address is Route D, Box 8, Indianapolis, Ind.

Sanitation, Heating and Lighting for a Suburban or Country House

No. 5—By Edward E. Ashley, Engineer, Starrett and Van Vleck, Architects,
New York City

WITH all the usual precaution taken in construction, it is desirable to provide auxiliary means for fighting fire, for even the best equipped fire department usually takes four minutes or more after the discovery of the fire to arrive with fire fighting apparatus, and these few minutes, if extinguishers or other auxiliary apparatus are or are not available and employed, generally determine whether the loss is to be trifling or whether the fire will gain such headway as to involve the entire premises.

When the water pressure required, having sufficient power to throw a stream over the roof of the house, cannot be provided, there should be on each floor of a dwelling a chemical extinguisher. These should also be placed in the garage and other buildings and in the cellar. They will provide security which is otherwise impossible.

Sanitation

Sanitation or the protection of health is derived from the Latin word "Sanus"—to make healthy or whole—and deals generally with the removal of the waste materials or excretions from the human body.

In dealing with this problem in connection with the dwelling, it is best to divide it into two distinct parts, one dealing with the work outside of the house, and the other dealing with the plumbing inside the dwelling.

Sewer Connection to Public Sewer—In

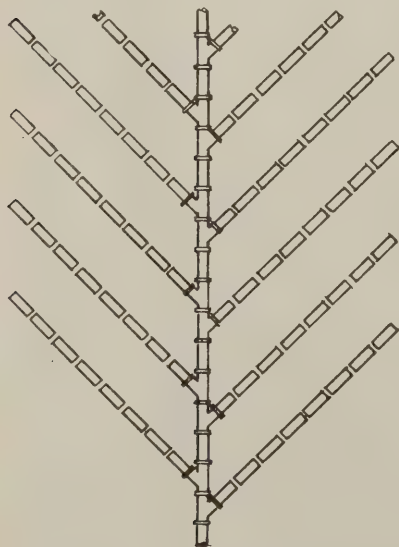


Fig. 14—Sub-surface drainage

the first case, where the house is located in a sewered community, the outside work is very simple: that of extending a house sewer to and connecting with the sewer in the street. This connection should be laid, so as to have a good pitch to the sewer, not less than 3-16-in. to the foot; and when tile is used it should be at least 4 in. in

prising how lackadaisical the people are about trying to improve their sanitary conditions, and in some cases actually acting as obstructionists. It is useless to try to improve conditions unless every one will do his or their part. The privy although contributing somewhat to comfort, cannot be considered as a sanitary medium. Being

DIMENSIONS OF TANKS REQUIRED FOR VARIOUS NUMBERS OF PERSONS							
NO. OF PERSONS	A	B	C	CAPACITY OF SETTLING CHAMBER-APPROX.	CAPACITY SYPHON CHAMBER	SIZES OF SYPHON	SIZE OF DISCHARGE
1 - 4	2'-6"	6'	5'-4"	80 CU. FT.	14 CU. FT.	3"	4"
5 - 9	3'-6"	6'	7'-6"	180 " "	30 " "	3 "	4 "
10 - 14	4'-0"	6'	8'-9"	210 " "	35 " "	4 "	5 "
15 - 19	5'-3"	6'	10'-0"	285 " "	36 " "	4 "	5 "
20 - 29	5'-6"	6'	10'-6"	348 " "	44 " "	5 "	6 "
30 - 39	5'-9"	6'	11'-9"	468 " "	59 " "	5 "	6 "
40 - 49	6'-0"	7'	11'-9"	490 " "	49 " "	5 "	6 "
50 - 59	6'-0"	8'	12'-6"	590 " "	59 " "	5 "	6 "

Fig. 13—A, width; B, depth; C, length

diameter. Care should be taken to avoid running sewers close to trees, as the roots will be attracted to and will sometimes close up a sewer entirely. Where it is impossible to avoid running near trees, use cast iron pipe. If the sewer connection is more than 75 ft., it is desirable to provide at fence line or other convenient location an inspection manhole. The connection from a point five feet outside of building to within the building should be of cast iron pipe.

Non-Sewered Districts—When building in suburban or rural districts where a sewer system is not available, it is then necessary to provide some means of disposing of the sewage. In the early stages of the development of sewage disposal, privy vaults were provided and a separate discharge for sink and other slop wastes directly on the surface of the ground with or without the use of a drain.

Old-Fashioned Privy—The old-fashioned privy was a step forward, and surprising as it may seem, this is where progress has stopped in a great many places throughout our country, regardless of the wonderful work being done by our U. S. Public Health Service and by the Surgeon General's office during the late war. It is, however, sur-

built simply as a container for human excretion in a slowly "decomposing condition," it becomes a center for pollution and infection, the liquid portion escaping only to

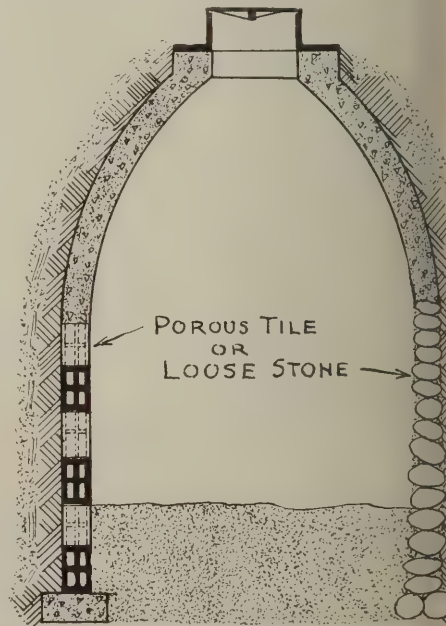


Fig. 15—Leaching well

pollute soil and neighboring wells, to say nothing of the offensive odors contaminating the air.

it may reach and taint wells for hundreds of feet around, and it may pollute the air existing in soil under cellars, which air

the organic matter is converted into carbonic acid gas, marsh gas, hydrogen, and ammoniacal compounds.

Process of Sewage Purification—The process of sewage purification may be divided into two distinct actions, with a resting period in between.

Preliminary Action or Treatment—The first action takes place in the septic tank, into which the fresh sewage is emptied and the solid matters are allowed to break up and gradually settle to the bottom of the tank, forming what is known as "fresh sludge." The time usually allowed for this preliminary part of the first action is eight hours, although satisfactory results may be obtained by shortening this to about six hours. The final part of the first action is the forming of the anaerobic bacteria, which liquefy and gasify the organic matters, leaving in the bottom of the tank an accumulation of inorganic matters and some organic solids which resist decomposition to such an extent as to make it impractical to retain them in the tank for complete liquefaction. It requires from two weeks to six months to complete this septication depending on the condition of the tank and season of the year, for in summer months the action is generally rapid while in winter months it is very slow; sometimes in extreme cold no action takes place at all.

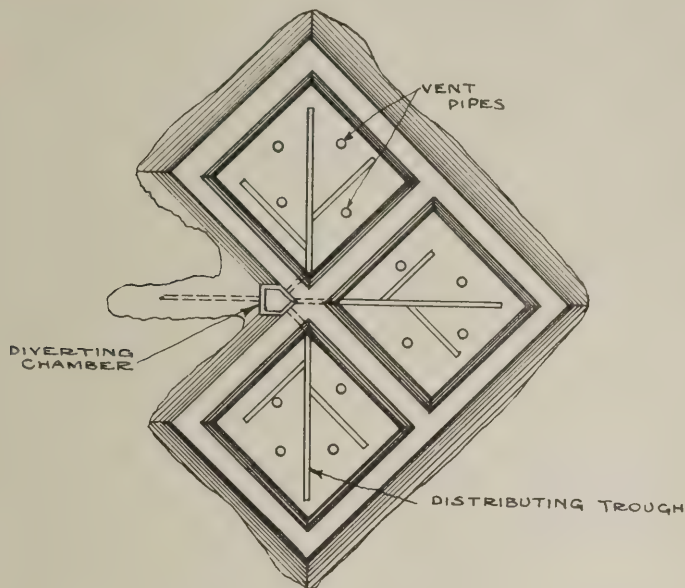


Fig. 16—Plan of sand filtering-beds

Cesspool—A cesspool is the next step forward, and if constructed with tight walls and bottom would require cleaning, at least,

will exhale and permeate the house above." *Septic Tank*—The fact that the sewage in an ordinary cesspool did liquefy or gasify

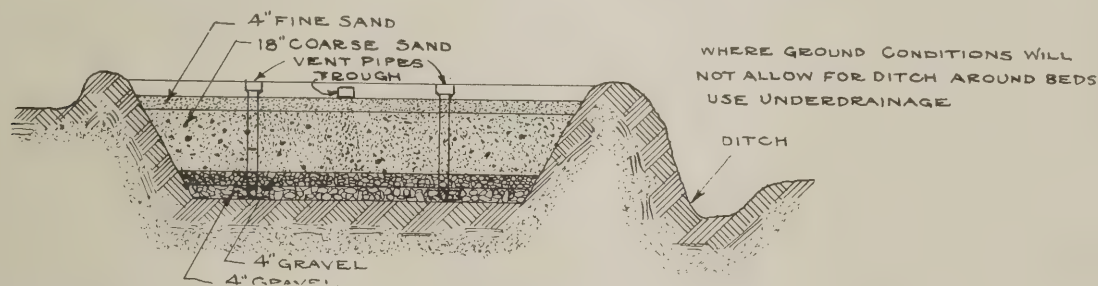


Fig. 17—Section of sand filters

twice a year. Very few, however, are built that way, and are seldom or never cleaned, and even those that are cleaned at intervals still have their liquid overflow polluting the adjacent soil and water. Prof. A. P. Folwell in his book, "Sewerage" says: "Fresh sewage is not injurious to health unless taken into the stomach, nor is it offensive to the smell; but from putrescent excreta and kitchen slops come those noisome gases which, although probably not themselves bearers of malefic germs, at least lower the vitality and render the body more vulnerable to disease, and may constitute a serious nuisance. Retained for weeks and months in a liquid or semi-liquid state in a cesspool, sewage is then under conditions best adapted to putrefaction in its foulest form. Especial pains should be taken, therefore, to see that a sufficient outlet be always open for the escape of these gases, such as by the continuation of the soil pipe above the roof, or by special vent carried above reach of snow. This vilest of liquid is dangerous in two ways,

led to the experiments by such pioneers as Scott Moncrieff, Cameron, Debdin and Col. Ducat, and as a result, the septic tank was developed.

The action taking place in a septic tank is sedimentative and liquefactive through a bacteriolytic action, by which a portion of

It will be found that when the tank is functioning properly the volume of sludge will remain more or less constant, the additions balancing the liquids and gases given off, plus such additions as remain in the inorganic matters and insoluble solids. When this excess accumulates so that the sludge

PERSONS SERVED BY SEWER	NO OF BEDS	AREA OF EACH BED (SQUARE FT)	MEAN WIDTH AND LENGTH OF SYPHON CHAMBER (FEET)	DIAMETER OF SYPHON (INCHES)	DISTANCE FROM ROOF OF SETTLING TANK TO TOP OF WALL BETWEEN SETTLING TANK AND SIPHON CHAMBER (INCHES)
4	3	60	3 X 3	3	12
8	3	120	3 X 5	3	12
12	3	180	4 X 5	4	12
15	3	224	4 X 6.5	4	12
25	3	350	4 X 6	5	12
35	3	480	4.5 X 5	5	16
50	3	660	5 X 6	5	16

Fig. 18—Sizes of sand filters

content is greater than one-third of the total volume of the tank, it must be removed. No definite time may be stated for this cleaning, as it may be necessary to clean the tank in one year or in eight, depending entirely on local conditions. The sludge removed is practically odorless and

tered. Nevertheless, it is necessary, to make a careful study of each particular location, the type of soil and the general topography, before reaching a conclusion as to the best method to employ, for each method is subject to considerable variation, depending upon the soil encountered.

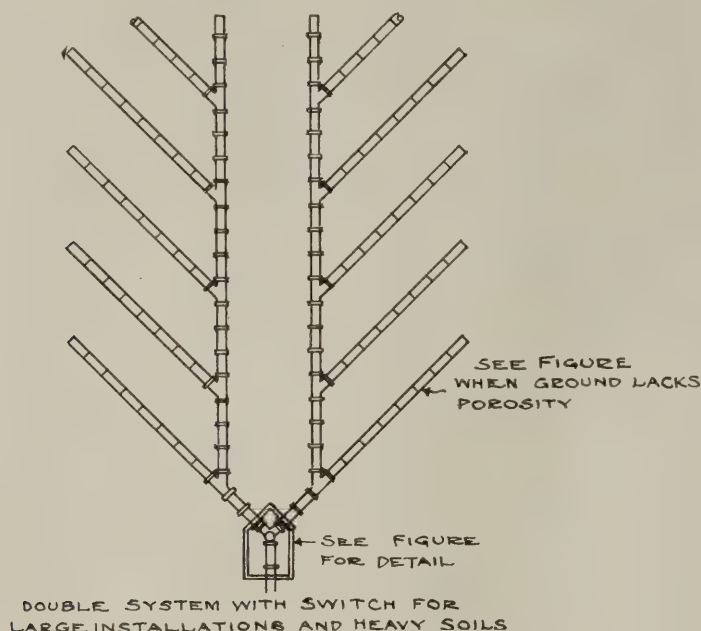


Fig. 19

non-putrescible, and may be used as fertilizer.

The cleaning of a tank should be put off as long as possible, in order not to disturb the septic action and decrease the putrescibility of its contents.

After the septic action takes place, the liquid is discharged into a dosing or syphon chamber and held there for final treatment. The period of detention is dependent upon the method of the final treatment, generally anywhere from thirty minutes to two hours. See table (Fig. 13) for sizes of tanks and chambers.

Final Action or Treatment—The final treatment may be accomplished by one of several methods. The one best suited and most commonly used for small residential plants is the sub-surface drainage method (Fig. 14) which disposes and purifies the effluent through a series of agricultural drains located directly beneath the surface of the ground. Another method is the use of leaching wells or underground filter beds (Fig. 15). Still another is the employment of surface sand filters (Fig. 16), which are easily made when the under soil is sandy, by simply removing the top soil. However, when the soil has no porosity, as with peat, hardpan, soggy or bog ground, or silt, it is then necessary to provide some artificial method for disposing and purifying the effluent by building a sand filter, or by deep cultivation, to break up the ground and permit of small applications of effluent being applied. It is extremely rare, however, that such conditions will be encoun-

The action taken in the final treatment is again a chemical one, and not a mechanical one of filtration as might be supposed. It has been found that the ground, particularly near the surface, is fitted with micro-organisms. These organisms are yeast-like and thrive particularly well in sandy soil, which allows them, due to its porosity, an appreciable amount of air. Where the sewage effluent is applied to a section of ground, these organisms or bacteria immediately act as an oxidizing agent and transpose any offensive organic substances into harmless organic salts and fertilizer. (See reports of Royal Commission on Sewage Disposal 1902, referring to "Sewage Farming.")

The action of these organisms is comparable with the action of the lungs in purifying the blood. The best results are obtained by intermittent dosing of the soil with the effluent which causes a respiration to take place by the recovering and expiring of the air, thus acting on the liquid passing through it, causing a nitrification to take place. For sizes of sand filters see table 18.

Sub-Soil Irrigation—Probably the least troublesome and one requiring least actual expense and oversight is the sub-soil irrigation. This is particularly so with the average small residential plant which generally requires locating the plant in close proximity to the residence.

This system may be used as already mentioned in most any soil, excepting where there is no porosity, or where ground water comes within two feet of the surface. The

amount of drainage will depend entirely on the character of the soil, a heavy soil requiring considerably more pipe than a loose sandy one. It is desirable to select a site where the ground slopes away from the disposal tank, which will assure an operating head on the discharge, causing a complete flush of the system at each dose. It is also desirable to provide for even the smallest plant a double irrigation field, so that a resting and regenerating period may be allowed to restore the field to proper condition. See table (Fig. 18).

Leaching Wells—When it is impracticable to use a sub-soil irrigation field, which is sometimes the case where extensive planting is to be done, leaching wells or underground filters already referred to (Fig. 15) are employed. These operate very much as sub-soil irrigators. They are generally built of porous hollow tile or brick with a sand bottom, and domed over with a manhole and cover. The area of these wells should be approximately as indicated in the third column of the table (Fig. 18). It is desirable to provide, at least, two such wells with a third for alternating with the others to permit of a resting period. It is necessary occasionally to replace the sand in the bottoms of these pits.

(To be continued)

A New Drum Type Mixer

THE cube design of Austin concrete mixers by which the mixing is accomplished by throwing the batch from plane to plane with a force varying according to the speed of revolution has required construction of



Type of mixer made in standard sizes

unusual strength, naturally increasing the price. A new drum type mixer has been added to the line, using the customary elevating mechanism in the interior, saving in construction cost to meet the demand for a moderate priced mixer. The new mixer will be supplied in all standard sizes and from one-half bag to two yards by the Austin Machinery Company, Railway Exchange Building, Chicago, Ill.

MIXING COLORED PAINT—If you are about to mix some colored paint you will save time and labor by breaking up the lead and color separately and then straining each before adding to the lead mass.—*A. Ashmun Kelly.*

[illegible]

HAFFNER METHODS

FIGURE 15

NO. _____ DATE _____ 19__

CASHIER FUND RECEIPT

PAY _____ \$ _____

FOR _____ AND _____

CHARGE TO _____ ACCOUNT _____

APPROVED BY _____ RECEIVED PAYMENT _____

um in gross; that is, the total credit to be given to the customer, irrespective of the amount of cash discount taken, or other deductions made.

All receipts for cash sales will be entered in the "Accounts Receivable" column in the same manner as receipts from customers. This is proper, for the reason that all sales

All other entries will be made through the two "General Ledger" columns. For instance, assume that in paying an invoice for \$1000, the customer made a deduction for, say, shortage or poor quality, and \$18 for cash discount at 2 per cent on the balance, the entries in the various columns would show as follows:

Credits:

General Ledger (with the words "Notes Receivable" written in the "Account" column) \$2500.00

General Ledger (with the word "Interest" written in the "Ac- count" column)	17.50
--	-------

Each item in the two "General Ledger" columns will be posted separately to the debit or credit, as the case may be, of their respective accounts in the General Ledger. The totals of all other columns will be posted to the debit or credit of their respective accounts, at the end of the month. The total of the "Accounts Receivable" column will be posted to the credit of Accounts Receivable account; the total of the "Discount Allowed" column, to the debit of Discount

[illegible]

for cash are entered to the debit or charge of accounts receivable through the Sales Analysis, as illustrated and described in the preceding article of this series.

If considered desirable, a customers' ledger sheet may be maintained with Cash Sales; that is hardly worth while, however, since the individual debit and credit entries, through the Sales Analysis and Cash Receipts Record, for the cash sales transactions of each day will entirely balance each other.

The "Discount Allowed" column is to be used only for the entry of amounts of discount deducted by customers.

The "Freight" column is to be used only in case customers deduct freight paid by them, where the invoice price includes freight paid to destination.

Debits:

Net Cash Received.....\$882.00

Discount Allowed 18.00

General Ledger (with the word "Allowances" written in the "Ac- count" column).....	100.00
---	--------

Credits :

Accounts Receivable\$1000.00

In order to illustrate the use of the "General Ledger Cr." column, let us assume that cash is received in payment of a note due in the amount of \$2500, on which interest has accrued to the extent of \$17.50. In this case the following amounts would show in their respective columns:

Debits :

Net Cash Received.....\$2517.50

Allowed account; the total of the "Freight" column, to the debit of Freight account, the total of "Net Cash Received" column to the debit of "Cash on Deposit" account. Where more than one bank is dealt with, the detail for each bank will be accounted for by the use of "Bank Statements," illustrated, by Fig. 14. These Bank Statements also provide a means of determining the net balance on hand at each and every bank.

Each entry in the "Accounts Receivable" column will require to be separately posted to the credit of individual customers' accounts in the customers' ledger.

Under the heading "Deposited In" appear two columns, headed respectively, "Bank No." and "Amount." These are provided to take care of those concerns who have

[illegible]

more than one depository. In the column headed "Amount" will be shown the total of the deposit made each day, or periodically, opposite which, in the column headed "Bank No." is noted the number of the particular bank in which the deposit was made. Deposits may be made in a number of banks on the same day, in which case the amounts deposited in the several banks would be shown opposite their respective numbers.

Daily, or at stated intervals, if daily depositing is impracticable, all cash received should be deposited in the bank. Especially at the end of the month is it necessary to deposit all cash in the bank, since the total of the "Net Cash Received" column is posted to the "Cash on Deposit" account, and the actual deposits must agree therewith.

Petty Cash Fund

It is advisable, in order to maintain a thorough check and control over cash receipts and disbursements, to force all such transactions to pass ultimately through the book. This is accomplished by establishing an "Imprest Fund" or "Petty Cash Fund," which is a fixed sum; say, \$100.00, more or less, held in the office for the payment of petty purchases.

When any payment is made from the "Petty Cash Fund," a "receipt" or "voucher" (Fig. 15) is made out, and is temporarily counted as cash on hand, thus keeping the balance intact. Thus the fund of \$100.00 might be accounted for by \$67.50 in vouchers and the balance of \$32.50 in actual money.

From time to time, therefore, the "Petty Cash Fund" must be replenished. When this becomes necessary, a check is drawn, to the order of the cashier or to cash, for the exact amount as shown by the total of the vouchers. The check is then cashed, and the proceeds placed in the fund.

At this time a "Petty Cash Summary" (Fig. 16) should be made up, showing the number and amount of each voucher, the aggregate amount of all vouchers and the total amount chargeable to each expense or other account for which payment was made. The "Petty Cash Summary" is then to be treated as a purchase invoice, and entered in the "Purchase Analysis" (see preceding article "Accounting for Purchases").

There are many instances where a number of different "Petty Cash Funds" may be maintained; as, for instance, different funds established for various jobs. The principle and procedure is the same for many accounts as for one.

Cash Disbursements Record

The Cash Disbursements Record (Fig. 17) is, to all intents and purposes, precisely like the Cash Receipts Record (Fig. 13) in its operation, save that each is the exact antithesis of the other; where one records the receipts of money and shows its transfer to the bank, the other deals solely with itemized withdrawals from the bank.

The net amount of each check is to be entered in the column headed "Checks." Check number is to be shown opposite each withdrawal, in column headed "Check No." and the date of withdrawal in column headed "Day."

If for any reason a check is rendered void, the number of the check should be entered in its numerical order, the word "Void" written in the column headed "Paid To," and the voided check filed with the cancelled checks subsequently returned from the bank.

The "Discount Earned" column is to be used only for cash discounts deducted in payment of accounts.

The "Freight" column is to be used for showing deductions on account of freight paid to transportation company, where goods were billed by the shipper f.o.b. point of destination.

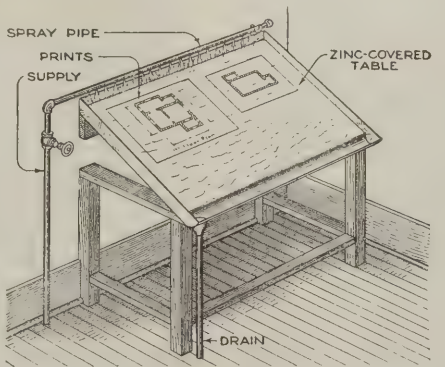
All payments to trade creditors are to be entered, in gross, in the "Accounts Payable" column.

All other entries will be made in the two "General Ledger" columns. All entries in the "General Ledger" columns will require to be separately posted. The totals of all other columns will be posted to their respective accounts in the General Ledger at the end of the month.

(To be continued)

An Improved Blueprint Washer

THE washing of large blueprints is always an awkward job because of the splashing and mess, which is impossible to



A blueprint washer that uses nothing but clean water to develop the exposed prints, and eliminates the need of using trays and sinks

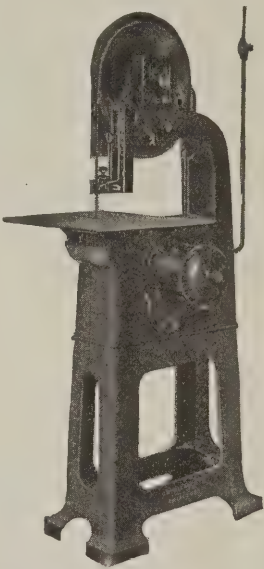
avoid when large trays are used. Also, owing to the size of some of the trays and the inconvenience of emptying them, they are not uncommonly left for a long time full of dirty greenish-yellow water.

The washing device illustrated does away with the tray or sink, as the washing is done entirely by a flow of clean water over the print. An inclined table, which is built in any convenient location, is provided with

raised sides and a trough at the bottom for carrying off the excess water, the whole being covered with sheet zinc or lead. A water pipe, which is drilled with a series of small holes, is arranged parallel with the top of the table so that there will be a uniform flow of water over the surface of the prints.—B. Francis Dashiell, Dunkirk, Md., in *Popular Mechanics*.

A Portable Band Saw

A PORTABLE band saw with a totally enclosed ½ h.p. motor operating on an electric light circuit is one of the latest additions to labor-saving woodworking machines. It is equipped with many features



A band saw that works on an electric light circuit

of stability, convenience and safety, with ball-bearings throughout. The floor space required for the machine is 15 by 29 ins. Its height is 5 ft. 9 ins. over all; table 42 ins. from the floor. All adjustments are controlled by hand wheels or thumb screws, without the use of special tools or wrenches. The machine is a product of J. D. Wallace & Co., 1401 West Jackson Boulevard, Chicago.

Standardization of Brick Sizes

IN figuring quantities of brickwork be sure of the sizes of the brick units or you may figure to a loss. It is true that the 1920 convention of the Common Brick Manufacturers' Association adopted the 8 by 2¼ by 3¾ size and the better manufacturers at once commenced to follow the new size, the number of firms making the standard size brick constantly increasing. Nevertheless there is a small percentage that for reasons of their own prefer to make a size that is off-standard.

Porch Enclosures

THE addition of another room to the house to take care of the growing family or to provide an extra bedroom in case of emergency or perhaps to better enjoy the benefits of an all-weather room—glassed in and leak-proof in case of storm, and cross ventilated and open in warm weather

Mr. Schuckmell, in describing this phase of his business to a representative of NATIONAL BUILDER, stated: "We experienced more or less difficulty at first in getting people to realize the immense benefits to be derived from porch enclosures at a very limited expense, but after we had completed

with our orders.

"One of the hardest problems we had to overcome at first was to make our sash leak-proof. The size of the sash was another one—a large sash would not only be in the way when it was open, it was liable to sag, and being exposed to the weather



The installation of this enclosed porch resulted in a large saving in the annual coal bill



The most popular room in the house was an afterthought



A good example of the appearance with and without porch sash



This rather unattractive rear porch was improved at a small expense

—without disturbing the existing arrangement of the house and without too great an outlay of cash, that problem, we dare say, has baffled more families than one. The accompanying illustrations show how one Chicago contractor, The Schuckmell Company, solved the problem for a number of home owners in and around Chicago, and has succeeded in working up a profitable business in this line.

a few installations our troubles were over so far as getting the business was concerned—every job we did was a standing advertisement and almost invariably resulted in another job and sometimes three or four, and before long we had more work than we could handle. We were forced to enlarge our plant to take care of our rapidly increasing business and our greatest concern now is how to keep up

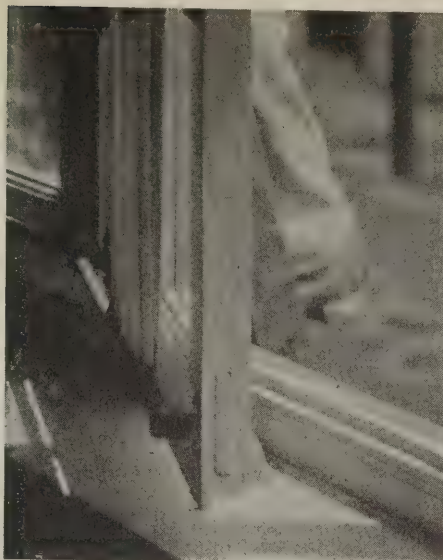
would bind during wet weather. After a number of experiments we have arrived at what we consider maximum sizes for sash—not over 51 inches in height and not over 23 inches in width—and find that these sizes used in connection with stationary transoms give very good satisfaction. In trying to make our installations leak proof we have developed a combination sash and double water-drip shown in the accompany-



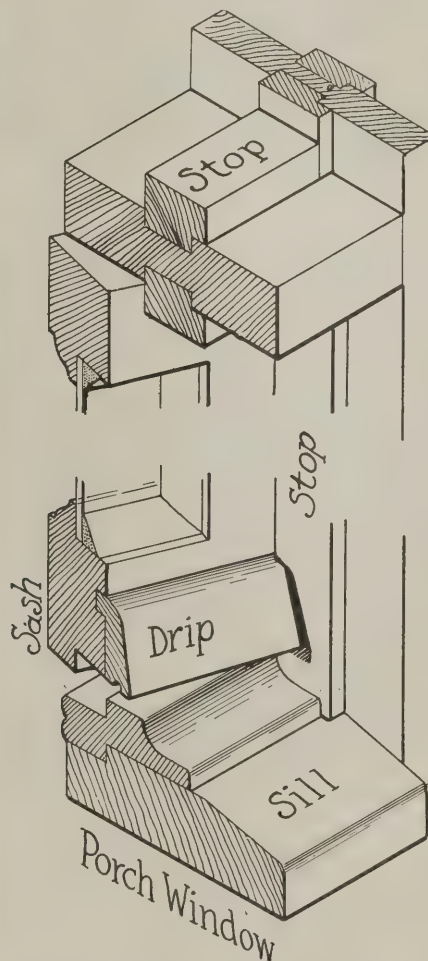
Enclosing these porches adds one room to each flat



These hinges permit opening of the windows without removing the curtain rods



The construction of this water drip is shown in detail in the sketch on this page



Sectional sketch of porch window showing water drip feature

added comfort derived from its use but it is more than absorbed in the increased value of the house. In a row of houses of similar design, the one with an all-weather, enclosed porch easily stands out in a class by itself, and its attractiveness, as well as its utility, appeal to the eye of the prospective purchaser at a glance. A porch 10 ft. x 6 ft. x 6 ft. high, two sides and front, can be enclosed for about \$125, including combination sash—screen and glass—exclusive of freight and labor."

Firm Brackets for the Hand Railing

"SOMETIMES the occasion arises where it is necessary to put up brackets for a stair railing in a brick wall," writes C. R., a Chester, Pa., subscriber. "The usual way to do this is to plug the wall, using wooden plugs. But the wood shrinks, and soon the brackets are loose and the rail is down. A good way to overcome this difficulty is to use sheet lead instead of the wooden plugs. After the hole has been drilled, take a small piece of the sheet lead just as wide as the hole is deep, and roll it into a small bundle. Drive this little bundle into the hole just as though it were the wooden plug. The bracket screws into the lead easily, and by punching the metal all around the bracket with a nail punch it makes a very secure grounding. The same method can be used when putting common wood screws in a brick wall."

Lathing an Interior of Brick or Stone

"THIS is a little hint I find of great value when building with stone or brick," writes E. H. G. of New Hampshire. "Instead of wedging for strapping and putting in blocks between bricks or stone on which to nail furring, by which method you hardly ever get a good job, put up a two by three frame, studding 16 in. on center, boarded with old boards—for brick 2 in. apart, for stone 3 to 5 in. apart. Then let the masons go at it, using the boards to lay their stone or brick against. Masons can do more work having only the face side of the wall to work on. Every 2 or 3 ft. up the frame a wire is used, or an anchor iron, back into the wall. When the outside wall is finished, the inside walls are ready for lathing, and there is something better to nail the laths to than strapping. This method has been tried out here on two stone buildings and produced a better job and at less cost than the old way."

BUILDERS' ADVERTISING—A Western builder claims that his most effective advertising is obtained by the liberal use of signs on his equipment and on the job. But advertising is a science in itself and he may be missing a bet in other ways.

ing illustrations, which has given good results, and while we cannot absolutely guarantee our installations as being waterproof we have yet to meet a dissatisfied customer. We have followed up all of our work, and as fast as an improvement suggested itself we tried it and if successful we adopted it,

until we have succeeded in overcoming practically all of the weak points.

"We find that the glassed-in porch or all-weather room, as we call it, for that is really what it is, is the most used room in the house, and the very small comparative cost is easily overcome, not only in the

Band Stands

IN the design of municipal band stands there is as much need for individuality as there is in the design of residences. The various types range from the plain elevated platform without any canopy to the elaborately treated masonry stand with sculptured decorations and high tiled or mosaic domes. Often, in this latter type, provision is made for public comfort stations and rest rooms below the stand proper.

The illustrations on this page show some of the types used in public parks. In Douglas Park, Chicago, a square, raised platform of timber is provided in the square facing the field house. (Fig. 1.) This type is inexpensive and appropriate in its location, as no decorative effect is necessary.

The location among the trees on an elevation above the lagoons in Lincoln Park, Chicago, make the rustic stand especially suitable. Much of the detail of its design can be seen in the two illustrations. (Figs. 2 and 3.) This type does not detract from the natural beauty of the surroundings and it also serves as a shelter and observation point. Its location on one of the higher

dome. The domed ceiling as well as the exterior decorations are tile mosaics. Walks lead up to the stand from all four sides, the terraces being planted to shrubs and

semi-circular in shape, rising from front to back in a series of terraces or steps, each of which is sufficiently wide for a row of chairs. It is built of white granite, with



Fig. 1—The simplest form of band stand is an unroofed platform



Fig. 2—A location among the trees makes the rustic band stand appropriate

points in the park makes a high structure unnecessary. Simplicity should be the keynote in designing such a rustic band-stand or shelter house, and it is advisable to avoid as far as possible any elaborate decorative treatment.

A more elaborate band stand is in Garfield Park, Chicago. (Fig. 4.) This stand is apart from any other buildings and is designed for decorative as well as utilitarian purposes. It is a granite structure, massive in structure and built upon an artificial elevation. The stand itself is high and is roofed with an ornamental copper

grass. Its extreme elevation make this decorative treatment possible. A further advantage in its elevation is the space that is secured beneath the stand proper which, in this case, is used as a store room for tools and equipment used in the park maintenance. While such a band stand is expensive, it is a permanent improvement and is in conformity with the general plan for beautifying the park.

Unlike the other stands described, the masonry band stand at the south end of Lincoln Park (Fig. 5) is designed more as a stage than as a stand. The stand is

the steps of tile and concrete. The wall serves, in a way, as a sounding board. This stand has no roof, nor are there any permanent seats other than the low tile steps.

Many of the more inexpensive band



Fig. 3—Floor and details of rustic band stand

stands are made portable and are set up at different points for concerts. These are literally nothing more than stages or platforms, and offer no advantages toward permanently beautifying the parks. Under ordinary conditions, municipal band stands, whether in parks or public squares, should be designed with an eye to their conformity with their surroundings. In general they should follow the design of other public buildings. As an example, if a park, together with the park buildings, are rustically treated, a stand of similar design would doubtless be most appropriate.

Where the stand is desired merely as a stage and shelter for the band and where no care is taken in its use for beautifying, its design and construction are simple. The unroofed platform will serve this purpose admirably, though it often becomes unpleasant for the musicians, especially during showers and on bright sunny days.



Fig. 5—Where the audience is confined to one side only, this band stand is especially fitting



Fig. 6—A shelter and rest room that also does service as a band stand

Should it be desired to cover the stand, the roof should be high and there should be a sufficient overhang to prevent water dripping upon the outer row of seats.

The stand itself may be built square, octagonal or circular, as is desired. The square stand will be slightly cheaper and will serve all ordinary purposes as well as the other. It is customary to elevate the floor from 4 to 6 ft. above the ground, though excellent results are often obtained where the elevation is much less. The band itself will regulate the size that is required. Except for large bands a stand 16 to 24 ft. across should be large enough.

As the ordinary stand is open to the weather at all times, it is often desirable to use portable chairs instead of built-in seats, as the latter become dirty and rough from exposure. It is readily possible to provide storage space under the floor for such equipment. Where permanent seats are used, some provision for covering them or for enclosing the stand by means of curtains or otherwise should be made.

Common Brick Manufacturers Association Plan to Finance Brick Construction

THE tentative plans being worked out by the Common Brick Manufacturers' Association contemplate raising \$1,000,000 to aid home builders and substantiate the con-



Fig. 7—A small band stand in a suburban park

fidence of the membership in the new Ideal wall type of construction. Under the new financial scheme any responsible head of a family of good character who desires to own his home will be aided from a central million dollar fund subscribed by the industry. Each loan must be approved by the local brick manufacturer and by a responsible local bank or building and loan association, which latter will have the actual handling of the money. This loan will help fill the gap between the amount normally loaned on construction and the cost of the house.

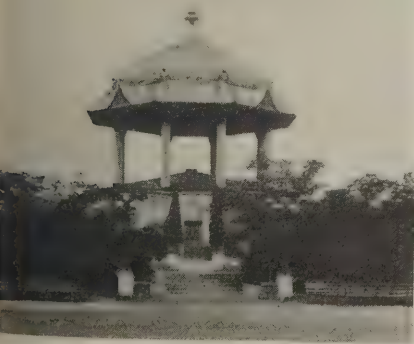


Fig. 4—A massive masonry stand lends itself to the general plan for beautifying park grounds

A Little Shop Building

THE accompanying photograph and floor plan illustrate a little store building in the Hollywood suburb of Los Angeles, Calif., that presents a particularly neat and attractive appearance. It also has an especially well-planned interior, while in the rear, as a quite unusual feature, there is a most charmingly laid-out little garden.

The lot on which this shop is located is but 30 feet in width by 88 feet in depth. The building naturally occupies the full width, and is 50 feet deep, which means that the garden in the rear is 30x38 feet in dimensions. The foundation of the structure is of concrete, and the walls are of brick, while the front is finished with cement-stucco. The garden plot is laid out with cement walks, lawn and shrubbery about a small pool in the center, and a concrete seat faces the space from the rear.

It is the front of the store that deserves particular notice. The entrance is comprised of a glass door, with a narrow panel window at either side and a rounded transom above, set in a great arched doorway, while the wall space over the entrance is attractively yet simply embellished with "staff" work.

The interior divisions of the plan are comprised of, as will be observed, a small entrance vestibule, a sales room, a large work room, and a special vault room, besides the usual lavatory. The entrance vestibule is designed with a little wall fountain facing the front door, and both this vestibule and the sales room have cement floors, while pine flooring is naturally used in the work room. The ceiling of the vestibule is 12 feet high, and of the other divisions it is 10 feet. The interior woodwork is of pine, which in the front part of the building is finished in French-gray enamel and in the back room is in light blue paint, and all inside walls are plastered.

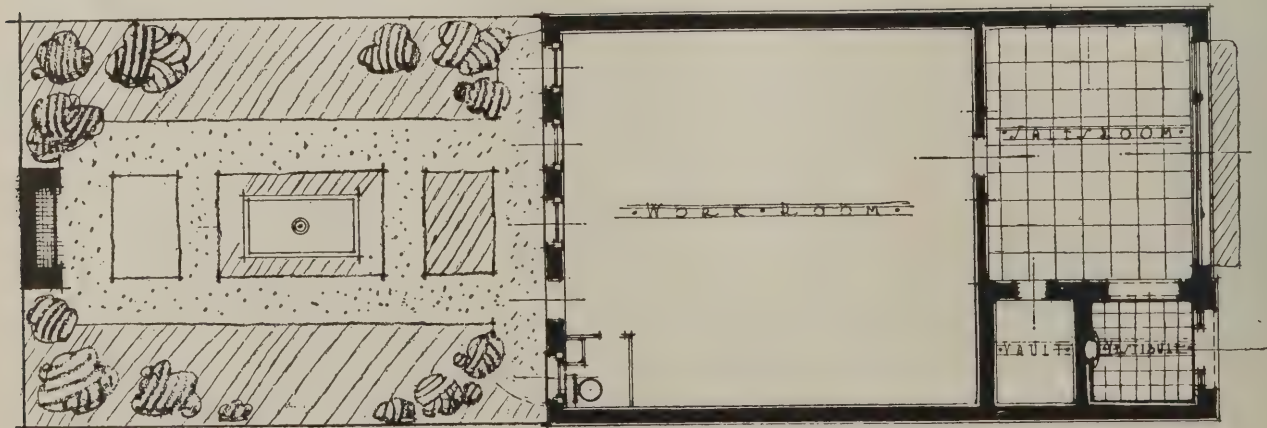
The building has no basement, but is equipped with built-in gas radiators for heating. It is the shop and work room of



An attractive small store

Alice Hardy, furrier, and was designed by Richard D. King, architect, of Los Angeles.

The present building cost is estimated to average about \$5,400.



Floor plan showing store arrangement and garden plot

A String of English-Style Stores

By Charles Alma Byers

ILLUSTRATED herewith is a string of nine little stores, all in one building, that presents an exceptionally attractive appearance to the street. The architectural style is Elizabethan English and unusually well handled. The main or lower part of the walls consists of deep, red brick, with the space underneath the show windows finished with greenish gray tile, and the gables and

lar in shape but having a maximum width of 23 feet. The interior woodwork consists of Oregon pine, finished in light brown stain, and the walls are plastered and tinted. The floors are of pine, over sub-flooring. Each store possesses, of course, a separate entrance and show windows, and is equipped with toilet and sink or wash-bowl, with running water. No basements are provided,

\$58,000,000 in Housing Construction

FIFTY-EIGHT million dollars has been loaned by the Metropolitan Life Insurance Company throughout the United States to build homes and apartments. The Chicago Trust Company, handling

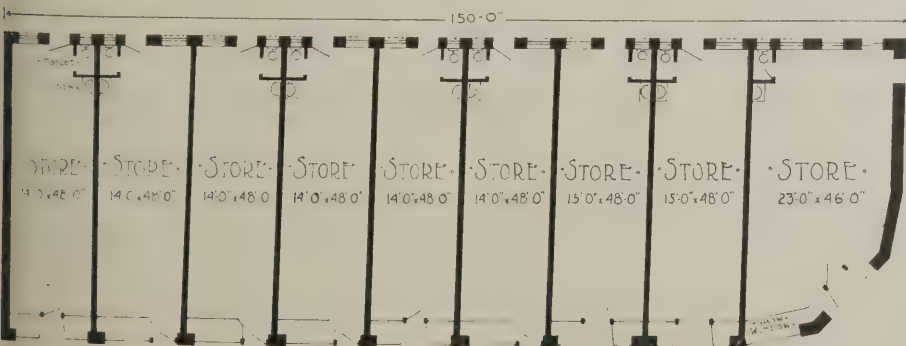


Nine stores in one building

the top of the walls are of cream-tinted cement-stucco, treated in half-timbered style. The roof, it will be observed, is designed with effective irregularity, including several little dormer windows, and its covering is of greenish gray composition shingles. These upper windows, incidentally, are for show only, for there are no rooms on the second floor and the attic space is left unfinished. The exterior trimming is done in rich brown. The store rooms vary somewhat in width, six of them being 14 feet in width each, two having a width of 15 feet each and the remaining one, on the corner, being irregu-

but such might have been easily included, at additional expense. While rather small, the store rooms are practical and attractive and naturally always in demand. They are occupied at present by a bakery, an ice-cream parlor, a delicatessen, a beauty parlor, a sewing-machine and music dealer, a restaurant, a dealer in gowns, and a cleaning and pressing establishment and a real estate dealer. The string of stores was built recently in Los Angeles, Calif., at a total cost of approximately \$20,000. Charles D. Wagner and Charles F. Pyke were the designers.

the loans for the Metropolitan Company in Illinois, Wisconsin and Northern Indiana, announces that in that territory \$3,400,000 of the fund has been spread sufficiently to build 1040 homes and apartments, while new buildings are now going up at the rate of 30 a month. These houses have been erected in 66 cities. The unusual part of the plan, according to the banking officials, is the small average of each loan, which is said to indicate that the construction is done for small home builders. The Illinois loans average about \$4,000 each, which is approximately half the value of building and lot in each case. The builders are given three to fifteen years in which to repay the loans. The banking officials state that the Metropolitan company does about as much clerical work in making one of these small loans as it would in putting out the entire sixty million dollars in a few big loans, and that the large loan policy is the one usually favored by American companies with vast sums to invest. This is another reason why this large insurance company deserves great credit for placing such large sums into home building loans.



A French Chateau

THIS French chateau type, designed by Architect E. B. Rust, and built by Edwards & Wildey as part of their 1920 tract

bath are separated entirely from the living apartments, yet having outside exit to the patio and thence to the breakfast room,

kitchen and dining room. In the bathroom are dressing table and mirrors for the lady, with light above and duplex plug in the



French Chateau Type

development work in Los Angeles, is the most widely commented on piece of architecture on a street of distinctive homes.

A month before it was completed it sold for a cash price of \$12,000. The choice rested with the lady, and on inquiring of her as to whether it was the location near the university, or the perfection of the conveniences that clinched her interest, she said "No," but that the moment she set eyes on the place, before ever she set foot inside, she was charmed with its general appearance, high-pitched roof and lines of mediaeval beauty and said to her husband at once, "This is the house!" Possession and a year's occupancy but deepened that first impression, all of which is good practical business for the builders, and worth noting.

The house is on ample lines, comfortable and well arranged. The front door opens directly into the 20x20 living room, with an ample fireplace and built-in bookcases, indirect lighting system, individual gas furnace with pilot—whose register is in the floor near bookcases to the right of the French doors leading to dining room. French doors likewise open on the patio, and to the right is a hallway that runs from the front bedroom to the extreme rear bedroom, so that these and the spare room and

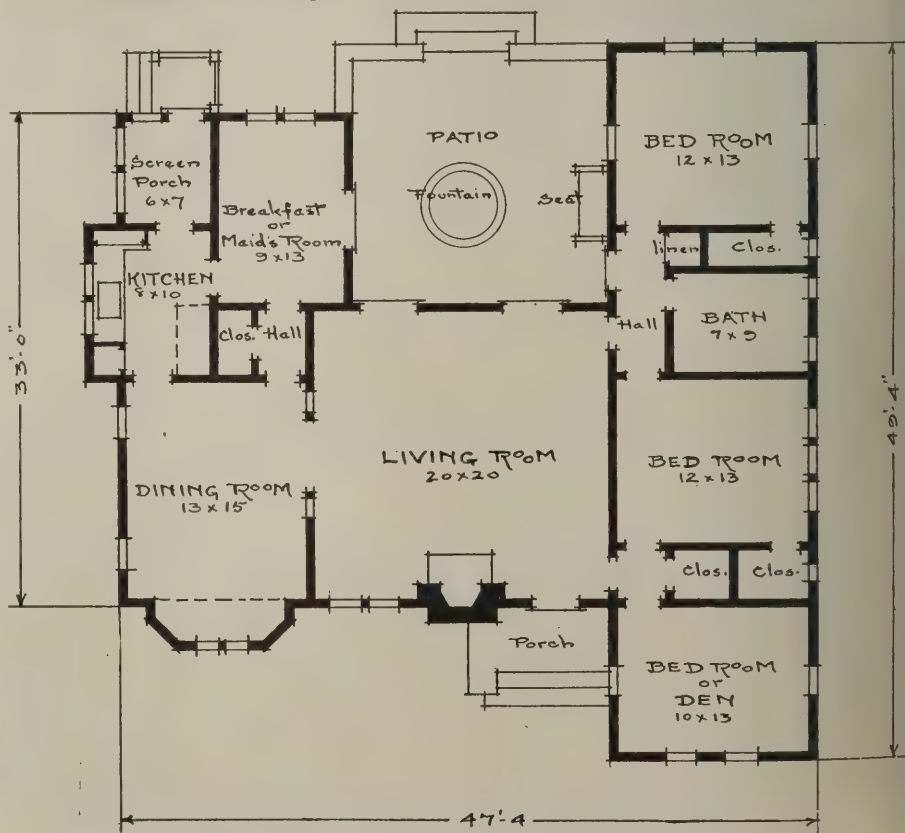


table into which can be plugged electric vibrator, curling irons or the electric plate for heating baby's midnight lunch. Over the stationary stand is shaving mirror and light for the man. The bathtub is half below the floor level and tiled in.

convenient to patio and living rooms. Worthy of note is the lattice work pattern and profusion of delicately-colored morning glories in the wall paper of this room, and the built-in corner buffets are equally charming.

also for inside bearing walls. Ceiling joists and rafters are also 2x4's, and very particular attention was paid to the bracing of the rafters, so as to have a good firm roof, care also being taken to allow for ample ventilation of attic and walls.

The exterior of the house was lathed with button board, then a good coat of cement plaster, and the final coat of California



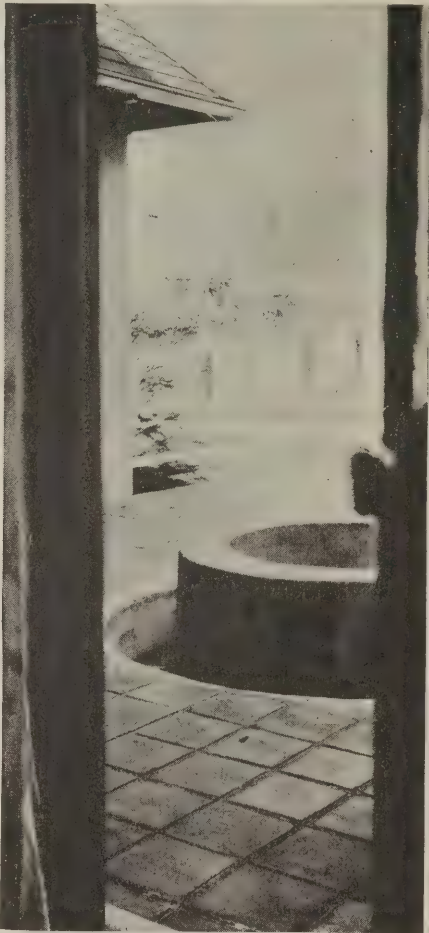
Patio and fountain



Dining room has direct system of lighting. Note the built-in buffet

The dining room has direct system of lighting, and the built-in buffet has a counter of Tabascan mahogany. The breakfast room is said by the lady to be the choice room of the dwelling, as it has the sun until two o'clock in the afternoon, and is equally

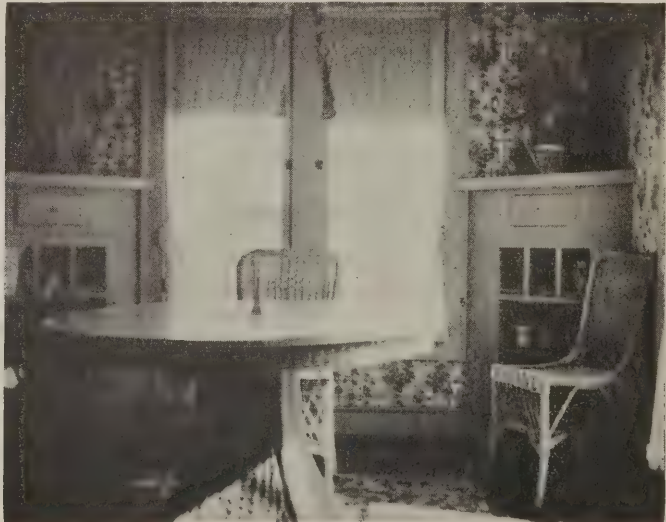
The foundation of this house is of concrete, and the 2x6 floor joists are spaced 16 inches on the center. The flooring is 1½-inch oak, over a sub-floor of 1x6 that is nailed securely to each joist. Two-by-four studding is used on all outside walls,



Glimpse of tile floor of patio with fountain. Plants and flowers to be set in space around fountain



Living room. French doors in opening to dining room



Breakfast room, showing built-in features and French doors opening on the patio

stucco, which comes in a variety of colors and is absolutely water-proof when rightly applied. Particular attention was given to the making of window frames, and the setting of them, so as to get an absolutely water-tight job against the plaster. Redwood was used for outside casing of frames, this wood holding the paint better than anything else for exterior work in the California climate. Jambs of pine.

Garage has cement flooring, electric light and plenty of storage room, and accommodates two cars.

Careful thought was given by the builders to the finishing touches that are often neglected by ordinary builders. Porch lanterns, mailbox, numbering, electric bells both front and rear, walks laid, the lawn seeded, and plants and shrubbery set out that best correspond with the style of architecture. The sink is just the right height for the average woman, and the laundry tubs adjustable as to height. There is a transformer on the electric doorbells that takes the pull off the main circuit so that the bell never gets out of order as in the case of those connected up to batteries. Shades were in the house, and the screening all in place—the frames being painted to correspond with the general exterior trim of house.

There are electric duplex plugs in every room in the house, from two to three in some rooms, allowing for the ready connecting up of floor or table lamps, electric piano, vacuum cleaners, power sewing machine, etc. These duplex plugs are put near the basement, except in laundry where they are set high enough to plug in for washing machine, electric mangle and irons. Wide experience has shown Messrs. Edwards & Wildey that it pays in both cash and prestige to give attention to these details.

Revision of Building Codes

SECRETARY of Commerce Hoover's letter to the President states that the unnecessary restrictions of many building codes retard building activity. At a meeting in New York early in February the Building Construction Committee of the National Fire Protective Association a vote was taken on the provision "That stucco on metal lath and masonry veneer residences be permitted within municipal fire limits except in strictly congested districts." A majority voted in favor of the provision, and a final draft of the recommendations is to be drawn up by the committee at a meeting on March 21 and presented to the National Fire Protective Association at their annual convention.

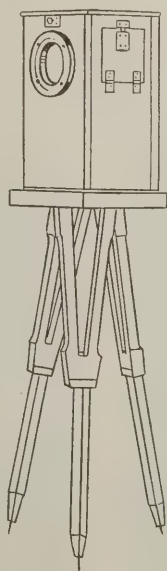
The revision of the building code of Chicago has been under consideration for some time by the city council building subcommittee at the request of a joint committee of the American Institute of Architects and the Illinois Society of Architects. Some of the provisions in the revision re-

fer to small house construction within the fire limits, in which connection the action of the committee of the National Fire Protection Association last month is significant. The expectations are that the revised code, if passed, will permit in Chicago within the fire limits the use of 8 in. brick, concrete block or hollow tile walls; also stud wall construction covered on the exterior with metal lath plastered with three coats of portland cement mortar and back plastered, or portland cement plaster on metal lath or wooden sheathing and studs. The frame and metal lath type of construction will in addition to being limited to buildings of an area of not over 1200 sq. ft. and not more than two stories high and standing not less than 3 ft. from the lot line. The passing of this ordinance, it is declared, will stimulate building more than anything else, for only by bringing the detached home within the reach of the majority can the demands of the profiteering landlord be kept within bounds.

An Automatic Water-Finder

ON the subject of finding water the work of the "dowser" with his forked hazel or willow rod has been discussed time and again. The success of those gifted with the qualities that in combination with the divining rod permit them to find water at available depths has been certified by many reliable persons. "Otherwise reliable" is the correction invariably offered by other than eye-witnesses to these performances.

Now, however, comes a four-page circular from Edwin A. Mansfield & Co., engineers, New Brighton, England, illustrating,



"The tripod is set up and by the instrument is placed by aid of compass accompanying the outfit in relation to the magnetic north. A pivoted magnetic needle commences to move if subterranean flowing water is present, the strength of swing depending on the volume of water below"

describing and, with testimonials, authenticating the performances of the Mansfield patent water finder, supplied to railway companies, land companies, well-boring engineers, etc. The principle on which the instrument works is said to be "the indicating of the presence of currents which flow between earth and atmosphere, and which, seeking the path of greatest conductivity, are always strongest in the vicinity of subterranean water courses, the waters of which are charged with electricity to a certain degree. In taking observations wooden pegs are placed at intervals of twenty paces in a direction usually S.E. to N.W. The instrument is tried over each of these pegs in turn, and should the needle move on any one of them tests are made all around it and the spot where the greatest movement of the needle is obtained is where the boring should be made. The instrument indicates water-courses flowing underground in a natural state and not water-pipes or sources that have sprung up to daylight. The device is made in several models, from those finding water at depths up to 200 ft. to those finding water or oil up to 3500 ft." The prices range from 30 pounds (\$164 at normal exchange) to 175 pounds or \$840 normal exchange.

Bricklayers Will Not Limit Output

A WASHINGTON dispatch states that on February 24 Attorney General Daugherty announced that the executive heads of the international organization of bricklayers, masons and plasterers have signed and executed a consent to the entry of a far-reaching court decree directing that the decree be published by the labor organizations and read to all the 100,000 members of their local unions at their regular meeting, and be incorporated as part of the constitution of the international union and appended thereto in the next constitution to be adopted.

Four Basic Principles

The decree lays down and adopts these four basic principles:

1. There is to be no limit to the productive capacity of the individual workman within the working day or any other given time.
2. There is to be no limit upon the right of the employers to purchase their materials wherever and from whomever they may choose, whether those materials be union made or otherwise.
3. There is to be no favoritism shown by organized labor towards employers or trade associations or contractors' associations, and no discriminations are to be indulged in against the independent employer who may not be a member of such an association.
4. The labor organization is not to be used or permit itself to be used by material men or contractors or subcontractors as an instrument for the collection of debts or enforcement of the payment of alleged claims.

Follows U. S. Investigation

The court decree will be entered as the culmination of the investigation of Colonel William Hayward, federal district attorney at New York, in conjunction with the department of justice into the building trades and housing situation.

How to Lay Out Brick Work and How to Frame Up Around Fireplaces

By I. P. Hicks

THE construction of a modern fireplace is one part of building construction of which many carpenters and bricklayers have had but little experience. In fact, when there is a fireplace to build there are many carpenters and bricklayers who do not know how to lay out the work. This is particularly true in respect to building the better class of farm residences and those for small country towns.

Those who have never had any experience on this work never seem to know just how to figure out the dimensions required, how to form the skewback arch for the hearth, space required for the chimney inside the headers, etc. All this is a perplexing problem for the inexperienced. In our sketches we will endeavor to show the layout of the brickwork, the arches and the frame up around the same; in fact, show every essential thing about the building of the fireplace.

Many mantels are now laid up faced with press brick instead of the tile facing that was used years ago. A mantel faced with press brick requires quite a bit more space than the one just faced with mantel tile on the face or front.

The plan shows the layout of the brickwork and the dimensions required to a very close figure. Of course there may be some variations on account of the size of brick being used, but on the whole these should be small if standard size brick are used.

The chimney provides for three separate flues, one 8x12 for stoves, one 8x12 for the fireplace and a 12x12 for a heating plant. In large residences a 12x12 flue is often necessary for the heating plant and this depth is also necessary for the fireplace in order to make room for the fire brick at the back.

If actually necessary for lack of room one brick could be taken out of the width of this fireplace, but the dimensions and the layout as shown is about the best that can be planned for a good fireplace with proper construction.

The plan shows the studding set flat on the back side of the fireplace with the one each side of the chimney set edgewise. Building in this way prevents the plastering cracking down by the side of the chimney.

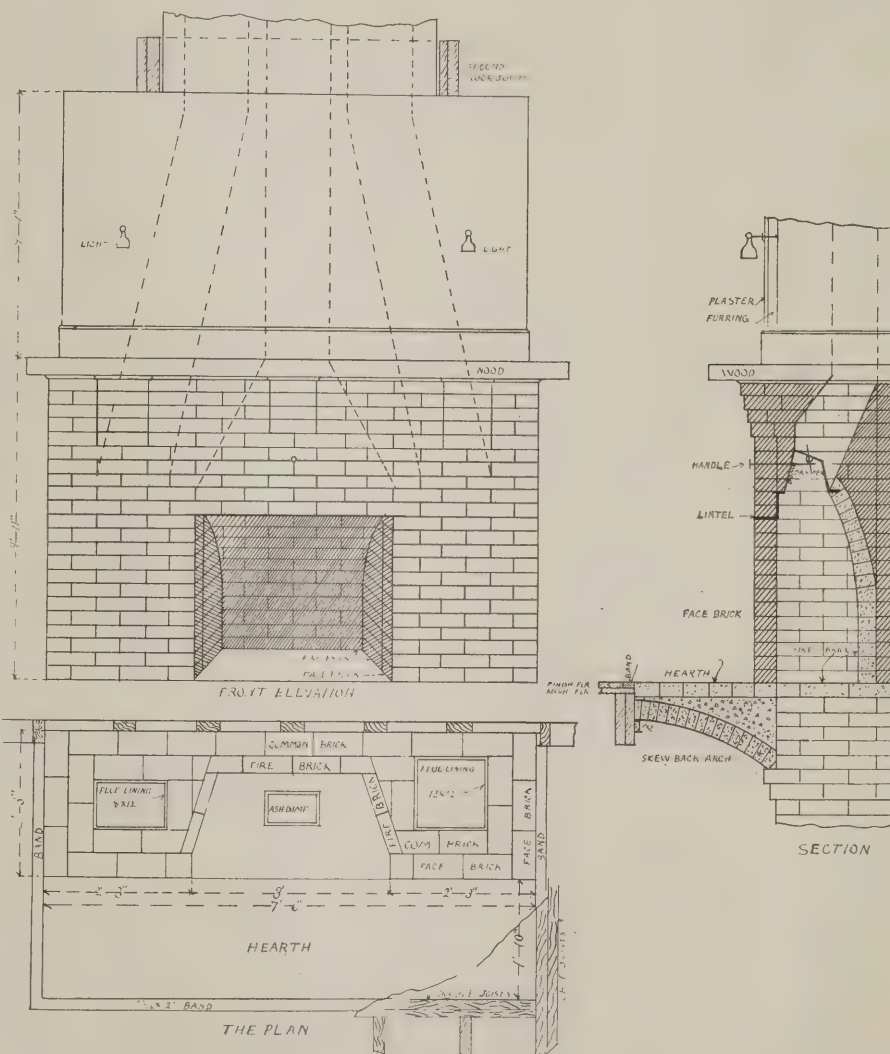
A 2 in. band is run around so that the hearth and the finish floor both finish up to the band, making a neat finish around the floor and mantel.

The framing of the joists is shown in the lower right hand corner. Double joists should be used each side of the chimney and also for the header, all as shown.

The elevation shows the height of the mantel from the floor and the height to the ceiling joists above. It is customary to have the top of the mantel 5 ft. above

and a 1x2 is nailed to the header to support the outer side of the arch, as shown. The space above the arch is then filled with concrete up to the starting of the brick or tile hearth, as the case may be.

The fire brick on the back are curved outward at the top to throw the heat outward and into the room. A steel L lintel



the finish floor, but a variation of an inch or so is of no particular importance. The dotted lines show how the flues are drawn in so that the chimney can be reduced in size above the first floor. A and B show the joists each side of the chimney as they appear at the second floor line.

The section shows how the skewback arch is formed for supporting the hearth. Two courses of brick are projected out from the chimney to start the arch on,

is placed over the opening for the fireplace, also a steel dome damper above the lintel, all as shown. The flue then slopes backward to the proper position to be carried on straight upward to the top of chimney. From the point where this flue starts just above the fireplace the flue lining should be started. The flue lining should be so mortared in that no smoke can get up by the side of it. The flue lining in the other flues should start from the bottom of chim-

ney. The drawing in of these flues is so gradual that no trouble will be experienced in setting the flue lining. Be sure, however, that all joints in the flue lining are

well filled with mortar when building up around the flue lining.

Above the mantel shelf the chimney is furled with 2x4's set flat ways. This makes

room for electric light wires above the mantel. It is also better to plaster on than the brick and makes it better to nail the picture molds to at the ceiling line.

Tamped Earth Walls in Farm Buildings Are Successful

By B. Francis Dashiell

THERE is a method used in building walls which is one of the oldest types of construction known to man, historically and practically known as "Pise' de Terre" or tamped earthenwork walls. With the present extremely high prices of stone, concrete and wood and other building materials, there has been a revival in parts of Europe and America of this old type of wall construction in plain cheap farm buildings. Such a practice can and should be made more generally applicable throughout the farming centers of America.

Such methods of wall construction were used in the ancient days and are practically imperishable, as they successfully withstand heat and frosts and beating washing rains. In fact, in the southwestern portions of the United States there may be found buildings with pise' de terre construction made as far back as 3,000 years ago. In England, Africa and parts of Europe and Asia will be found buildings of the same types and as old and older. Compare this with the present type of short lived buildings put up on the average farm today. This is merely stated to show that tamped earth in wall construction is practically everlasting in buildings adapted to this method. This is not the well known type of building construction used in Mexico and adjoining states known as adobe, which is clay and straw baked in the hot sun of the deserts. It is a mere earth loam tamped in place between wooden forms and which when cured or dried out closely resembles the usual types of sandstone.

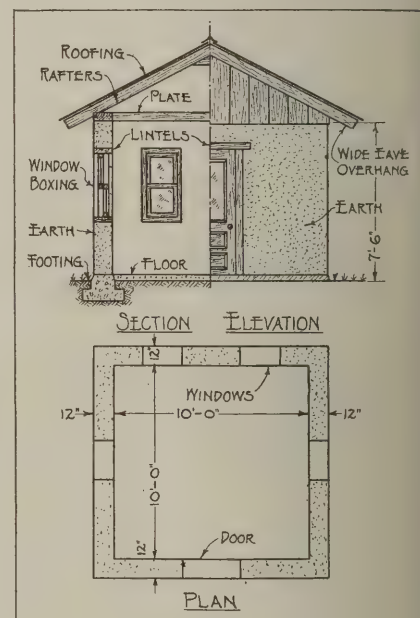
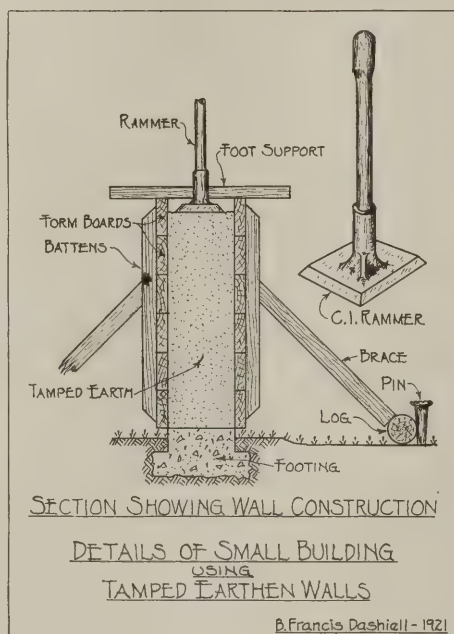
The loam used in this work should be a good and clear loam with not too much sand or clay in mixture. Excessive quantities of sand will produce a weak crumbling wall, while heavy clay loams will crack when dry. Pure loam of the proper consistency will give excellent results and should be screened so as to be largely free from roots, leaves and stones of an objectionable size. Nothing is needed to make the loam cohere or bind, as the tamping will do that, so therefore no water should be mixed with the loam, just using it as it comes from the place where dug and in its moist condition. It should be placed within the forms at once and tamping done as soon as a small portion is in place. It should be tamped well into place, part by

part, until it gives forth a ringing sound, then place in more loam and tamp until it rings, repeating the process as the work progresses. The most important part in the whole work is to be sure to tamp until it gives forth a ringing sound. This earth stone so made will become harder and harder with age.

Wooden forms similar to those used in the placing of concrete are used to form

piece of wood may be laid over the top of the doorways and window openings to reinforce the overhead material and the earth tamped all around it.

After the walls are tamped and have reached completion, the roof materials are placed on in the same way that the work is done on any building. The eaves, however, should be given a generous overhang to protect the sides of the walls from the



the walls and partitions and are set up parallel and not less than 10 in. apart, so as to make a wall 10 or more inches in thickness as required. The forms should be made in sections so that about 4 ft. of wall height at a time can be made, as it will be found extremely difficult to tamp at the lower portions of a form for a wall about 8 ft. high. Lock and brace the form firmly so that it will not spread under the ramming and tamping action.

Spaces for doors and windows are not cut in the finished wall, but are provided for with box forms set down between the side form boards. Tamp the earth up to the level of the window bottoms and then set in the box form of the proper size or set in the complete window frame and tamp the earth all around it. A pipe or

drip. The walls will harden with exposure and dampness will not penetrate so easily as with concrete.

Anyone, in fact any unskilled labor, can put up the walls for a small shed or building in a short while with just a set of forms and an iron tamper and the necessary loam. Some different experiments may be necessary to test out various kinds of loam that may be available so as to find that which coheres best with the least tamping. This method is so simple, effective and durable that it can be tried on any farm in the construction of low priced sheds and buildings. Many different arrangements can be made in the shape and kinds of walls and partitions, as all parts will join together perfectly into one monolithic construction.

Concrete Formwork for Machine Bases--By Edward H. Crussell

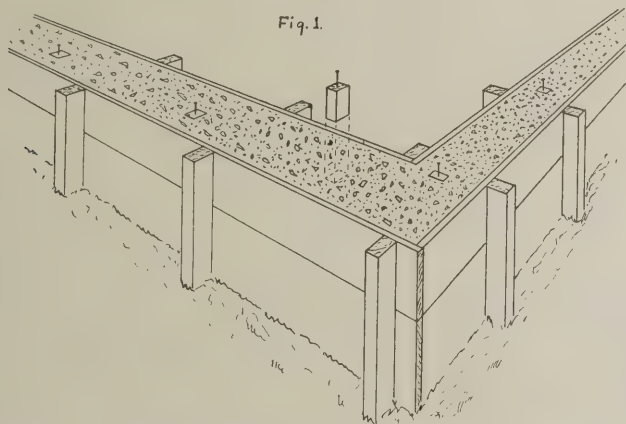
It will perhaps surprise some of the younger readers to learn, that long before concrete came into such general use as a building material for foundations and walls, it was used by the old-time millwrights for foundations for stationary engines and other heavy machinery. The millwright's materials were more often sand, cement and cinders, than the various mixtures of crushed rocks, or gravel, that occupy such an important place in concrete

and splitting it with a handaxe to the size indicated.

It is necessary that these blocks be level with the top surface of the wall, or even slightly below it, so that they may be entirely out of the way, but unless something is done to indicate their location they may be hard to find when needed, because they get colored with the cement and look just like the remainder of the wall. The best scheme is to drive an 8d nail a short dis-

going is needed, bolts are generally used. These have to be placed in the wall in such a manner that their tops, or threaded ends, come exactly into correct position. Different thicknesses of timber require different projections of bolts and this is provided for in various ways. Where the timber to be fastened is thin, say 4-in. or less in thickness, the easiest and best method is to bore a hole through a piece of scrap wood of the same thickness as the timber, fasten this piece temporarily to the top of the form so that the hole comes in proper location for the bolt, and place the bolt in position with nut and washer, just as it is desired to have it in the finished work. With the bolt, or bolts, in place, the concrete is filled into the form, and after it has set, the nuts are unscrewed, the blocks of wood removed, and the timber, properly bored for the bolts, is dropped into place over them and fastened down. Sometimes, to save unnecessary boring, the bolt, instead of being passed through the block, is fastened to the side of it with wire or a couple of nails; both these different methods are illustrated in Fig. 2.

Where a greater projection of bolt is desired, as when anchoring timbers 10 in. or more in thickness, either of the methods pictured in Fig. 3 may be used. Both of these schemes accomplish the same result but in different ways. That shown at A is more economical of material but does not



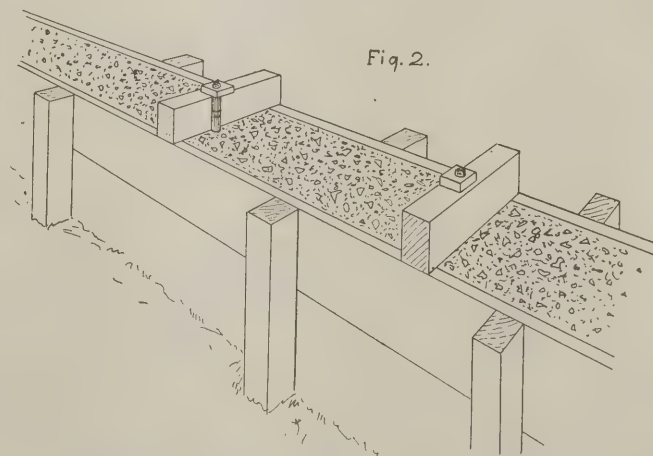
Portion of foundation wall showing nailing blocks in position

formulae of today, but the ends attained were usually eminently practical and satisfactory.

The writer's attention has recently been drawn to the fact that, in spite of their age, and usefulness, some of the ideas used by the millwright are not as well known to the average building mechanic as they ought to be, and it is his intention, in the present article, to explain some of the more important methods of providing for the fastening of timber, steel, or machinery, to concrete bases or foundations.

In building work, with stone or brick foundations, the sills, which are often not more than 2-in.x4-in. or 2x6-in. in size, are usually simply bedded in mortar on top of the wall, the weight of the building being depended upon to keep them in place. This method is often used where the foundation walls are of concrete and while it in general answers well enough, it is easier to keep the sills in line if there is something to fasten them to. A simple but very satisfactory method is to insert small blocks of wood into the top of the wall while the concrete is still soft. These blocks of wood need not be more than 1x2-in. in cross-section and 3 in. long, pushed vertically into the top of the wall and spaced about 2 ft. apart. They are easily made by sawing a 1-in. length off the end of a 1-in. board,

tance into the end of each block, and then, when the blocks are placed in the wall, the nails are left projecting. When the concrete is ready for the sillpiece, a mark is



Illustrating methods of using bolts for concrete forms

made on top of the wall opposite each nail with a colored crayon, the nails are withdrawn, the mortar spread, the sills leveled, lined, and fastened in place with the greatest ease. Fig. 1 shows a portion of a foundation wall with some of these nailing blocks in position.

Where a stronger fastening than the fore-

answer for all purposes; when arranged as at B there is a better chance to finish off the top of the wall, but it is necessary to test the bolts after the form has been filled, and before the concrete has set, to make sure they are still plumb and have not been pushed out of position.

The end of the bolt which is imbedded

in the concrete is usually provided with a large washer, this is to insure good anchorage. When the bolts are long enough, a better method is to bend the end of the bolt at right angles. This not only supplies the necessary anchorage, but avoids any possibility of the bolt turning while we are screwing up the nut. The outside of a concrete wall sets much quicker than the inside, and with a straight bolt and a tight fitting nut there is some danger of the bolt turning before the nut is screwed home; where this occurs, it is almost impossible to effect a remedy. All nuts and bolts used in work of this kind should, of course, be tested for free running before they are put in place, but sometimes, especially when fastening steel to concrete, the threads of the bolts get marred while putting the work into position, and in a case of this kind the bolt with a right angled bend in it is a big advantage.

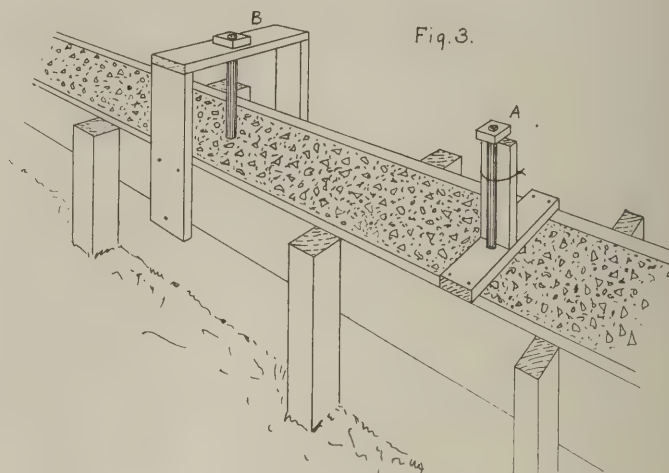
When fastening steel to concrete, the anchor bolts usually do not need to project more than an inch or so, or enough to just reach through the lower flange of the beam or the base plate of the column that is to be fastened down. The writer, however, remembers a concrete base for a steel smoke stack, which was 28 feet high, 10 feet in diameter at the top, and required six anchor bolts $1\frac{1}{2}$ inches in diameter, with a projection of over five feet. Work of this kind calls for special methods, but does not usually mean anything more than accurate measurements and care to see that once the bolts are correctly placed they are not knocked out of position. In this case two templates were made exactly alike. The

to anchor was 80 feet high, and weighed something like a ton and a half, particular care was taken that there should be no hitch during the work of raising it and lowering it into position.

Steel columns are frequently anchored to concrete piers with two bolts in diagonally opposite corners. Figs. 4 and 5 show two different methods of holding the bolts in

plenty of time for the cement to set, but the practice is not to be relied upon.

We come now to the placing of anchor bolts for fastening down machinery which is, undoubtedly, the most important work to be considered in this line. Sometimes these anchor bolts have to be set to measurements taken from a blue print, at other times they can be set to measurements taken



Other methods of using bolts in anchoring form timbers

position, Fig. 5 being the easiest to measure and place, but Fig. 4 being more economical of material and allowing more room for placing the concrete. This latter is an item worth considering when the top of the pier is small.

Timbers and other woodwork are sometimes anchored to concrete by driving bolts

directly from the machine. Where the anchor bolts are few and the arrangement is regular as, for instance, equally distant from the four corners of the machine, the bolts may be set from the center line of the form in almost any of the ways already explained in this article. If there are many anchor bolts, or the arrangement of them is irregu-

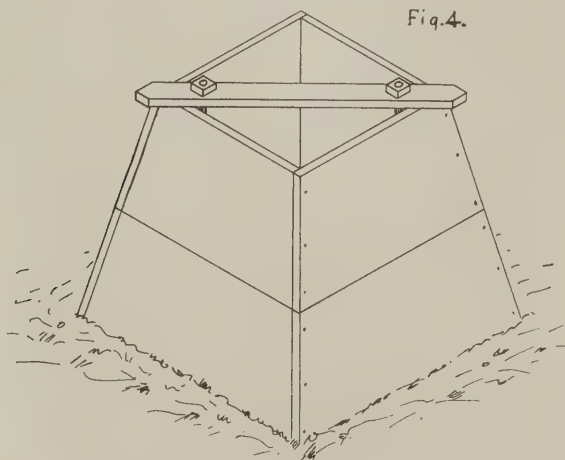


Fig. 4.

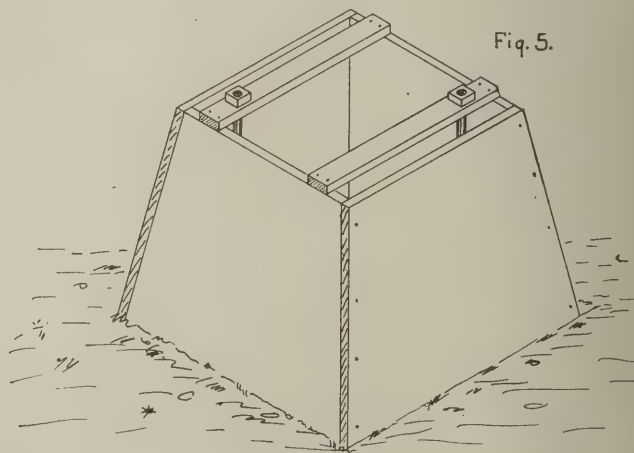


Fig. 5.

Showing two different methods of holding bolts in position

bolts were passed through suitable holes in the templates; one template was then suspended at the correct height above the form so that the nuts of the anchor bolts would rest on it, the other was merely raised sufficiently above the form to permit of placing the concrete. With the two templates fastened together, plumbed and braced in position, there was little danger of the anchor bolts getting out of place. As the steel stack which these bolts were

or large spikes into the lower side of the timber and embedding them in the fresh concrete as soon as the latter is placed. This scheme does well enough for rough work, but is not to be depended upon when anything like accuracy is desired, because of the settling that takes place in all green concrete.

Anchor bolts may be placed in old concrete by drilling holes in the concrete, embedding the bolts in cement and allowing

lar, the only safe way to place them is to construct a skeleton template of the base of the machine, bore holes through the template in the proper location for the bolts, and suspend the template over the form in the position the machine is to occupy.

If the machine is already on the ground, the template may be slipped under it and the holes marked directly on the template through the holes in the base of the machine. This is undoubtedly the safest

method, and was the method used by the old-time millwright in the days before interchangeable machines and parts of machines became so common. Then the bolt holes in the base of the machine were drilled wherever they came handiest, rather than to some prescribed measurement, as now.

Fig. 6 is intended to represent a plan view of one of these templates in place. The narrow parallel lines on the outside show the upper edges of the form, the wider parallels show the construction of the template, and the circles indicate the holes in which the anchor bolts are to be placed. If the template is large it may be necessary to brace the corners of it to keep it square. It may also be necessary to provide more supports to prevent it sagging. These matters are easily understood and arranged for by the man on the job. Dif-

poured inside the dam and under the base of the machine so as to bring it to a firm and even bearing.

After the cement has set, the nuts are screwed onto the anchor bolts, the top of the concrete base cleaned off and pointed up and the job may be declared finished. We ought, perhaps, to mention that the wedges or packing pieces used for leveling the machine should be placed underneath and out of sight as they are not removed, but remain embedded in the cement.

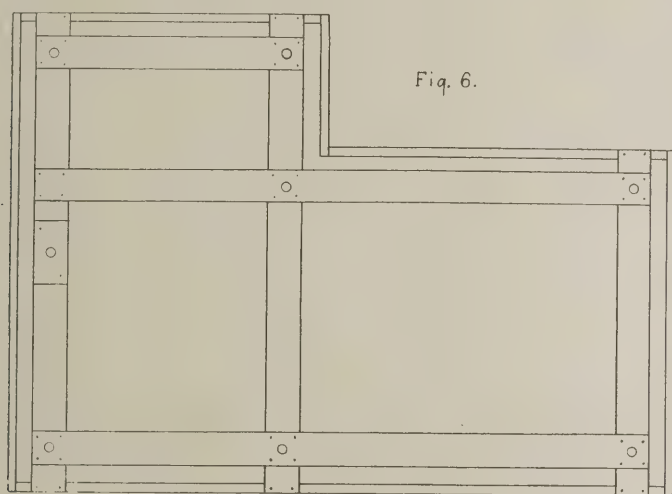
A Portable Electrical Drill and Grinder

A NEW combination portable drill and grinder has been placed on the market for shops and factories doing such work but not of sufficient volume to warrant the

load. A switch of the make-and-break automatic-stop type is located in the top handle, giving the operator full control. Aluminum castings and ball-bearings are used throughout. The machine, including the motor, is built complete by the manufacturers with a one year guarantee against electrical or mechanical defects. In case of the motor burning out for any reason within one year the concern agrees to re-wind it free of charge. The Wodack Electric Tool Corporation, 23-27 South Jefferson street, Chicago, are the manufacturers.

A Versatile Wood-Working Machine

A NEW woodworking machine is now on the market that operates from an electric light circuit and claimed to be a portable planing mill in itself, performing fif-



Plan view of templates in place

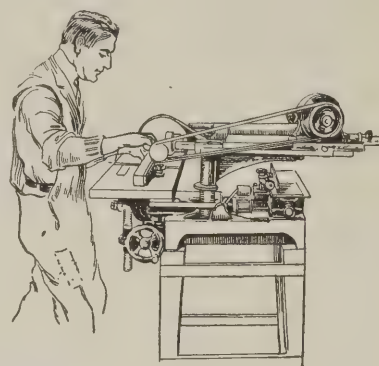
ferent heights for the anchor bolts are provided for as at A in Fig. 3.

While it isn't necessarily a part of this article, it can do no harm to include a brief description of the method of placing and anchoring a heavy machine when there is no crane or derrick available.

The piece of machinery is first skidded or rolled as near as may be to the side of the concrete base, and raised on blocking by means of jacks or pinch bars, until the lower side of its base is slightly higher than the tops of the anchor bolts. Timber, or other suitable blocking, is then piled on the concrete base to the same height and by means of steel plates or small rollers, the machine is moved over onto the concrete until the holes in its base come exactly over the anchor bolts. It is now merely a matter of taking out the blocking a little at a time until the machine is eventually lowered into position.

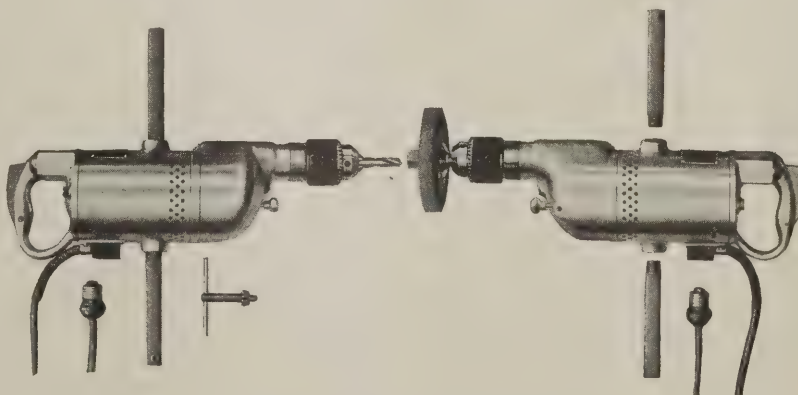
After this has been done the machine is leveled for level and brought to the correct height by means of small wedges. A dam of sand is then built on top of the concrete around the outside of the base of the machine, and a grout of cement and water is

purchase of separate machines. The new machine operates with a universal type motor on direct or alternating current of the same voltage, with a simple speed change from slow speed for drilling to high speed



A versatile woodworker that needs a name

teen different woodworking operations as it cross-cuts, rips, miters, grooves, rabbets, planes, bores, mortises, joints, dados, tenons, molds, bevels, and ploughs. The machine weighs 245 lbs., with base dimensions of 18x24 ins. and requires a bench space of 1 sq. yd. The Hutchinson Manufacturing Co., Inc., Norristown, Pa., wants a name for "the little fifteen" and offers a prize of \$100 for the best idea.



Portable electrical drill and grinder

for grinding. The drilling capacity is $\frac{1}{8}$ in. to $\frac{5}{8}$ in. in steel; used as a grinder it carries a 6 in. by $\frac{3}{4}$ in. grinding wheel. The complete weight of the machine is 18 lbs. and the motor develops $\frac{1}{2}$ h.p. under

HEATING TOO LONG REDUCES STRENGTH OF ANIMAL GLUES— Forest Products Laboratory tests show that the most favorable heating for animal glues is 140 degrees and less than 7 hours.

Slate as a Permanent Roofing Material

By Oliver Bowles

Mineral Technologist, United States Bureau of Mines*

Suggestions on the Nature, Uses and Application of Slate in Construction

DURING RECENT MONTHS the Bureau of Mines has conducted a detailed study of the slate industry with special reference to increased efficiency in its production, preparation and utilization. The results of these investigations will be incorporated in a forthcoming bulletin. The purpose of this preliminary paper is three-fold. One object is to bring to the attention of slate producers certain modifications in manufacture and classification which would encourage a wider use of slate. A second purpose is to direct the thought of roofers toward the importance of proper laying of slate, and the third object is to acquaint the general public with its enduring qualities.

Origin and Character

Without entering into any detailed discussion of the origin and history of slate, a subject to be covered in the bulletin mentioned, it may be of interest to the general reader to know that slate is originally formed from mud or soft clay, carried down by streams and laid down in successive layers in deep water. The pressure of superimposed materials gradually compresses the clay into a firm rock known as shale. In many places this shale was, during the succeeding ages, subjected to intense pressure and folding due to mountain-building forces within the earth. This intense pressure, together with high temperature, changed the clay into other minerals such as mica, chlorite and silica, which are very resistant to weathering, and also developed a very definite cleavage or splitting direction which characterizes the rock as slate. It is this property which renders slate of value for roofing, for, by using a broad chisel and a wooden mallet, a slate worker can readily split it into thin sheets which are later trimmed into rectangles of various sizes.

Possible Improvements in Manufacture and Classification

Slates should be graded and classified in such a way that the consumer will not be deceived by their characteristics. The most obvious error is, of course, the wholly dishonest practice of some manufacturers in designating slates with names

that definitely misrepresent their qualities. Instances have occurred where a purchaser requesting and expecting an unfading slate has been supplied with fading slates simply because the producer could not supply the desired quality and did not wish to lose the sale. Such operators commonly meet with failure after a brief and inglorious period of deception, but during the short span of their activities much harm has been done to the reputation of slate.

Aside from such practices, which are universally condemned by the trade, it is believed that a truer classification of the established grades would render slate more popular. For example, the professional roofer knows the changing effects of "sea green" slate, but the purchaser commonly does not know that the original color alters to various shades. Such variability in color is by no means undesirable, for it gives many beautiful effects, and such slates are much in demand. If the inexperienced purchaser, however, buys "sea green" slate with the object of obtaining a green roof, he will find that he has made a mistake. It would be better, therefore, to employ a more descriptive term for "sea green" such as "weathering green variegated." As the term "sea green" is long-established, it might be bracketed after the new term until the latter had become well known.

The term "variegated" when used alone also leads to confusion. It commonly relates to an unfading, but it may be applied to a fading slate. The experienced dealer knows that "variegated" is a mottled green and purple, but there is nothing in the term to convey this impression to the public. Would it not be better to have trade names that briefly and definitely describe the slates, and that give the purchaser reliable information as to whether the colors are fast or changing?

Slates from some localities are much weaker than from others. Weakness in the material results in excessive waste from breakage in punching, and in the frequent appearance of broken slates in the finished roof. It is a difficult matter to classify slates according to strength, for the slate of a given bed commonly varies greatly from point to point along its course, or at different levels beneath

the surface. As a protection to the public and to maintain a high reputation for slate it would seem advisable to conduct frequent tests of transverse strength, and to reject all slates that fall below a certain standard. Many products such as cement are sampled and tested frequently, and continued purchases are made only if the product conforms with certain fixed specifications. The slate dealer would do much to popularize his product if the same rigid tests were applied, and all slates that failed were summarily rejected. Some slate selling organizations now classify slates according to strength, and adjust prices in conformity with their relative qualities.

Aside from improvements in classification as suggested above, the Bureau of Mines has been led to believe that there are various other ways in which the slate producer could modify his operations so as to render slate more popular, and widen his market. In the first place he should endeavor to cater to the demands of the consuming trade in so far as such demands do not impair the quality of the product. One of these demands is for a thickness sufficient to prevent excessive breakage. In certain regions slate splits with great freedom, giving thin uniform slabs. As slate is sold on the basis of surface area, it is obvious that a slate maker can obtain greater returns from a block split into thin slabs than he can obtain from the same block split into thick ones. Also the weight per square is less, which involves lower charges for haulage. Consequently there is a tendency to make thin slates from free-splitting rock.

If slates fall below 3/16 in. in thickness they are likely to be so weakened that undue losses occur from breakage during punching and laying. While such breakage may involve the loss of considerable slate, there are even more serious aspects to the use of weak slates. The staging which supports the workmen while they place the upper courses of a roof must rest on the lower courses already finished, and its supports may break weak slates in these lower courses. Furthermore painters, window cleaners and other workers may at various times find occasion to stand on the roof, with resulting breakage

*U. S. Bureau of Mines Reports and Investigations.

of weak slates. Such breakages involve replacement of broken slates on the finished roof, which is somewhat difficult, and slates so placed are never as satisfactory as the original ones. The annoyance and expense involved in the use of weak slates has had a detrimental influence on the use of slate, and it is believed that if slate producers would maintain a thickness a little greater than 3/16 in. rather than less, the advantage gained from this better service to the consumer would be ample to offset the slight saving in material or in the freight charges involved in making the thinner ones. Rejections of orders have resulted from deficiency in thickness of slates, and it is much better to keep right up to standard or even to excel it, for a satisfied customer brings repeated orders, and a satisfactory roof is the very best advertisement.

Another way in which the manufacturer can render his products more saleable is to specialize on popular sizes. A slate maker can manufacture more squares of the larger sizes in a month than he can of the smaller ones, and there is a tendency to regard volume of production as an item of more importance than the manufacture of sizes that the trade demands. This is a mistaken idea, however, for with a surplus of large sizes and a shortage of moderate sizes in stock, the producer is finally obliged to see his customer seek other sources of supply. If the customer is by any means persuaded to take the larger sizes, he will probably be unsatisfied, and may not only cease to purchase from this particular producer, but may even turn to other types of roofing manufactured in standard popular sizes. It is better, therefore, to specialize on slates in lengths from 14 to 20 inches, even though the material is suitable for larger sizes.

The Roofer's Responsibility

In some instances slate roofs have not given satisfactory service, and it is important to point out the chief reasons for the failure of such roofs to fulfill the expectations of the purchaser. To secure a roof of high quality, part of the responsibility rests on the roofing contractor. The contractor's duty is to lay the slate on the roof in accordance with the most approved practice. It is commonly stated that any carpenter can lay slate, and many roofs are laid by inexperienced workmen. Slate roofs give much better service when placed by men who specialize in such work. For example, most carpenters in placing slates drive the nails "home" just as they would in securing wooden shingles, with the result that when the sheeting dries and shrinks the slates are cracked. A skilled slate roofer does not drive the nail to its full depth, but allows the slate to hang loosely.

Another common error is due to mistaken economy or, in some instances, even dishonesty on the part of the roofer, for in order to save slates he may give a head-lap less than the regulation requirement of three inches. As a result the roof may leak, not through any fault of the material, but through improper workmanship. The law in some states renders it illegal to place slate with less than a 3-in. head-lap.

Occasionally the nail holes in slates are punched by the manufacturer before shipment. However, the practical roofer usually punches the slates at the place where they are to be used, and during the punching process he selects them into three grades—thin, medium and thick. The heaviest slates are then placed near the eaves, those of medium thickness midway, and the lightest at the ridge, which gives a very uniform roof.

The art of laying slates involves many other important features, but the points referred to above are sufficient to indicate that a grave responsibility rests on the roofing contractor. Upon him, to a great extent, the reputation of slate depends, and his efficient and honest service is reflected in the satisfaction of all those who may be sheltered by the roof of his construction.

The Enduring Qualities of Slate

No practical roofing material has yet been found that can excel natural slate for permanence or satisfactory service. In judging the permanence of a roof, the age of the building it covers is commonly regarded as being the age of the roof, but this may not be a true criterion. It is reported that in the Peach Bottom slate district of Pennsylvania and Maryland the same slates were used on seven successive buildings during a period of over 100 years, and in England slates have commonly been moved from one structure to another. American history covers so brief a period that it can properly record only the initial stages of the life of a slate roof, and on this account multitudes of people have little conception of the actual period of useful service a slate roof is capable of rendering. Consequently one must go to the old world to obtain records of real value. In England and Wales and in France many buildings constructed in the 15th and 16th centuries were roofed with slate, and the roofs are still in excellent condition. There is a record of a chapel in Bedford-on-Avon in Wiltshire, England, roofed with slate in the 8th century, and after 1200 years of climatic exposure the roof is moss-covered but in good condition.

Every householder knows that a leaky roof not only is a source of continual annoyance, but that it seriously impairs the walls and ceiling, and probably the

contents of the structure that it is designed to protect. In the first place, therefore, it is well to point out that properly manufactured slates laid according to established practice on uniform and strong supports of moderately steep pitch will provide a roof that will not leak. Furthermore, as pointed out in earlier paragraphs, a roof so constructed will maintain its quality for very many years without any repairs or treatment other than the occasional replacement of a broken slate. A more general recognition of the inherent qualities of slate would no doubt lead to its wider use, for, while the first cost is greater than that of many types of roofing, the low maintenance and replacement costs render it an inexpensive roofing material when long service is considered.

With so many available convincing records of the durability of slate roofs, it is somewhat surprising that so many permanent homes and other structures employ less enduring roofing materials. This is no doubt due in part to the lower cost of the more temporary types, and in part to the aggressive advertising of competitors.

The modern tendency toward speculative building has a similar influence, for structures built to sell are commonly covered with the cheaper and less durable types of roofing. A wider knowledge of the excellence of slate on the part of the purchasing public, and a growing demand for roofs of standard quality would tend to discourage the use of roofing that from time to time must be repaired or even completely renewed.

The Bureau of Mines makes no claim that slate is the only permanent roofing material. There are various other types of mineral roofing that are enduring and satisfactory, but the bureau has not yet been able to undertake a special study of them.

Summary

Efficient and painstaking workmanship is one of the surest roads to success in any slate manufacturing enterprise. The sacrifice of quality for volume of output may give larger returns for a limited period, but excellence in the product is a fundamental requirement of a permanent business. Throughout the slate regions of the United States the selling agencies are constantly receiving orders with the proviso attached that they must be filled only by certain reliable companies which have given dependable service in the past. Careful workmanship and true classification of products by the manufacturer, together with honest and efficient service on the part of the roofer, would go far toward establishing slate in its rightful place as an attractive and permanent weatherproof material adapted for universal use.

Concrete Block and Tile Construction

This is the Sixth Article of a Progressive Series Begun in February, 1921—
Questions in Regard to Concrete Block and Tile Construction Will Be
Answered by Mail and Also in this Department

STOCK or normal length concrete block usually consist of whole, half and quarter block. Although blocks other than the half and quarter lengths can be obtained where demanded, a considerable saving of time and money can be made by adhering to these lengths.

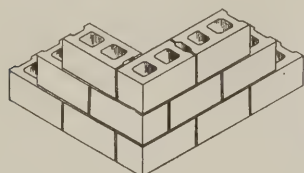


Fig. 17—Corner construction of hollow one-piece block, where block of thickness equal to half full length are used for the entire wall. The corner block are of same dimensions as the full size wall block

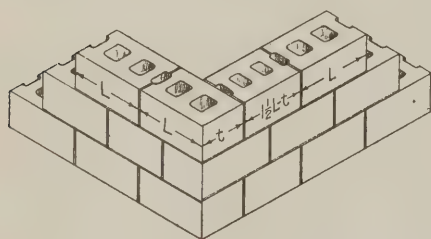


Fig. 18—Corner construction where wall thickness is greater than half the length of the full size wall block. A normal corner block and a special block of length equal to $1\frac{1}{2}$ times full length less wall thickness is used. This construction is only applicable where the wall thickness is constant from bottom to top, as in one-story buildings

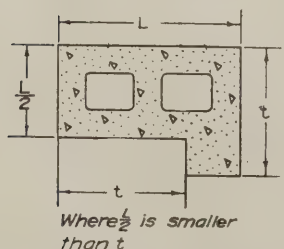
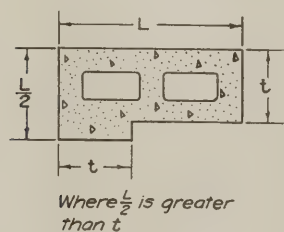


Fig. 20—Special reversible corner block for use in case where the wall thickness is greater or less than half the block length. Only one special per corner is required in each course

Corners

One of the first practical problems encountered by the builder with blocks is making the proper return at the corners. In simple construction, where hollow one-piece type blocks of a single thickness equal to half the length are used from bottom

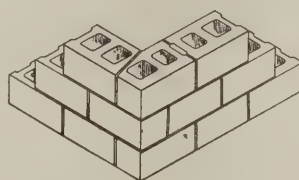


Fig. 19—Special corner block in common use where the thickness of the wall is greater than half the full block length. This system has the disadvantage of requiring two specials in each course at each corner, but is otherwise quite satisfactory

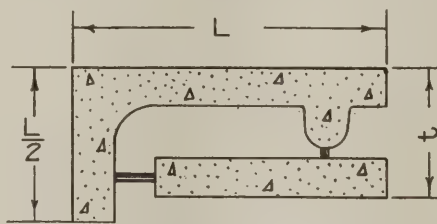


Fig. 22—Special corner block for the Bradstad system

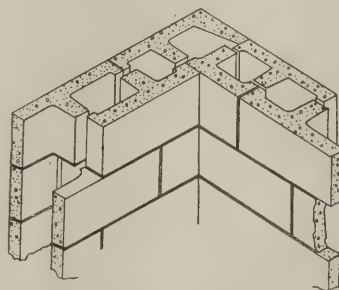


Fig. 23—Hydrostone system corner construction for double walls. Where single wall hydrostone is used, the construction is as shown for the outer wall

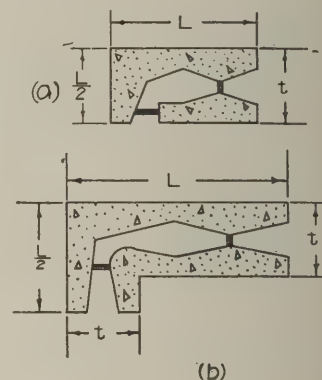


Fig. 21—Corner blocks used by the Anchor two-piece block system. (a) Is used where the thickness of the wall equals half the length; (b) where the thickness of the wall is less than half the length, and (c) where the thickness is greater than half the length

to top, the return is normal, only requiring the standard full size corner block, as shown in Fig. 17.

Where the walls are of block of the same thickness from bottom to top, but the thickness of the block is greater than half the length, the method shown in Fig. 18 may be used, employing a normal full length corner block and a special block the length of which is $1\frac{1}{2}$ times the full length less the thickness. The prevailing types of corner block used in hollow one-piece block construction, where the block thickness varies in different parts of the structure, are shown in Figs. 19 and 20.

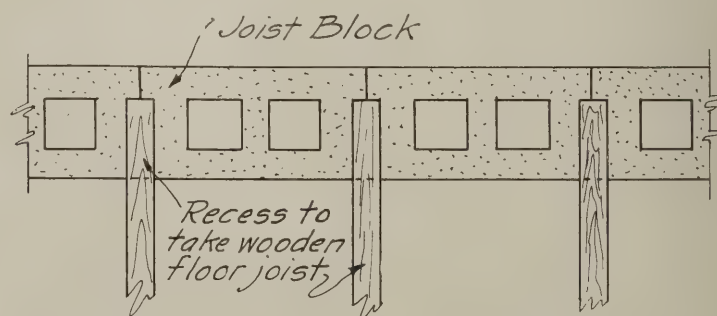


Fig. 24—Method of seating wood joists, using special hollow joist block

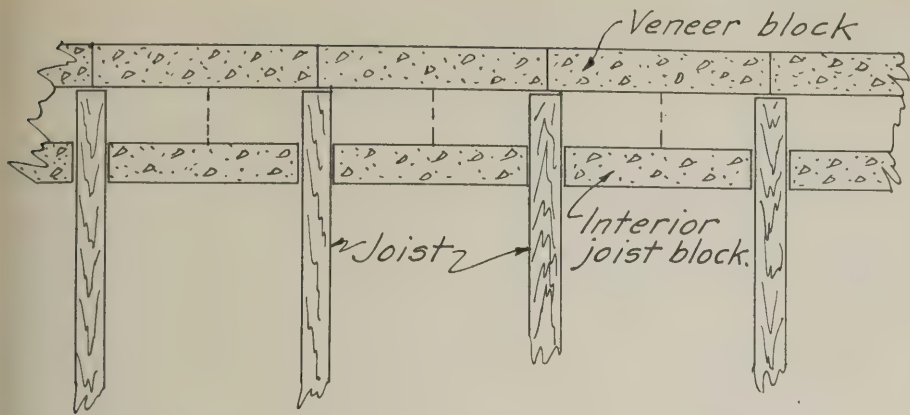


Fig. 25—Method of seating wood joists, using veneer and special joist backing block

Corner construction with the two-piece type of block differs somewhat with each system of block. Fig. 21 shows the three typical corners for the Anchor system, Fig. 22 the normal corner for the Bradstad and Fig. 23 normal corner for the Hydro-store system.

Support of Joists, Beams and Slabs

The usual method of supporting floor and roof joists in the hollow one-piece block systems is as shown in Fig. 24, al-

though equally satisfactory results are accomplished by the means shown in Fig. 25, which is commonly used in connection with the two-piece block systems. The special joist block shown in Fig. 24 are, in several

systems, simply the normal full length (16 in.) wall block with the inside end lugs omitted. Joists in such cases are seated either on a course of solid block or on $\frac{3}{8}$ in. steel plates sufficiently large to distribute the load so that a hollow or two-piece wall is not required to carry more than 167 lbs. per square inch of area. (See standard specifications for block, paragraph 8.) These methods are illustrated further in Figs. 26 and 27.

Beams of steel or concrete are seated very similarly to wood joists, but in the case of the latter, some simple means of anchoring the ends of the beam reinforcing into the block wall are often used. The construction below the beam is often of hollow or two-piece block, leaving spaces to be filled with concrete in which the ends of the beam reinforcing are imbedded. Fig. 28 shows form for a concrete floor beam and space left to key the beam into a wall of two-piece construction.



Fig. 28—Forms for concrete floor beam, showing recess left in block wall to receive the beam

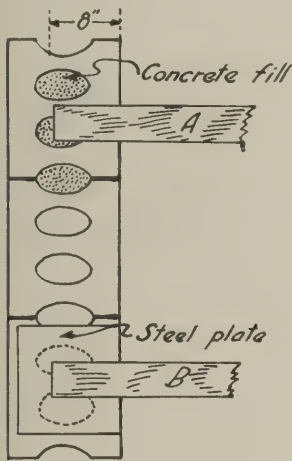


Fig. 26—Joist A rests on a hollow block made solid by filling with concrete; joist B on $\frac{3}{8}$ -in. steel plate. Each method is satisfactory

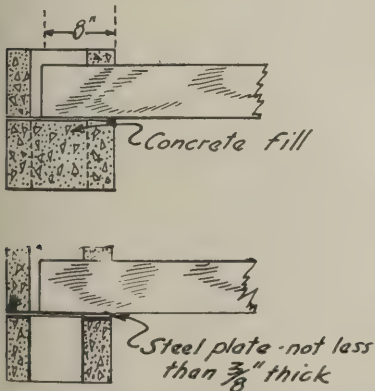


Fig. 27—Wood floor joists are properly given 8 in. of bearing on the solid block or steel plates, and never, even with light loading, less than 6 in. of bearing

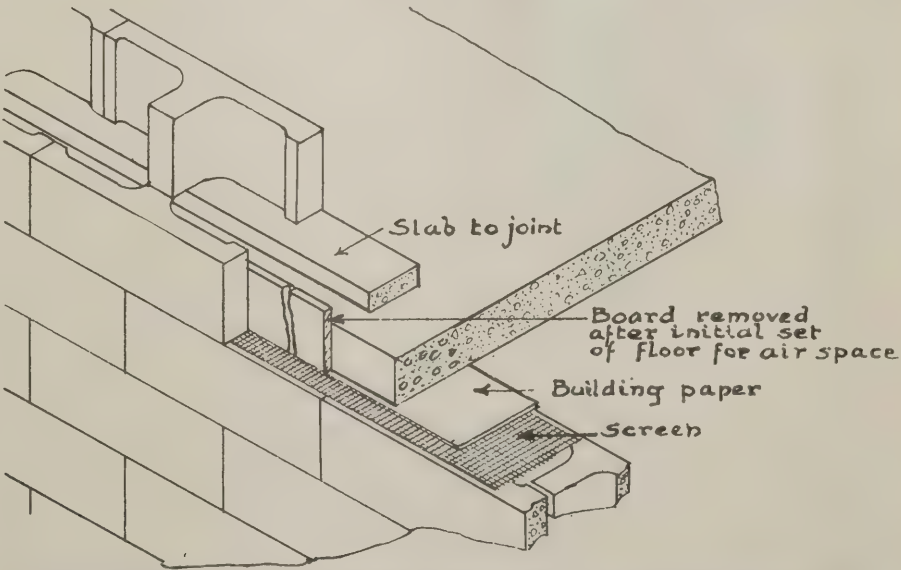


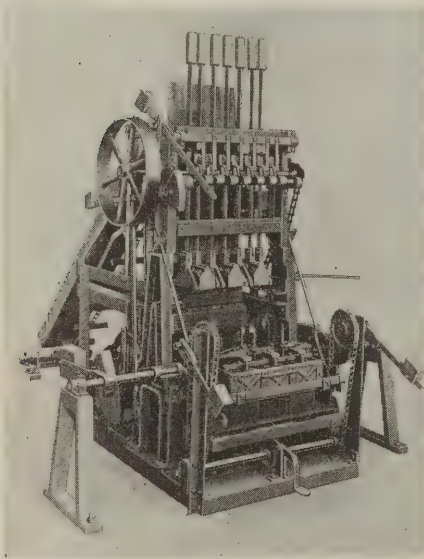
Fig. 29—Concrete floor slab supported on inner wall of a two-piece block system. The construction is practically identical where the walls are of hollow one-piece block

The prevailing method of supporting concrete floor slabs is as shown in Fig. 29. In the hollow one-piece systems, the slab is generally given bearing on the inner two-thirds of the wall, such bearing being at least 6 in. in width. Veneer block are then used on the outside surface of the wall, and a space of half an inch or more left between wall slab and veneer block. Architects very commonly take advantage of the opportunity of producing an artistic belt course with these veneer block, which are not necessarily of the same height as the standard wall block. That part of the floor resting directly on the wall may be increased in thickness as need be to equal the height of the veneer block.

(To be continued.)

An All-Automatic Concrete Tile Machine

A NEW concrete tile machine completely automatic and therefore of continuous operation takes the concrete fed into the conveyor at the back and only requires the operators at the front to insert empty pallets and carry them away filled with tile. While an empty pallet is being exchanged for a full one, the machine is making the next batch of three tile. Tile of many



All-automatic tile machine

dimensions can be made without it being necessary to purchase additional pallets, changes in the mold box and tamp feet giving this flexibility. The 5 by 8 by 12 in. tile is considered the standard size, but tile 5 by 4 by 12 in. and 5 by 12 by 12 in. are frequently used and can readily be made. The tile are made with the cores vertical and delivered with the thick side down, enabling a wet mix to be used. The new machine is the product of the Ideal Concrete Machinery Company, Cincinnati, Ohio.

Hollow Walls

By CHARLES CRESSEY

Owing to the Present Great Interest in the Ideal Wall, the Accompanying Expression of Views Was Sent, Before Publication, to William Carver, Architect, One of the Factors in the Development of this Type of Construction, and His Reply to this Article is Appended

THERE is need, I feel sure, that someone interested in brickwork should voice a mild depreciation of the enthusiastic claims being made by advocates of brick-on-edge hollow walls. Is it good policy to obscure the real merits of rowlock construction (such as economy, light weight, noise resistance and insulation) by giving first importance to the very doubtful merit of the wall as a form of damp-proof construction? The chief object presumably, of the country-wide publicity being given to this type of brickwork, is to feature the use of common bricks and not to boost this particular class of wall to the detriment of other systems. It is of first importance in good advertising to be sure of the facts in making recommendations to the public, and I can only say as a purely personal view, following extended experience with cavity walls, that a rowlock-built hollow wall is not damp-proof construction either in principle or fact, and should on no account be adopted where weather resistance is of first importance, unless some additional protection is arranged for. Others no doubt can quote this or that example of rowlock work which is giving good service under exposed conditions. I respect contrary views based on sincere experience, but so far I have always found rival conditions to exist, to dispute any claim to monopoly of damp resistance in rowlock walls examined. Again I know of some examples of damp brick-on-edge work, which verify every expectation of failure based on my previous experience in hollow construction. The reasons for failure are simple and inevitable, and are best understood by comparison with a good example of cavity wall, which has proved its claims to standardization by long years of service under all conditions of weather. I refer to walls of various widths, the outer skin of which is a half brick on bed, disconnected from the inner main wall by a 2-in. space and tied only by special galvanized wire or twisted flat metal bonders which provide only a thin vertical edge across the cavity. The cavity is continuous all ways and is unbroken except for the metal ties (spaced one to each square yard). There is thus a nearly absolute separation of the exposed exterior from the interior walling and the weathering properties are beyond dispute, unless by carelessness those very features are provided which I believe will discredit rowlock work, if its foster fathers do not mix zeal with discretion. In the

true cavity wall, a bricklayer will at times allow projections to partly cross the space from one or both sides, and mortar droppings will complete the connection for the passage of moisture. Again, droppings will stick on the metal ties with similar effects, but this risk is remedied in good work by boards within the cavity, laid on each row of ties until the wall is raised ready for the next row, when by lifting strings provided, the boards and droppings are raised and the joints are automatically cut clean by the edges of the wood strip. At various times I have had to cut openings to investigate damp spots in an otherwise dry wall and have always found the expected chunk or brick, or mortar collection to be responsible. A good superintendent will usually watch for these troubles and dislodge the droppings by using a long stick, afterwards taking care to have the bottom cleared by means of the hand holes provided in advance. This accumulation at the bottom is a fruitful source of trouble if neglected. There are advocates in each of the camps favoring ventilation or non-ventilation of cavities in hollow walls, but I think that sealed spaces are mostly preferred for all-round practice. One original builder I knew used temporary wall ties of cross grained wood on ordinary two-story work. After the wall was well set he would swing a long floor board within the cavity, smashing every lath tie, ultimately clearing away the fallen scraps at the bottom of the wall. Yes, his walls were quite dry and I never heard of a collapse, although I hesitate to advance his methods except to convince the rowlockers that one earnest man at least thought an unbridged cavity of first importance. In practically all brick-on-edge work I have seen, the mortar dropping condition is an offense against reason, if damp resistance is seriously desired, but even where nothing but the brick bonds cross the cavity, what is there but blind luck to ensure dryness when every brick is a carrier by absorption, or by surface conductivity if exceptionally hard burned? I know case after case of dampness where condensation alone dripping on brick bonds has disfigured the interior decoration in a pattern of spots. It is somewhat of a paradox that the small damp resisting qualities possessed by the hollow wall with header bonds should be due chiefly to the porosity of the bricks used. That is to say, that, like a common brick solid wall, there is always a certain capacity of absorption before the

interior surface is affected. The same wall built of denser bricks will often leak sooner, on account of concentration of surface water, and the lack of adhesion of mortar and brick causing water runs into the body of the wall. If rowlock men want to go one better than their present best, why not cross-bond in the fifth course only, as in common solid wall bond, and use fewer headers in the bonding course at that. It would surprise many who are unfamiliar with cavity walls, how little cross bonding is required where the wall is well stayed whilst green. Numerous pages would be necessary to present the well tried methods of damp-prevention at heads, jambs and sills in cavity walls and the precautions necessary at the wall base, floor bearings and roof plates. The anti-damp crusader must be alive on his job from start to finish to beat his enemy, but there is no doubt about a hollow wall being worth the effort when well done. More attention could be given to this class of work with profit as apart from damp prevention. There is a conviction in my own mind that extravagant waste of good material occurs in ordinary brickwork methods where load carrying is of minor importance. If properly studied, modernized brickwork could take a much more prominent place in building on grounds of pure economy.

REPLY FROM WM. CARVER, ARCHITECT

The Ideal wall was conceived and developed by the Common Brick Manufacturers' Association to provide a lower cost brick wall construction. Before being offered to the building public, prominent architects and engineers were asked to criticize it and a favorable opinion was expressed in each case on the theory of its construction. This theory, as regards its quality of remaining dry, may be briefly stated as follows:

Very little moisture can be conducted along an ordinarily hard burned header brick crossing a cavity, either by capillary attraction or surface conduction, providing the joints in the outside skin or web are properly filled with mortar. In case any moisture should reach the portion of the headers within the cavity, the slight constant circulation of air within the cavity tends to dry them out. This circulation of air must occur whether or not the cavities are stopped at each floor, the natural slight air leakage of any kind of masonry construction permitting the infiltration of a small amount of air, which in addition constantly rises within the cavity on the warmer side and falls on the cooler side.

Reasoning at first purely from theory, it was considered that this movement of the air would keep the interior surface of an interior wall dry in anything but very extreme conditions. The question of mortar droppings was also considered, and it was demonstrated that should the bricklayer be ordinarily careful there need be but little mortar allowed to drop down within the

cavity, and owing to the large proportion of headers, practically none of this slight amount of mortar would reach the bottom, and it was considered that the slight current of air mentioned could be depended on to keep the headers dry even though a little mortar were dropped on them, if the bricklayers were reasonably careful. So far, we were theorizing only, but wrote the following paragraph, which is incorporated in our literature on Ideal wall (Par. 78, page 16, "Brick—How to Build and Estimate"): "Reasonable care should be used by the mason to avoid dropping mortar inside the wall cavity. The bricklayer should be instructed regarding this, in order not to defeat the purpose of the wall by affording contact with the inner and outer webs even at this point."

Before taking the responsibility of recommending this form of construction to the building public, however, our investigation was extended to find whether this construction had been used before, and we were pleased to find that not only were there many instances of its employment but that in every such instance we could find the wall had given satisfaction. The wall has been actively promoted since the spring of last year and during that time thousands of Ideal wall dwellings and other buildings have been built. It will be conceded that an ounce of experience is worth a pound of theory, and out of the multitude of buildings thus erected only two cases have come to our attention in which dampness has appeared on the inner surface of the walls, and in each of these cases the cause was found to be due to the fact that the roof construction at the eaves was faulty, allowing water to get in at the top of the wall. Both these houses were in the neighborhood of Los Angeles, and the trouble occurred after the long continued and torrential downpours which mark the rainy season of California. Not only has there been an absence of complaint, but we receive letters constantly from people who have used this wall and who find it entirely satisfactory. To give only one typical instance here—the following is quoted from a report by Theodore A. Meyer, architect, referring to two Ideal wall houses designed and superintended by him at Dobbs Ferry, N. Y.: "These houses have attracted a great deal of attention and favorable comment from the architectural profession. . . . During the construction, in very hot weather, heavy thunder showers were frequent, but the top of the walls were always protected with planking. After the roofs were on it was observed that the walls were dust-dry after the most heavy rains and it was observed that the outside walls dried out in from three to five hours after the most drenching rains. As an extra precaution, a dampproofing compound was applied to the masonry without furring, excepting in one instance, where, for experimental purposes, 6 sq. ft. were left without the damp-proofing. Observations made after heavy rains since the plastering was completed

have disclosed no difference in that portion."

A few other favorable comments from builders who have used this construction were published in the February number of the NATIONAL BUILDER.

Any good system of doing work will, if carelessly and improperly performed, give trouble. That is always to be expected. The very few cases of trouble experienced with this wall and the large number of successful jobs prove that, if ordinary care is used, the Ideal wall is as sound and satisfactory in performance as can humanly be expected.

"Own Your Home" Expositions

HOUSES "in the raw" in the form of bricks, of piles of lumber, or barrels of cement, with a roll of blueprints may be seen with the mental eye of the builder, but to the average citizen it is all a mess and a jumble of junk.

To enable the prospective house buyer to see a house "as is" the building material must be put together in the form of a house or in sections of a size and character that expresses its appearance, use and merit as a structural entity.

Then comes the matter of plans and costs and all the comparisons to meet the personal conditions and the purse of the prospective buyer. From the A B C of construction to the elaboration of interior finishing, the citizen "wants to know and wants to be shown."

Therefore the "Own Your Home" shows by getting to the root of the matter in stimulating interest in home-owning, in showing how homes are made by a great variety of methods and materials and in varieties of plans to suit a variety of conditions, and also by supplying information on values, prices, actual and comparative; and showing how and where and under what conditions to obtain the means to finance the building of a home, has been a powerful influence in breaking "buyers strikes" in home buying.

The second annual Chicago Own Your Home Exposition will be held at the Coliseum, beginning March 25 and closing April 1. It will form the fourth annual exposition in New York, April 22 to 30.

Several dates have been set for the American Building Exposition at Cleveland, Ohio, but have been deferred from month to month as the estimates on the completion of the new city auditorium in which the exposition is to be held, have proved more or less premature. The last call comes after Mayor Kohler had insisted that the auditorium must be completed to the last detail before the building could be used. The date now set is about April 18.

Meantime Los Angeles is having a "house beautiful carnival," and in similar ways elsewhere the public is being educated as never before in how, what and where to build.

English Manor Style Represented in Community Court

By Charles Alma Byers

THE general appeal and utility of the community court idea, from the standpoint both of owner and of tenant, have become quite commonly recognized. To the investor, for instance, the community court represents an economical building idea, especially in respect to conservation of ground

besides a total of ten garages. The explanation is, of course, that two of the buildings are comprised of four apartments each and the remaining three of two such divisions each. All of the apartments, each possessing its own individual entrance, naturally face the attractive formal garden

grouped about a turntable and cement-paved courtyard, occupy a rear corner of the plot, and are reached by a driveway extending inward from the street along the left-hand side of the court ground.

In architecture, the buildings of the court are representative of the English manor



An attractive community court designed in the English manor style. Arthur S. Heinemann, architect

space, and also affords him the opportunity to so improve his property, if he wishes, by unit or installment construction, as funds are made available. And to the tenant, it offers the more common advantages of the ordinary apartment house combined with a degree of the privacy of the private residence.

The community court illustrated herewith, as a presentation of the idea, is of quite exceptional interest. It primarily invites attention, of course, as an unusually attractive and economical specimen of court designing, but, in addition to that, it introduces a style of architecture that is also uncommonly interesting.

The court occupies a plot of ground equivalent to about two ordinary city lots—a plot, in other words, with a street frontage of 130 feet and an irregular depth graduating from 191.35 feet on one side to 211.58 feet on the other. It possesses, as will be observed from the plan, but five detached buildings, or units. However, fourteen complete living apartments, of from four to six rooms each, are provided,

around which the buildings cluster, and the ones located on the sides are duplicates, except for a reversal of the arrangement, of the ones opposite them. The garages,



Detail of entrance of the rear house

style. The adaptation has been especially well handled, particularly in respect to a realization of the style's general characteristics, and the court's ensemble effect is therefore decidedly attractive and pleasing. An exceptionally interesting feature of designing and construction is the modified "thatched roof effect" that has been carried out in the buildings with ordinary wood shingles.

The buildings, including the outside or main walls of the garages, have an exterior finish of cement-stucco, applied by the "cement gun" process, over metal lath and frame construction. The framing material consists of Oregon fir, well braced and substantially nailed, and the metal lathing is fastened directly to the studding, over sheathing paper. There are no basements or cellars. All foundations are of concrete, and all entrance porches are floored with cement-surfaced concrete, while the walks and steps are likewise of concrete and cement. Brick, however, is quite liberally introduced for masonry trimming, notably about the entrance porches and for surfac-

ing the walls underneath the two window bays. Brick is also used mainly in the exposed construction of the two outside chimneys of the front houses, which chimneys are prominently revealed to street view. The other chimneys, incidentally, are built of brick but surfaced with stucco.

An effective treatment accorded to some

"thatched roof effect" which is so attractively employed in these houses. Here, instead of being applied to the entire roof surface, as is frequently the case, the effect is practically confined solely to the roof edges. The edges at both eaves and gables are, it will be observed, designed with a rounded or rolled appearance, quite natur-

for the rounded eaves. The demand for roofs of this kind has led to the making of stock shingles especially prepared for the purpose, which at least are obtainable in some cities. In this case, however, the shingles, which are pine, were prepared on the job, which was done by giving them a very thorough soaking to make them suitably pliable. The same result is, of course, also obtainable by steaming. As to the "waves" or irregular lines produced in the courses, that is accomplished by shearing off the butts to make them conform to the desired effect. Wooden shingles laid over a curved surface, in this manner, must necessarily be very liberally or securely nailed, to prevent them from yielding to their natural tendency to straighten out when they become dry.

Another character-giving detail in the designing of the roofs of these buildings is comprised of the clipped gable peaks, which will be found illustrated in the photographs. This is a treatment that seems to be especially appropriate where the thatched roof effect is employed.

In studying the accompanying floor plans of these court apartments, the liberal introduction of closets and labor-saving and space-saving built-in features particularly deserves to be noticed. Not only does each bed room possess a good wardrobe closet, but there generally is a closet either off the living room or in an adjacent hall for wraps, and also frequently a closet in a hall or elsewhere for linen. The built-in



The row of houses on the right-hand side

of the exterior wall space that deserves notice is comprised of a simulation of the half-timbered effect. It is really employed to a quite limited extent, being in evidence, in fact, in only three or four places, and hence only to the degree of furnishing pleasing variation. It, for instance, will be observed to be in use for finishing the second-story walls of one of the front houses and of the one near the rear on the opposite side, and here on the front walls only. A street-exposed group of windows of one of the front houses, however, also introduces a suggestion of the half-timbered treatment, in panel form.

The outside woodwork, including the half-timbering strips, consists of Oregon fir, like the framing. The houses are provided with quite an unusual number of windows, universally characterized by small panes, and they are for the most part effectively arranged in groups. Further, several of them are of the casement type, hinged to swing outward.

The exterior color scheme carried out in the court is also uncommonly attractive. The stucco of the walls is a light tan shade, and the woodwork or trimming is done in a deep lead brown, while the roofs, which are marked by considerable irregularity in elevation and pitch, are painted a dark straw color. The cement work, represented in the walks and the flooring of the entrance porches, is naturally light gray, and the brick used in the masonry trimming is of the blue-red kind.

Perhaps a few words deserve to be incorporated here in special reference to the

ally resulting in a roof suggestive of unusual thickness. Moreover, the shingle courses here are productive of irregular lines or "waves." To produce this rolled



"Manor Court," looking from the rear toward the street

appearance, it is necessary to give both the gable edge or verge and the rafter ends at the eaves a rounded-off convex surface, furred fashion, and then to utilize narrow shingle lath to give a nailing surface. The shingles naturally require curving—with the grain for the gable roll and across the grain

features include, in every instance, a roomy lot of cupboard space, the customary sink and various other conveniences in the kitchen, and, in most cases, both a medicine-case and a linen cabinet in the bath room. Each apartment is, invariably, also provided with a disappearing or cabinet



Detail of stairway to the roof of the garage, with tool storage underneath

ironing-board, either in the kitchen or on the rear-entry porch, and further with a stationary laundry tray on the back porch.

The usual dining room is, in a number of the apartments, omitted. Where this is the case, either in or directly off the kitchen, there will be found a special breakfast corner or alcove equipped with the customary stationary table and seats; and in the living room, to fit it for serving on occasion as dining room also, there is a built-in china-cupboard. Other built-in features, variously distributed, include living-room bookcases, dining-room buffets or china-cupboards, draught cooler-closets in the kitchen, and so forth.

The interior woodwork throughout, in all apartments, consists of clear Oregon pine or fir, variously finished. In the living rooms and dining rooms—where the latter division is provided—the finish is in a wood stain, which, as to color or shade, is more or less varied for the different apartments. In the bed rooms and halls the finish is generally in old ivory or light cream, and in the bath rooms, kitchens and breakfast nooks it is universally in white enamel. All interior walls are, of course, plastered, and those of the living rooms, dining rooms and bedrooms are, in most instances, papered, while in the kitchens and bathrooms they are finished in wainscot effect with a smooth, hard plaster coat which is enameled like the woodwork. The plastered walls elsewhere are tinted. Oak flooring is used in all living rooms and dining rooms, and in the first-floor halls, and the pine floors prevail in all other divisions, including the bathrooms.

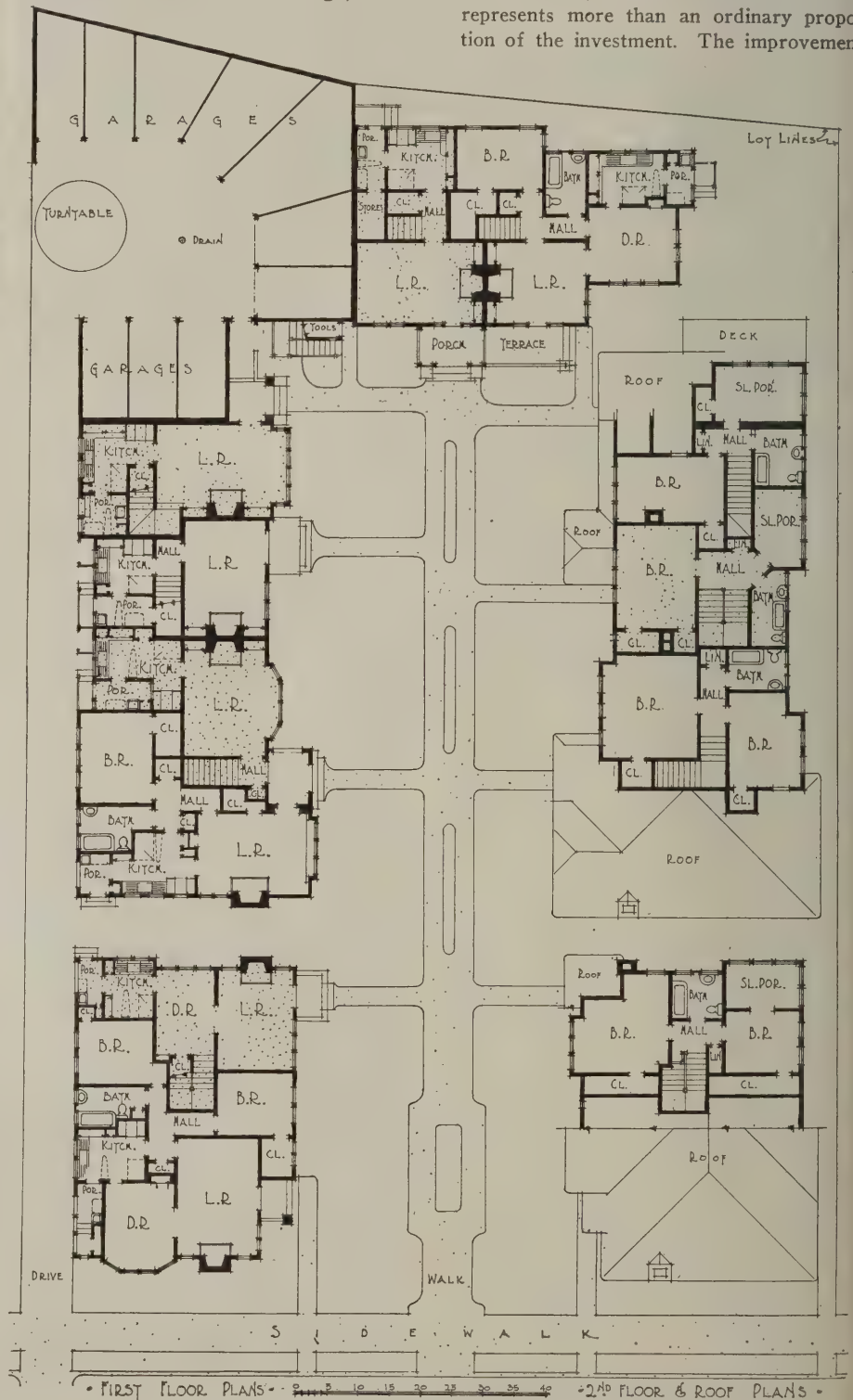
Each apartment is provided with a fire-

place located in the living room, which is mainly of brick construction and finish. There being no basements, the heating system, instead of being of the more common hot-draught or hot-water kind, consists of built-in gas radiators, which are placed in the floors of the principal rooms.

The apartments are equipped with all modern conveniences, in the way of gas, electricity and running water, and each also possesses an individual water heater attached to the running-water system. The fixtures, both plumbing and electrical, are attractive and modern in design, but of

inexpensive "stock" makes.

This community court, named "Manor Court," because of its style of architecture, is located in the Hollywood suburb of Los Angeles, Calif., and was designed and built by Arthur S. Heinemann, architect and builder of that city, for Dr. John Storer. It was built during the early part of the war, just before the material advance in building costs, and, exclusive of the furnishings, represented a total investment for ground and buildings of about \$75,000. The location, however, is in a quite expensive neighborhood, with the result that the land represents more than an ordinary proportion of the investment. The improvements



English manor style community court. C. A. Byers

would probably alone cost in the neighborhood of about \$70,000, if made today.

There remains still another feature in the planning of this community court that doubtless deserves to be brought to notice. It is, of course, quite necessary that there be provided for homes grouped in this

manner some means or place for drying washed clothes. In this case, such a place is provided by using the roofs of the garages. The roofing of them is flat and of several plies of roofing composition. And to reach the place there is a specially designed stairway, of quite attractive design-

ing and construction, planned as an attached feature of the house in the rear. A detail view of this stairway is shown in one of the illustrations. And underneath the higher part of the stairway and the landing at the top, incidentally, is a special storage for garden tools.

How to Finish Floors

By A. Ashmum

IN most respects the filling and finishing of a hardwood or softwood floor differs little from that employed in the finishing of the woodwork of a building. There are two items of difference, however, to be noted; namely, that as the floor may be subjected to the use of water the finish varnish must be water resistant, and the filler must be the best only, such as we find in silica filler. In the following article I shall endeavor to give the best method of finishing both hard and softwood floors.

Say we have an oak floor. Fill it full and plenty with best silica wood filler. Let it stand 10 or 15 minutes, then rub off with burlap or tow, across the grain of the wood. Let the job stand about 24 hours, then sandpaper it smooth, using a medium sandpaper not too coarse. Dust off and apply a coat of thinned copal varnish. Sandpaper again, then apply one or two coats of best floor varnish. If the finish is to be with wax, apply two coats of good rubbing varnish, rubbing the first coat with curled hair to remove the gloss, and the second coat with flour pumicestone and water. Clean up with water, let it dry, then polish with prepared wax.

Copal varnish gives the best surface for waxing on. Sometimes the raw wood is waxed, applying two or more coats of wax. But such a job will not endure as long as one done on a varnished surface. Wax is not a durable finish, though one which is easily renewed or renovated, and it does not require a skilled worker to do it. Water is fatal to wax finish, but protection is afforded by coating the wax with a very thin mixture of best copal varnish, six parts; boiled linseed oil, six parts, and turpentine, 10 parts. This preparation will not alter the wax effect.

Another good, dull wax finish is made by melting one pound of wax in a quart of crude petroleum oil, to be applied with a bristle brush. It dries, or rather sets, rapidly.

A hard pine floor looks well when first coated with shellac, followed by a coating of wax, which may be rubbed to a polish. Or you may first apply a coat of raw linseed oil, well rubbed in, then in course of about one hour give it a coat of shellac. Or you can give it two coats of shellac on the bare wood, the last coat rubbed to a polish.

Bathroom floors and floors of entrance rooms and kitchens should not be waxed. Parquetry floors are usually finished with shellac, as this preserves the natural color of the wood and if any other finish is applied over it there will be no altering of the natural wood color, for the shellac will keep out any other coating.

Varnish is the best for floors that have hard service; hospitals and similar public buildings require floors which are easily cleaned up and which will not wear away readily, and a good hard copal floor varnish is the thing to use. If such a floor is properly cared for it will wear for years. Milk is a good dressing for a varnished floor; wipe it up with skim milk occasionally.

When a new hardwood floor has been waxed it should be allowed to dry out over night before being rubbed to a polish, but an old floor may be waxed and polished at one operation. A woolen rag is useful for rubbing the wax, but the weighted brush is to be preferred.

Never use water, benzine or naphtha on a waxed floor. To make the wax thinner add turpentine, and to remove old wax from a floor use turpentine.

Waxed Floors

Wax finish made from beeswax and thinners will give a soft finish but one requiring frequent renewals. To make a harder and better wearing finish add some paraffine to the wax mixture.

Another Hardwood Floor Method

Here is another method for doing a hardwood floor: Mix up some raw oil and a little turpentine with some japan driers. Apply one coat of this, well rubbed in. When it is dry give the floor a coat of paste filler; fill the cracks with paste filler made like putty with pulverized silica. This putty may be colored to match the wood. Sandpaper smooth and give it a coat of shellac which, after becoming dry, should be sandpapered and then rubbed with flour pumicestone and oil. This will make a fine finish.

Maple Floors

Maple floors should be paste-filled with the very palest filler, and finished with shellac. Do not apply oil direct to the wood, for that would darken and spoil the beauty of the maple. Or give it a coat or

two of white shellac followed by a coat or two of pale copal varnish—one or two coats of either according to the character of the job. Each coat of varnish should be rubbed down with sandpaper, though the last or finish coat should not be rubbed, as maple is one of the woods which appear best when finished with a gloss coat.

Softwood Floor

A softwood floor may be stained and varnished; or stained, then shellaced, then varnished; or left with the shellac finish, just as preferred.

Here is a cheap finish yet one which will look first-class when done properly. Give a coat of raw oil to the wood and when dry apply a coat of some cheap paste filler; the cheapest is one that you may make from pulverized silica and boiled linseed oil with a little drier added. Let this dry, rub as usual, and then give it a coat of shellac and a coat of wax. Rub lightly to a polish.

New Hardwood Floor

Another way: Take a new hardwood floor, paste-fill it as usual, rub off, let dry, sandpaper, and then give it a coat of raw oil with japan driers in it. This must be well rubbed in. After it has become hard-dry give it a coat of thin shellac.

Fillers

A close-grained wood does not need a paste filler, though some finishers use it; a liquid filler is better in most cases at least. Shellac is the best liquid filler, but of course not the cheapest. Copal varnish thinned out with turpentine makes a good liquid filler, or paste filler made thin with turpentine does well. Shellac made thin with alcohol is best for pale woods like maple and white wood, because any filler containing oil will darken maple or any light-colored wood. One of the close grain woods needing paste filler is Georgia pine; this wood has some soft or open parts which liquid filler will not fill. The paste filling makes the soft parts as hard as the rest of the surface. When dry rub down and give it two coats of pale shellac varnish. A floor made from this wood should be rubbed once or twice a month with oil, crude petroleum being a good one.

For the Floor in Use

To do a floor which is in use, something

which will dry very quickly is necessary. We have it in shellac. This may be colored as desired, preferably with some earth pigment. Make the shellac very thin and apply two coats. This finish will be safe to walk on in a few hours; if done after night it will be plenty hard by morning. This may also be said of a good floor varnish, though shellac is quicker, for it will do to walk on in one hour if needs be. If you use shellac containing wood alcohol have plenty of ventilation, but better not use it; denatured alcohol is safer.

Oil Finish for Hard Usage

We have known floors of porches at summer resorts, hotels, etc., where there is much hard wear, which were made with rift Southern pine and treated with kerosene oil only. One will be slow to believe that such a finish could have any lasting quality, but the oil seemed to preserve the wood and the floor maintained a nice appearance and did not show floor marks.

It was once the custom first to oil a hard wood floor, then to apply wax. The effect of this treatment was seen in a darkened and muddled wood; in due time it was noted and the method relinquished. Then the idea was to show only the natural color of a wood. Now we show that, and we also use stains getting other effects.

One finisher tells us that he once did a fine floor by simply sand-papering it until it shone as if polished—it was oak. Then he wax-finished it. This process, however, is too costly in the amount of time it requires and hence has failed to become popular.

Suggestions for Reduction of Freight Rates

SUGGESTIONS for reduction of freight rates on building materials presented to the Interstate Commerce Commission by William B. King, general counsel for the National Federation of Construction Industries and the National Association of Builders Exchanges, are to the following effect:

"1. Wherever it appears that through the influence of rate increases traffic in heavy construction materials has been diverted to truck or water transportation, the rates should be reduced so that the railroads may have a chance to restore this source of income and the producers and consumers have the benefit of competition between railroads and other methods of transportation.

"2. That such rates should be adopted as will not tend to confine producers to sales in a limited local market but will leave open to them a wider geographic range of market, thus offering to consumers a larger choice and a freer competition and to the railroads an opportunity to receive freight for longer haul.

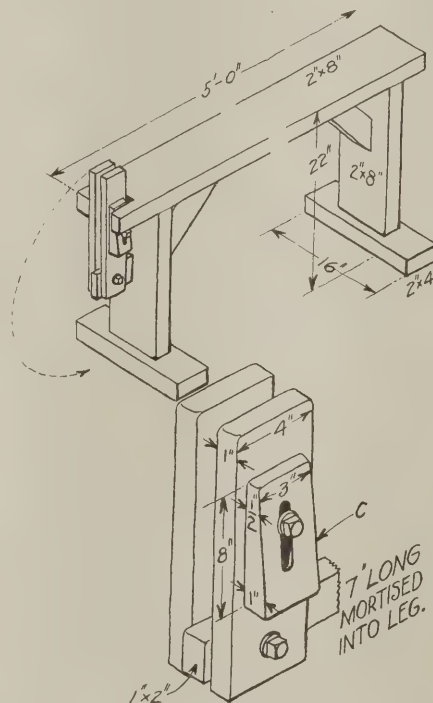
"3. That in adjusting rates those on heavy low priced construction materials

should be recognized as entitled to bear a proportionately less increase over pre-war rates than those on less bulky and more costly commodities.

"4. That the importance of home building, resulting in reduction of the unduly large rents now paid by workmen, should be considered as an element of importance upon the future prosperity of the entire community, in which the railroads have an important share."

A Handy Saw Bench

"**T**HE special features of this handy saw-bench," says the designer, Chas. J. Moore, of Venturia, N. D., "are that it is provided with a simple device or clamp for holding boards when jointing or mitering (swinging down and out of the way when not in use); it has legs that are straight and entirely under the top, and consequently out of the way when cutting a board lengthwise along the edge of the bench. Every workman knows how troublesome it is to have the rip saw strike the outward spreading legs of the ordinary wide-topped saw bench when, as often happens when putting on inside finish, only one bench is being used. The top and legs are made of 2x8, as indicated in the drawings, with the legs placed 4 inches from either end. A notch



2 7/8 inches wide is cut through the center of one of the projecting ends of the top and extended back to the leg, for receiving the clamp A, which is tightened by striking the wedge C upward. The jaws of the clamp are bolted loosely to the short arm D, which is mortised into the leg as shown. The wedge C is bolted loosely to one of the clamp pieces, the bolt passing through a slot

in the hardwood wedge. The slot permits the wedge to be held in place by the bolt and also allows it to be driven up or down, to tighten or loosen the clamp as required. When not in use it may be swung down and out of the way, as indicated by the dotted lines at F. This clamp is a great convenience on the ordinary work bench, also, when a vise is not at hand."

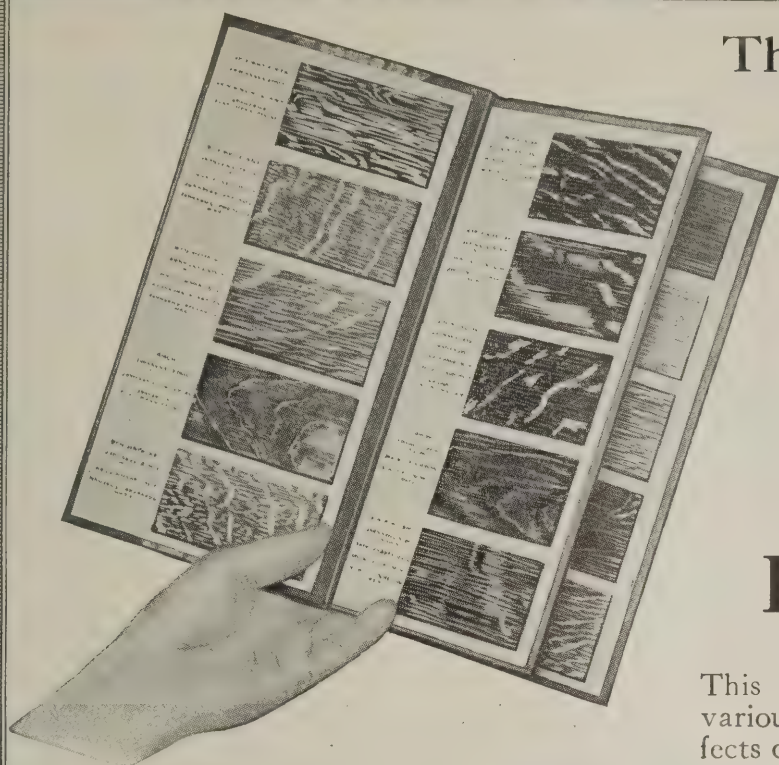
Fourth American Lumber Congress

OF particular interest to builders the work planned at the several meetings of the lumber industry is not properly recognized in that sense. There is a "best way" to do everything, but as individuals we are all disposed to think our way is the best way until we meet to consider what is the best way all around for everybody. It has been some job to get any idea of standardization even started. Now, the matter of grading lumber, of standardization of sizes, and all those things that help to give the builder and users of lumber definite quantities and values are being thrashed out, with that full understanding of all the conditions that come from assembling of men who are practical—who know the material from its growth as a tree until it is placed in a house as part of its structure or formed for a clothes pin. This means a uniform product, standard sizes, known strength, definite value, and that means a lot to the builder or user of lumber. It is the foundation of service.

The fourth annual American Lumber Congress is called for April 6th, 1922, at 10 o'clock in the Florentine room of the Congress Hotel, Chicago, Ill. Every national, regional, and state lumber association is invited to appoint a delegate and send his name to Mr. T. F. Laist, Chicago representative of the National Lumber Manufacturers Association, Harris Trust Building, Chicago. The congress will organize itself as it sees fit, and as a means of giving better service the builder may well scan with a critical eye the lists of "those present" to see if the representative of the source of his supply is on the job.

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Announcements and Publications

Industrial Engineering Co., consulting engineers and mill architects, 402 Herberick Building, Akron, Ohio, desire catalogs and bulletins pertaining to industrial building fixtures and equipment.

Samuel Hannaford & Sons, Architects, of Cincinnati, announce the removal of their offices from the sixth floor of the Hulbert Block, where they have been located for 32 years, to the tenth floor of the Dixie-Terminal Building.

The Lufkin Rule Co., Saginaw, Mich., in catalog No. 10, "Measuring Tapes and Rules," 112 pages, 9x6, illustrated, describes the company's surveyor's pins, tapes, metal and wood rules, calipers, scales, squares, wantage rods, yard sticks, etc. Accompanying the catalog is a list of prices.

Valves, Governors and Regulators—Junior Catalog No. 21, recently issued by the Atlas Valve Co., 282 South Street, Newark, N. J., describes the company's Atlas, Ideal and Victor reducing valves, pump governors, pressure regulators, hot-water tank regulators, control valves and damper regulators. This 20-page illustrated catalogue describes and lists all sizes and gives prices.

"Hick's Builders' Guide," 360 pp.; 4½x7; 300 figures; \$3. Published by the U. P. C. Book Co., Inc., 243 West 39th Street, New York City. This old friend is with us again in a new, revised, and enlarged edition. The old material retained constitutes about one-fourth of the volume. Two new chapters on fireplace design and construction have been added, as well as several chapters on carpentry and joinery. The estimating data in this edition is remarkably complete and very simply presented as well. Tables by means of which beams, joists, and columns may be selected for any load and span ordinarily met with make up a valuable section of the book. The general builder, the mason in stone and brick, the plasterer, the carpenter, the painter, the roofer, the apprentice, will all find valuable instruction for their part in a building.

"Estimating Building Costs," William Arthur; second edition; 211 pp.; 4½x7; 91 tables; \$1.50. Published by the U. P. C. Book Company, 243 West 39th Street, New York City. In the author's preface he quotes the words of a great teacher of language to the effect that in *learning* a language "take a small grammar . . . rather than a big one." "*Estimating Building Costs*" is the "small grammar" for the young contractor or building tradesman or Y. M. C. A. student, and "*The New Building Estimator*," now in its twelfth edition, is the "big grammar." The smaller handbook is written especially for building tradesmen, contrac-

tors, material men, and technical students, but is useful to anyone connected with the construction of homes, barns, stores, and small manufacturing establishments. It is to be used only for estimating, and nothing is said about the actual construction of the buildings. In order to make the book "constant" in the face of fluctuating costs and wages, the figures are usually given in actual quantities required and in actual hours of labor necessary to put them up. Costs can then be adjusted to suit local conditions and all prices. Along with the 91 tables there are a number of illustrations, and at the end of each chapter are questions and problems to be worked out. A key at the end of the book facilitates the matter of review for the student.

"Sewerage and Sewage Treatment," by H. E. Babbitt; 531 pp.; 6x9; 186 figures; cloth; \$5, postpaid. Published by John Wiley & Sons, Inc., 432 Fourth Avenue, New York City. This book, written by a teacher, is intended primarily for text-book use, and is a development of class-room and lecture notes prepared by the author for use in his classes at the University of Illinois. It contains information valuable to the practicing engineers, however, and in a form for ready reference. The ground covered includes an exposition of the principles and methods for the designing, construction and maintenance of sewerage works, and also of the treatment of sewage. Stress is laid particularly on the fundamentals of the subject rather than the details of practice, though illustrations have been drawn from practical work. It contains certain tests made at the university, and never before published. The cuts illustrating the book are made from original engineering drawings.

"Small Houses." Ernest Flagg, architect, has a profound conviction, according to his own words, that because a certain method of construction has been long and unquestioningly employed is no proof that it is the very best method, and the results of some of his seekings after better and more economical methods of construction are interestingly set forth in his book on "*Small Houses*." This is not properly a plan book, though it contains many house plans. It is rather a series of "essays on the fundamental principles of design, and descriptive articles on construction . . . with plates drawn by the author illustrating methods and results, and numerous reproductions from photographs." These plates, and there is one for each of the 51 chapters in the book, contain floor-plans, elevations, perspectives, and details, of one or more houses whose attributes serve to illustrate the point the author is making in the corresponding essay. Some of the chapter

headings, taken at random, will indicate the range of subjects treated: Ridge-Dormers; Gardens; Truth; Partitions; Topography; Foundations and Cellars; Repairs; Proportion; Carpentry; Surroundings; Heating; Practicability; Plumbing and Drainage; Roof-Framing; Contrast; Stairs. The drawings are made free-hand on cross-section paper, a standard module of 3 ft. 9 in. being used throughout. The French influence predominates in the designs, with a resulting fine charm of line and mass. The houses range in size from five- and six-room styles up to those of 10 and 11 rooms; from the simply and compactly arranged to those of rambling design with open courts and separate servants' quarters. A garden or court or terrace is a part of every design. The author believes that houses may have individuality and beauty and still be of inexpensive construction, and this thesis is the foundation of his discourse, its dissemination the purpose of his book. Whether the reader agrees with all Mr. Flagg says or not, he cannot but feel refreshed and invigorated from his contact with the enthusiasm and spontaneity of the plans and discourse. The book is published by Charles Scribner's Sons, 597 Fifth Avenue, New York City, and retails at \$10 a copy.

"Wood Turning," 150 pp.; 5x7½. Illustrated. Indexed. In the September, 1921, issue of NATIONAL BUILDER mention was made of the Woodworker Series published by the J. B. Lippincott Company of Philadelphia, with special attention given to "*Carpentry for Beginners*." "*Wood Turning*," herein discussed, is another of that series. This volume was written and for the most part illustrated by William Fairham, and is designed to assist not only the home worker, but the practical wood turner, cabinet maker, joiner, carpenter, wheel wright, junior draftsman, and the teacher or student in the technical or continuation day school. The method of procedure is by means of progressive problems of gradually increasing difficulty and complexity, the presentation accompanied by illustrations and a clear explanation of the nature of the new points involved in each. The following chapter-heads give some idea of the subject matter and method of treatment: The Lathe; Turning Small Objects; Tools—Grinding and Sharpening; The Back Saty—Sawing and Boring; Split Turnings and Turned Mouldings; Twisted and Spiral Turnings; Chucks and Face Plates; Hollowing a Vase—Supporting Collars, etc.; Turning a Ball; Turning Wooden Rings, Square Turning, etc.; Finishing Turnings—Staining and Polishing; Miscellaneous Hints; Patterns for Turning (with many full-sized details). The book retails at \$1.50 a copy.

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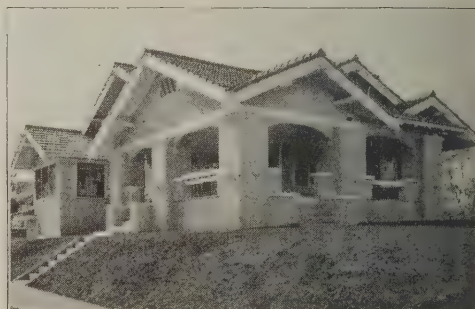
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NATIONAL BUILDER

Volume 65

CHICAGO, APRIL, 1922

Number 4

The Situation

THE prophets are all predicting a boom for house building. They, and every one else, certainly have every reason to look for extraordinary activity. January building permits were 50 per cent better than the same month a year ago, February permits were 73 per cent better than February, 1921, when it was expected a building boom was on the way. It looks now as if March permits would be about 100 per cent better than March a year ago.

Prices of building materials, according to statisticians of the industry, have declined considerably since the first of the year. The general average price of all building materials is now about the same measure above the general average pre-war price as the general averages of the price of all commodities, and the cost of living. In other words building material prices are normal, measured by present-day standards.

This fact is being recognized by big commercial interests and much new construction outside of housing is in prospect. Translated into terms understandable by the prospective home owner it means that material prices will come down only as the general level of all other prices comes down. He probably can get his materials for less money five years hence, but the chances are even that his income will be reduced in the same ratio.

On the other hand there are some signs that a stampede to build now may cause a temporary increase in many building material prices. Thus, the continued agitation of a building boom too often reacts to the disadvantage of those most interested in keeping construction activity alive.

Employment conditions in all the industries materially improved during March. Even the automobile industry took on 6 per cent more men during the month.

Activity in construction does not seem to be confined to any one or few localities. Indeed with few exceptions the condition is nearly universal. Those exceptions are mostly the Eastern and Central West industrial districts where the volume of manufacturing has appreciably shrunk during the last year.

Even the most unfavorable labor conditions, such as exist in Chicago, can not hold back the tremendous volume of needed construction. The situation in Chicago has not changed appreciably in the last month, except to become more intense. It now appears that not only are some Chicago

building trade unions under the control of ex-convicts and professional criminals, but that their influence extends to the criminal courts, where juries have recently refused to convict them of wanton murder.

An Exhibit of the Working of the Landis Award

A saving of nearly \$1,800 in the erection costs of a ready-cut bungalow was cited by the Chicago citizens' committee to enforce the Landis award March 22 as an illustration of the benefits of its fight to the would-be small-home owner.

The saving was revealed by a study of construction costs of two ready-cut houses, compiled with the aid of the manufacturing company. Both houses were erected in the Chicago suburbs, were the same size and model, and were put up under nearly equal conditions as regards soil, transportation and locality.

The Landis award house, however, showed a total cost of \$3,738.70, as against \$5,525.93 for the house erected under strictly union conditions, and employing union carpenters.

Here Are Comparative Tables

The tables of building construction costs follow:

LANDIS AWARD BUNGALOW

Excavating	\$90.95
Foundation and masonry.....	865.00
Heating	254.00
Plumbing	580.00
Electrical work	125.00
Plastering (not including lathing).....	240.80
Carpenter work, including supt.'s salary and lathing	1,057.00
Carpenter material, extra sash.....	133.10
Painting, decorating	385.00
City permit	7.85
Totals	\$3,738.70

UNION JOB

Excavating	\$82.00
Foundation and masonry.....	1,198.00
Heating plant	880.00
Plumbing	810.00
Electrical work	92.50
Plastering (including lathing).....	380.98
Carpenter work, including supt.'s salary, but no lathing.....	1,851.34
Carpenter material	133.11
Painting, decorating	385.07
City permit	11.00
Total	\$5,525.93

"A Conclusive Test"

"The comparison is a conclusive test of what the Landis award means to the small-home owner," said F. W. Armstrong, business manager of the committee. "Particular notice should be taken of the difference in the carpentry bills.

"The figures were gathered by an impartial source with the idea of obtaining a

rough estimate of the cost of erecting this particular type of ready-cut bungalow under Cook county conditions. They are an excellent indication of what the would-be home owner gains if he builds under the Landis award."

High Freight Rates and High Labor Wages

A review of the situation by the National Bank of Commerce, New York, on March 23 points out that the high cost of building due to freight rates and labor conditions means heavy taxation in the future. "Labor itself is the chief sufferer in the situation. Resistance by important classes of labor to wage declines in a period of declining prices disorganizes the entire productive organization of the country and contributes to unemployment in other lines. The maintenance of building operations on high wage levels delays general wage readjustment. It means exorbitant rents and prohibitive costs for homes for workmen. It is a general deterrent to a return to normal industrial, commercial and financial activity."

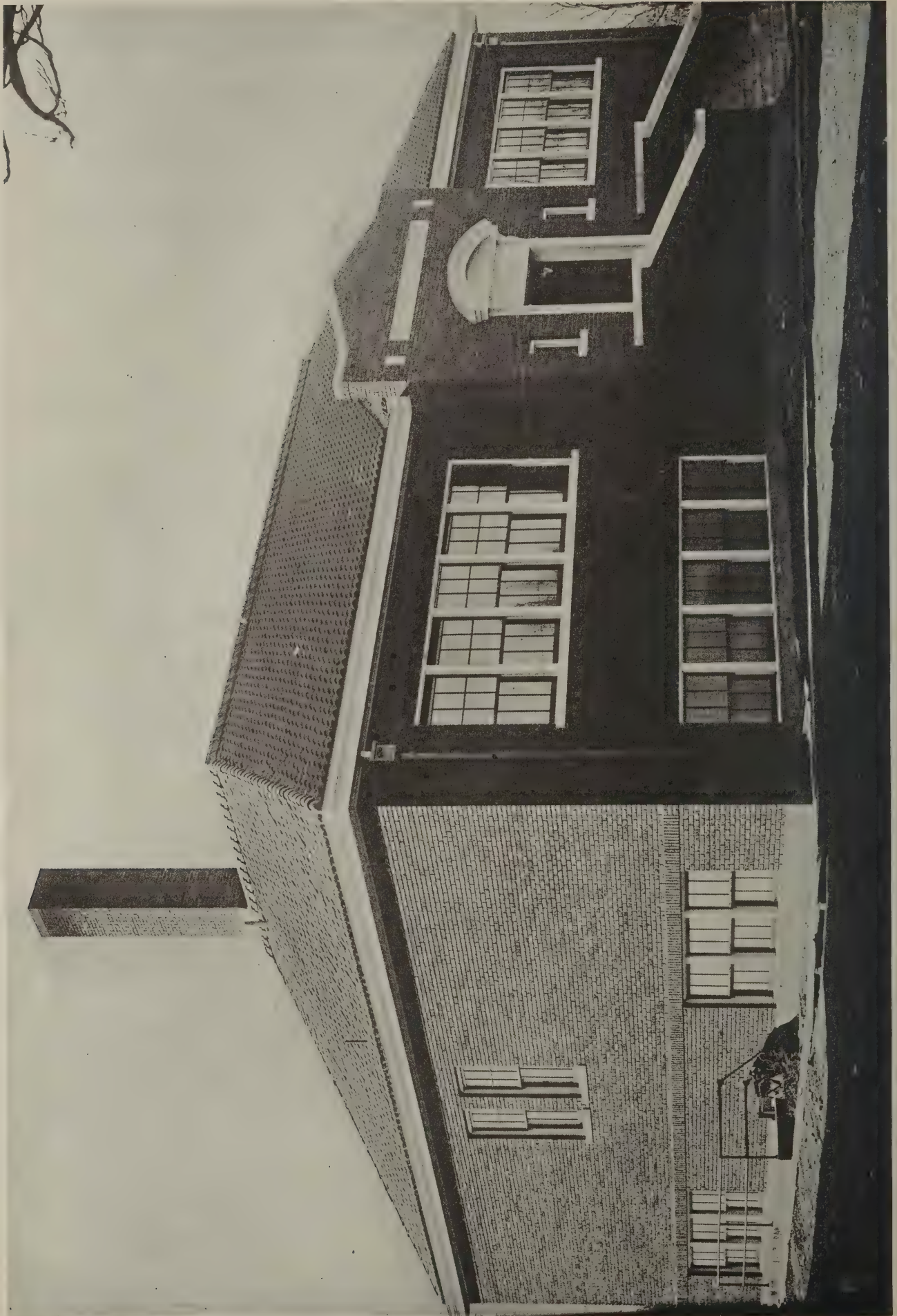
Reductions in freight rates on basic building commodities of from 10 to 15 per cent is expected to be ordered by the Interstate Commerce Commission in a few days.

Building Show Season Is On

Possibly the most important developments now taking place in the industry are the building shows being held in all the large cities and many small ones. The growth of this idea has been tremendous and every year sees greater efforts made to "cash-in" on the popularity of home ownership.

The factor that is missing at most of these shows is the building contractor. The architect is there with plans galore, the material man with attractive literature and samples in plenty, but the man who puts two and two together to make four, is seldom much in evidence. It is in the interests of all parties concerned, most of all the public, to draw the building contractor out of his shell and make him take a more active part in these building shows.

There is a great deal of lost motion and lost energy in running down the prospective home owner. The material men flood him with samples and literature, but, eventually, if he is a man of sense, he turns to his local building contractor for advice on what to use. Consequently the building contractor has just so much more to learn by a visit to a building show.



Grade School at Lyndon, Kansas. W. E. Hulse & Co., Architects, Hutchinson, Kansas
See Description in Reading Pages and Construction Details in Detachable Insert in this Issue

Kansas District Grade School

Details of a Modern Country School Building by One of the Foremost School Architectural Firms of the Central West — A Midwinter Job

WE. HULSE & CO., Hutchinson, Kan., are known throughout the states of Kansas, Nebraska, Missouri, Iowa, Oklahoma, New Mexico and North and South Dakota as among the foremost architects of public school buildings in all this vast agricultural empire; and in no other section of the world, probably, have greater steps been taken in the last few years toward better common school education in rural districts. Better buildings are of course among the most important of those improvements. The grade-school building at Lyndon, Kan., shown in detail herewith is typical of the modern district grade school as conceived by a firm of architects which has designed them, literally, by hundreds, and as executed by the modern country contractor.

The contract time for the completion of the building was four months. The contract price complete was \$30,547. The contractor was Mont. J. Green, of Manhattan, Kan.

Details—Foundations—Walls

The foundations and footings are 1:3:5 concrete, using gravel or broken stone for the coarse aggregate. The material in the crushed stone less than ¼ in. in size was allowed to be used as sand, if it complied with the sand specifications. In truing up the foundation the contractor was required to use an architect's or engineer's level—no hand level methods were allowed.

Where the brick walls rested on the concrete foundation, the concrete was first swept clean, then wet with water and sprinkled with dry cement to form a neat-cement-grout bond. The exterior of the concrete walls was waterproofed with one coat of asphaltum, applied hot, from 8 in. below grade to the footings.



Lyndon, Kan., grade school—October 1, 1921

Nailing blocks were not permitted in the concrete work. All furring and finishing secured to the concrete walls were fastened by drilling and plugging after the walls had set.

Other Concrete Details

The concrete basement floor was mixed 1:3:5 with a top coat of 1:1½. The reinforced-concrete steps, beams, etc., were mixed 1:2:4. The basement floor is laid on the ground; it is 4½ in. thick, composed of 3½ in. of the mass concrete and 1 in. of the richer surfacing concrete. This floor is reinforced with ¼-in. square bars laid 1 in. below the top of the 3½-in. base, 18 in. on centers each way.

Between the basement floor and the foundation earth is 8 in. of well tamped sand. Drainage of any seepage or ground water is provided for by two lines of 3-in. drain tile laid with open joints under the floor of the gymnasium to the boiler-room floor, and one line of 3-in. tile with open joints

laid under each toilet room. These drain tiles are connected under the boiler-room floor and run into the basin of a lift trap (described farther on).

Wall Details

The entire building is faced with Fredonia "rug" face brick. These were laid with full half-inch head and bed joints slushed in solid, raked out ½ in. deep and carefully pointed. The interlocking hollow-tile backing was bonded to the face brick with galvanized wall ties, one tie to each brick of every sixth course in height.

All piers, both in walls and interior, supporting lintels, beams, and girders and all other bearing piers are built of common brick. All floor joists rest on not less than three courses of common brick. The bearing of all steel girders on walls is not less than 12 in., and where the girders rest on masonry walls 12x18x¾-in. steel bearing plates are used under them. The lintels have at least 8 in. of bearing on the walls, and if the spans are 15 ft. or more the bearings are 12 in.

The stone trim is Bedford limestone, standard smooth finish cut to details.

All exposed brick work was waterproofed with Cabot's waterproofing. The mortar used was natural color, one part of portland cement, 3 parts sand and 10 per cent by volume of hydrated lime.

Interior Framing—Floors

All dimension lumber is No. 1 long-leaf yellow pine, as are also the floor joists. The floor joists have 4-in. bearing on the exterior walls, with 3-in. bevels. Every fifth joist is tied into the brick walls, in a continuous line across the building, with joist anchors. These joists are lapped and



Progress photograph, November 2, 1921—Front



Progress photograph, November, 1921—Rear

spiked where they are supported by interior bearing partitions. Headers and trimmers, except trimmers over 10 ft. long, are tripled.

Between this and the finish floor is sound-deadening quilt. All wood floors were of 13/16x2 1/4-in. maple. The floors after

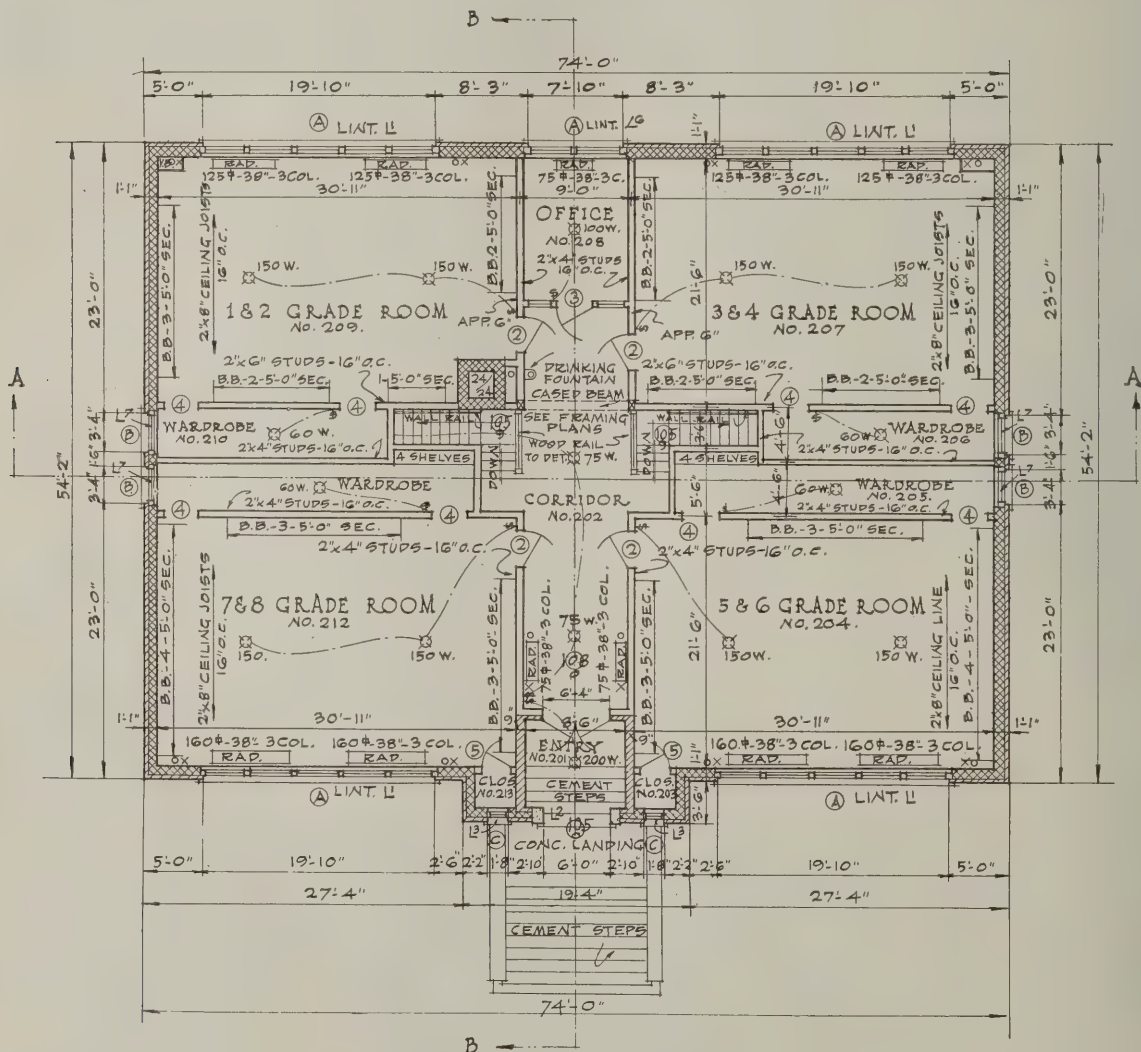
2x4-in. studs on 16-in. centers. Where stud partitions intersect masonry walls they are anchored to the walls with 1/2-in. bolts, 24 in. on center, passing through the double studding and securely anchored to the masonry.

The bearing partitions are bridged in solid with members of the same size as the studding. Headers and plates are doubled and securely nailed to the studding. Bucks for openings in the partitions are the same size as the studs, doubled, extend from floor to ceiling, and are anchored at both ends.

Plastering

The partitions and ceilings are lathed with common cypress lath, using 15 lath, 48 in. long, to the square yard. Joints were broken every fifth lath, leaving an open joint at one end of each lath.

Walls and ceilings have two coats of ce-



FIRST - FLOOR - PLAN
SCALE 1/8" = 1'-0"

Indicated scale is reduced one-half

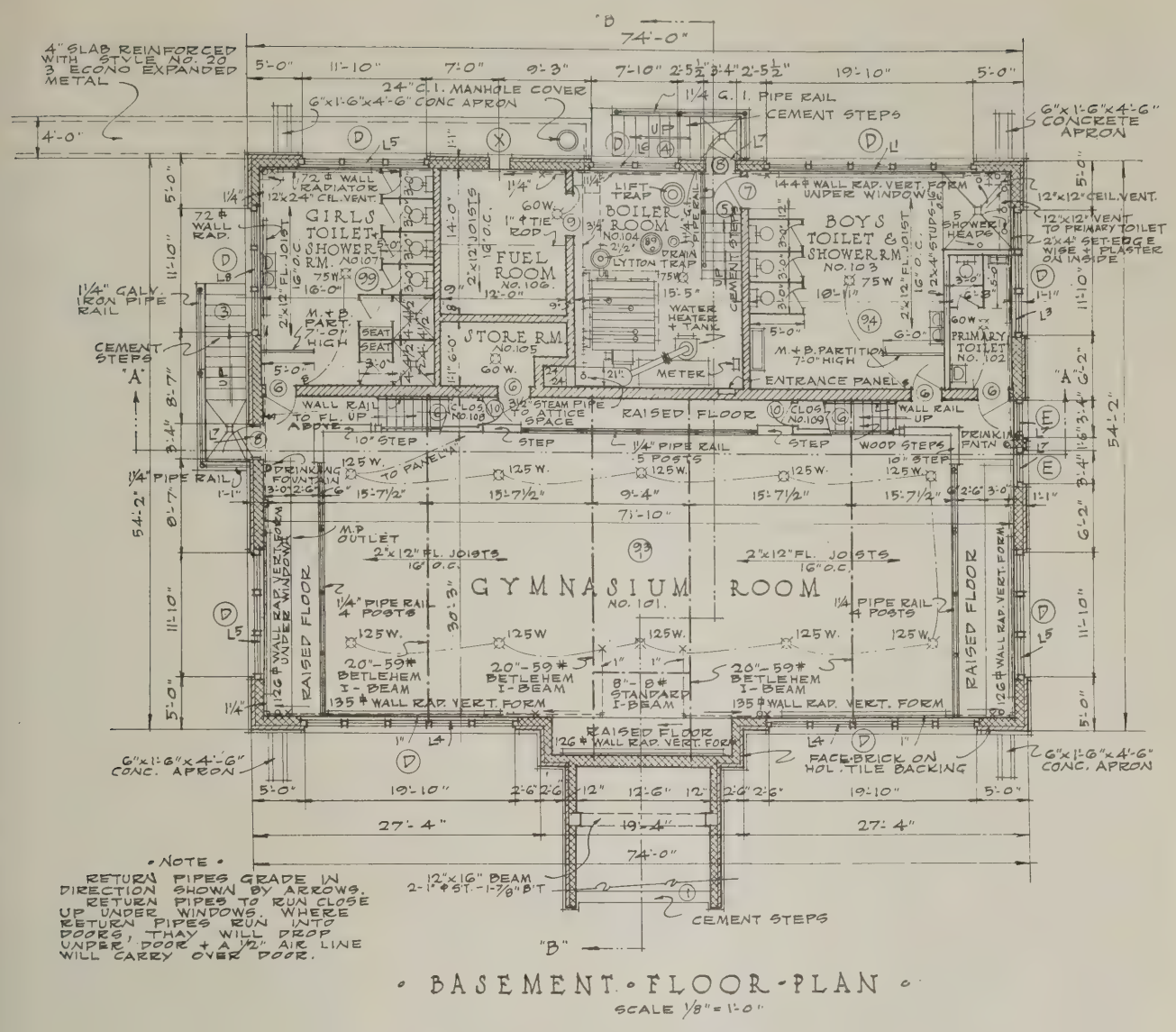
Floor joists are bridged at intervals of 8 ft. with 1x4-in. square-end bridging.

The rough floors are made of No. 2 ship-lap nailed at right angles to the floor joists.

surfacing were coated with two applications of "Lignophol."

All bearing partitions are 2x6-in. studs, 16 in. on centers. Other partitions are

ment plaster (commercial gypsum wall plaster) with a finish coat of plaster made by mixing 400 lb. of Keene's cement to 100 lb. of dry hydrated lime. This plaster is given



Indicated scale is reduced one-half

a sand finish, the sand for which will all pass a 12-mesh screen. Corners are protected with metal beads. The intersection of all interior partitions with exterior walls, or with columns, have 6-in. strips of metal lath secured in the angle before the plaster is applied.

The walls of the toilet and shower-bath rooms are plastered with Keene's water-proof plaster to a height of 6 ft.

The vent stacks are constructed of 3/8-in. gypsum wallboard on 2x4-in. studs, set edgewise. The part of the stacks visible in the rooms is plastered over in the same manner as the rest of the walls.

Stair details are shown in the drawings. The stair carriages are cut out of 2x12-in. lumber, spaced 16 in. on centers.

Roof Details

The roof trusses are shown in detail in the drawings. The sheathing is 7/8x8-in. No. 2 shiplap, laid at right angles to the roof trusses. Over the sheathing was laid a double-ply sheet of asbestos roofing felt, 32 in. wide, both plies being impregnated

with asphalt and cemented together at the factory. Over this was placed a roof of red clay tile.

Millwork Details

The exterior doors are No. 1 clear selected Western white pine. The interior doors are yellow pine. Exterior and corridor doors open out. Window sash is 1 3/4-in. No. 1 clear selected Western white pine, and is provided with metal weather strips throughout.

Toilets

The partitions in the toilet and shower-bath stalls are "Weisteel," made of single sheets of No. 16 gage steel with sanitary V-shaped moldings at top and bottom. These panels are interlocked and welded into both the front and back posts.

The compartments in the toilet are 3 ft. wide by 5 ft. deep and the partitions between the compartments are 4 ft. 6 in. high; the bottom of the partition is 1 ft. above the floor, and the top of the partition 1 ft. below the head rail.

The shower-bath compartments are 4 ft. wide by 4 ft. deep. The partitions, backs and fronts, are 5 ft. 6 in. high and extend to the floor. Openings into the shower-bath compartments are 2 ft. wide. The dressing-room stalls are 4x3 1/2 ft.

Plumbing and Heating

All drainage pipes in the building and to a point 5 ft. outside are cast-iron. Vent pipes smaller than 4-in. diameter are galvanized wrought iron with galvanized malleable iron fittings. Vents extending through the roof are flashed with 4-lb. sheet lead, turned down into the hub of the pipe, calked in place and spread out over the roof for a distance of 10 in. each side of the stack.

The water closets have 4-in. waste pipes and 2-in. vents; the lavatories 1 1/4-in. waste, 1 1/4-in. vent; the urinals 1 1/2-in. waste, 1 1/2-in. vent; the sinks, 1 1/2-in. waste, 1 1/4-in. vents; drinking fountains, 1 1/4-in. waste, 1 1/4-in. vent.

The boiler room is provided with a No. 2 Penberthy automatic drainer, installed in a concrete pit 24 in. square by 30 in. deep,

DOOR SCHEDULE				
MK.	SIZE	THK.	DESCRIPTION	GLAZE
1	30" x 7'-0"	1 3/4"	14' TR. CURT. #G226W	PS.
2	"	"	CURTIS #G304 Y.P.	UPPER PAZ MAZE CL.
3	"	"	SEE DETAIL	—
4	"	"	CASED OPENING	—
5	2'-6" x 7'-0"	1 3/8"	CURTIS #G304	—
6	30" x 7'-0"	1 3/4"	"	—
7	"	"	" #C310	—
8	"	"	" #C-242 MAZE G.	—
9	SEE DET. OF FUEL ROOM DOOR			
10	2'-0" x 6'-0"	1 3/8"	CURTIS #G304	—

WINDOW SCHEDULE				
MK.	TYPE	GL. SIZE	HT. BK. OF G.	DESCRIPTION
A.	D. H.	38/36	6'-10"	SASH DIVIDED AS PER ELEV. ALL WINDOWS OF BASEMENT FLOOR ARE TO BE MAZE GLASS. - ALL GLASS TO BE D. S. A. GRADE.
B.	"	32/33	"	
C.	STATKY	12/25	2'-10"	
D.	D. H.	38/24	4'-10"	
E.	"	32/24	"	
X.	MAJ. COAL CHUTE	#183	"	

LINTEL SCHEDULE	
MK.	DESCRIPTION
L1	15'-38" BETHL. I-B. + 1-5/16" x 11" PL. RIVETED
L2	STONE LINTEL
L3	2-3 1/2" x 3 1/2" x 5/16" L'S BACK TO BACK
L4	20'-59" BETHL. I-B. + 1-3/16" x 11" PL. RIVETED
L5	10'-20" STD. C + 1-5/16" x 11" PL. RIVETED
L6	8'-11 1/4" # " " " " " "
L7	2-3 1/2" x 3 1/2" x 5/16" L'S BACK TO BACK + RIV'D
L8	9'-15" STD. C + 1-5/16" x 11" PL. - RIVETED
	2-3 1/2" x 3 1/2" x 5/16" L'S BACK TO BACK + RIV'D OVER ALL JOINTS IN MASONRY INT'R WALLS OF BMT. FL. PLAN

with a removable cast-iron cover. The 3-in. boiler-room floor drain and the tile drains from the sand beds under the basement floors are connected into this pit, as already noted.

The drainer is constructed entirely of bronze and automatically lifts and discharges 320 gal. per hour at 25 lbs. pressure with a working head of 6 ft. This drainer takes care of the sewage of the boiler room and discharges it to the city sewer. All of the remaining portion of the house drain is above the city sewer.

The water supply of the building is furnished by a 2 1/2-in. connection with the city mains, with the following interior main connections: boiler 2 1/2-in. branch, 2-in. connection; hot-water heater (150 gal. capacity) 2 1/2-in.; closets 2-in. branch, 1/2-in. connection; urinals, 1/2-in.; lavatories 3/4-in. branch, 1/2-in. connection; showers 1 1/4-in. branch, 1/2-in. connection; fountains, 1/2-in. branch, 3/8-in. connection.

The building is heated by a smokeless cast-iron boiler with a rated capacity of 7150 sq. ft. of direct radiation. Each radiator and the ends of all drops are drained through thermostatic traps.

Painting and Finish

After erection all steel work was coated with two coats of "Antoxide," the first coat being maroon and the finish coat bronze green.

Exterior woodwork, after a priming coat, was finished with two coats of white. The exterior window sash is black.

STAIR SCHEDULE						
MK.	NO.	CONST.	RISE		RUN	
			NO.	HEIGHT	TOTAL RISE	TOTAL RUN
1	1	CONC.	10	6"	5'-0"	9' 12"
2	1	"	6	6"	3'-0"	5' 12"
3	1	"	11	6 1/2"	5'-11 1/2"	10' 11"
4	1	"	9	8"	6'-0"	10' 6"
5	1	"	8	7 5/8"	5'-1"	7' 10"
6	2	WOOD	21	6 3/4"	14'-8"	20' 10"
7	2	"	4	6 3/4"	2'-3"	3' 10"

FINISH SCHEDULE						
FL.	R.M. NO.	FLOOR	BASE	WNSG	B.B.	P.MLD.
BASEMENT	101	MAPLE	Y. P.	—	—	—
	102	CMNT	CMNT	—	—	—
	103	"	"	—	—	—
	104	"	—	—	—	—
	105	"	—	—	—	—
	106	"	—	—	—	—
	107	"	CMNT	—	—	—
	108	"	—	—	—	—
	109	"	—	—	—	—
	201	CMNT	BRICK	BRICK	—	—
1ST FLOOR	202	MAPLE	Y. P.	PLAS. P.	—	Y. P.
	203	"	"	—	—	—
	204	"	—	—	—	—
	205	"	"	—	—	Y. P.
	206	"	"	—	—	"
	207	"	"	—	—	Y. P.
	208	"	"	—	—	"
	209	"	"	—	—	Y. P.
	210	"	"	—	—	"
	211	"	"	—	—	"
	212	"	"	—	—	Y. P.
	213	"	"	—	—	"

WALL FOOTING SCHEDULE							
MK.	A.	B.	C.	D.	E.	F.	G.
A-A	4"	14"	12"	1'-10"	9'-7"	1'-1/2"	2'-1/2"
B-B	6"	"	"	2'-2"	"	"	"
C-C	4"	"	"	1'-10"	9'-7"	"	"
D-D	6"	"	"	2'-2"	"	"	"
E-E	"	"	"	"	8'-8"	"	"
F-F	"	12"	"	2'-0"	9'-7"	—	—
G-G	"	"	"	"	8'-8"	—	—
H-H	3"	9"	8"	1'-3"	8'-0"	—	—
I-I	"	12"	10"	1'-6"	9'-7"	—	—
J-J	—	14"	—	1'-2"	9'-7"	1'-1/2"	2'-1/2"
K-K	—	"	—	"	9'-7"	"	"
L-L	12"	4'-0"	12"	6'-0"	8'-8"	—	—

NOTES
TO BE 8" SAND FILL UNDER ALL CONCRETE FLOORS—SEE SPEC. IN ALL PLACES WHERE AN EARTH FILL IS REQUIRED SAME TO BE WETTED DOWN & WELL TAMPED BEFORE RUNNING CONC. SLAB.
1-1/2" PROPS AT TOP & 2-1/2" PROPS AT BOTTOM OF FNDTN. WALL AS INDICATED IN DIAGRAMS TO EXTEND ENTIRELY AROUND BLDG. LAPPING 3'-0".
WHERE BRICK & CONC. WALLS INTERSECT NOTCH 4" OF WIDTH OF BRICK WALL INTO CONC. WL. FOR THE JOINT.
PIPE TRENCH TO BE 3'-0" WIDE IN-SIDE & 4'-0" DEEP IN-SIDE. TOP SLAB TO BE LEVEL WITH GRADE. WALLS TO BE 6" THICK & FL. 4" REINF. WL. WITH 1/4" BARS 12" O.C. LAYED HORIZ. TOP SLAB 4" THICK MADE IN 5'-0" LGHTS WITH WATER PROOF TAP JOINTS. SLAB ALONG WL. OF BLDG. TO BE SUPPORTED ON 3 1/2" x 3 1/2" x 5/16" L'S BOLTED TO WL. WITH 1/2" x 12" BOLTS 24" O.C. REINF. TOP SLAB WITH STYLE NO. 20-3 ECONO EXPANDED METAL. PIPE TRENCH TO BE BUILT BY GNRL CONTRACTOR.

The interior woodwork is finished with a dark mahogany stain, mahogany coater and two coats of varnish.

The galvanized-iron cornice was given one coat of maroon "antoxide" and three coats of white paint. The gutter received one coat of maroon "antoxide" before setting in place and two coats of red paint after being placed. The galvanized-iron down spouts have one coat of maroon "antoxide" before being erected and three coats of white after they are placed. All interior galvanized-iron work received two coats of bronze green "antoxide" paint.

A Selling Argument?

THE accompanying view shows how a speculative house builder in a Mid-West city introduces structural steel in the construction of frame houses which sell for around \$15,000. I-beam columns are used in all the corners. They probably add some stiffness to the floors and partitions they help to support, but the main reason for their use seems to be as a selling argument. Prospective purchasers visiting the building in the course of construction seem to be tremendously impressed with this "improved construction" feature.

If the I-beams are properly tied together by lateral steel members, so as to form a cage-frame to carry the walls and floors independently of the wood studding, there is no question but what it would be improved construction, for such construction would certainly help prevent the cracks in

plaster and unequal settlement of door and window frames, which disfigure many otherwise fine houses.



Steel I-beams at corners of frame house

Build Better—At Less Cost

Problems and Tendencies of the House-Building Industry
Outlined by National Experts—Time for Builders and Contractors to Bestir Themselves

THE searchlight is on the building construction industry. For the first time in its history in America the National Government, engineers of national reputation, city planners, legislative experts, bankers and leaders in other industry, are beginning to concentrate on the business problems of house building.

Progressive contractors and builders are following these moves with the greatest interest, for there is every indication that the time is fast approaching when every one in the building industry must be on his toes, to keep pace

with the progress already instituted. The day is dawning when even the small country contractor can no longer close his eyes to order, method and efficiency in building operations, however insignificant or isolated.

Builders with factory schemes of organization and methods of handling labor are already in the field. This new competition, if it means anything, will lead to better buildings at less cost. To meet it the local builder must learn to be a better business man as well as a better builder.

John M. Gries Says:

ACCORDING to the census of 1920, there are 20,697,204 dwellings in the United States. There are no reliable figures either as to cost or replacement value of these houses, but an enormous amount of the nation's wealth is in its dwellings. If the average value per dwelling is \$2,000, the total value of all dwellings would be \$41,394,408,000; if the average value is \$3,000, the total value would be \$62,091,612,000.

The number of city dwellings is 9,484,552 and the number of rural dwellings 11,212,652. This means that 54.2 per cent of all dwellings are in the country. Although there are more rural homes, there are more families in the cities. There are, according to the census, 12,803,017 city families and 11,548,659 rural families.

The number of families that should be provided with houses each year amounts to probably more than 300,000, and considering the destruction of houses at about 80,000 each year, there is an annual need for nearly 400,000. On this basis the shortage acquired in the last few years is approximately 1,000,000 dwellings.

To determine what kind of houses are wanted incomes must be studied. Judging by income tax statistics the number of persons receiving an income between \$1,000 and \$2,000 makes up the largest single group; those receiving an annual income of between \$3,000 and \$4,000 is much smaller, and so on up. The market for small houses will be tremendously increased when such houses can be financed by those receiving an income between \$1,500 and \$2,000.

Of the 24,351,682 homes in the 1920 census, 12,943,604 are rented; 10,866,960 are owned by occupants; the tenure of the remaining 541,118 is unknown. Of the

houses owned by the occupants, 6,522,119, or 26.8 per cent, are owned free of encumbrance; 4,059,593 are encumbered, 285,248 are unknown as to encumbrance.

The national trend of the building industry is summarized in the accompanying collection of excerpts from a discussion of the "National Housing Problem" at the January meeting of the American Society of Civil Engineers in New York City. The men quoted are:

JOHN M. GRIES, Chief of the Division of Building and Housing, U. S. Department of Commerce, Washington, D. C.

B. ANTRIM HALDEMAN, Chief of the Division of City Planning and Municipal Engineering, Pennsylvania Department of Internal Affairs, Harrisburg, Pa.

CHARLES M. REPPERT, Chief Engineer, Bureau of Engineering, Department of Public Works, Pittsburgh, Pa.

WILLIAM H. HAM, General Manager of the Bridgeport Housing Co., Bridgeport, Conn.

JOHN IHLDER, Manager of the Civic Development Department, Chamber of Commerce of the United States, Washington, D. C.

To encourage home ownership by the occupant, residence property must be protected. Many cities do not provide adequate zoning ordinances. The loss in property value is an economic loss running into the millions, a direct result of the failure to zone properly. Such losses can

only be remedied by zoning laws. There may be some ill-gotten profit to some individuals by destroying property values in one section and thus forcing the people to move to another, but there is an economic loss to the community as a whole.

Eliminating the Wastes

No individual or single group in the industry can eliminate the unnecessary waste in building. To bring about the desired reforms in the construction industry the joint efforts of all groups are needed. The architect, engineer, contractor, sub-contractor, laborer, real estate dealer, building material producer and dealer, financier, banker and the general public must all aid in bringing about the better conditions. The cost of houses must be reduced through the elimination of waste in all branches of the building industry.

A little more house-cleaning is needed in spots, and more efficient production with lower costs before great activity in building will prove of great economic value. Although law will do some good, the industry can do much more by a joint effort to remove restrictions, and to eliminate the waste. In some cities conditions are favorable for building, whereas in others local community action is necessary before building should start.

Some of the causes of waste in building are: (1) Lack of standardization; (2) absence of factory methods in construction work; (3) unnecessary restrictions in building codes; (4) excessive capital required because of seasonal work; (5) jurisdictional disputes; (6) failure to schedule work; (7) trade agreements; (8) corrupt practices; (9) high discount rates for second mortgage money; (10) failure to plan and zone cities properly.

There must be greater standardization of parts in small houses. Less work should be

done on the job and more in the shop. Materials on most jobs are poorly routed, or often not routed at all. The carpenter often carries a piece of studding a distance of many feet, cuts it to length, and puts it in place, while on a more efficiently managed job all stock is brought to him by common labor ready for use.

A more or less efficient building practice has been developed in the construction of large office buildings, large apartment houses and typical factory buildings. In the erection of a large steel factory building, for example, the different pieces are marked and the work is so scheduled that both labor and materials are on hand when and where wanted. In complex and elaborately finished structures the scheduling of work has not been worked out so well. There has been little done in efficient management in building small houses, except where built in large numbers in one locality by one contractor.

It is claimed that of the small houses a very large percentage is built by contractors who build less than 10 houses a year. Such contractors as a rule do not schedule their work well, nor does such building lend itself to efficient scheduling. The arrival of materials is uncertain, the number of laborers available at any fixed time is uncertain, and it is next to impossible to buy to advantage under such conditions.

About Zoning, B. Antrim Haldeman Says:

The housing problem is directly affected by zoning a city for use. Row and group houses and other types of multiple dwellings that involve the intensive use of land can be much more economically constructed and provided with the necessary public utilities if they are erected on level or gently rolling land, which requires a minimum disturbance of natural conditions and movement of material during development. One-family dwellings, or dwellings of the detached or semi-detached type, particularly where they occupy large lots, can be more economically built, and with more satisfactory results, on hilly or heavily rolling land than multiple dwellings.

Efficient zoning would allocate land for the use to which it is best adapted by natural conditions, so far as such allocation might be practicable. The "load" on the land, as determined by the distribution and intensity of industrial, business and residential use, directly affects the cost of constructing and maintaining all public works and public services. Property improvements and public service utilities constitute a large item in the cost of housing which is naturally affected by the nature of the site and surroundings; and where distribution and "load limit" are predetermined by a districting plan and zoning code, large economies in the construction of

streets and other public improvements and utilities become possible.

Charles M. Reppert Says:

The restrictions imposed by old land subdivision and recorded locations of streets, and the absence of necessary zoning legislation, often make it practically impossible to lay out new streets with proper regard to location, economy, and relation to topography. As a result building operations in that locality are not encouraged.

If conditions were ideal the planning of cities would be carried out co-operatively by the property owners, realtors, engineers, and architects, under the direction of one skilled in the broad problems of city planning. Such is not now the case, as each

ZONING

Allocate land best adapted to the purpose, says Haldeman. Restrictions imposed by old land subdivision tend to make economy in zoning impossible, says Reppert

element interested carries out its own work independently and without much regard for the other. It is apparent today that the problem of city planning is not so much concerned about the technical problem itself, as to the manner in which it can be carried out, and it is also apparent that the solution of the housing problem is going to be delayed for many valid reasons until some one discovers how the new vision of city planning can be carried out in an economic and practical manner.

William H. Ham Prophesies Radical Changes:

The clientele of home buyers in the immediate future will present new demands which must be recognized in the building program. The dull, dismal, colorless home which has been so profusely built in the last 15 or 20 years must be eliminated. The building business is now going through a radical change.

Ten years ago the relation between the material cost on the job and the labor cost for installation was in the proportion of approximately 70 per cent for the materials and 30 per cent for labor. About two years ago this proportion was changed to 40 per cent for materials and 60 per cent for labor, and at the present time it is about 50-50.

Excavation methods are wrong because they employ either hand labor or horse labor in the majority of cases. Small machines are needed and must be developed for proper handling of small volumes of earth. Large machines for heavy excavation have been developed to the highest point of efficiency, but little effort has been made with the small machine.

Too Much "Rule of Thumb"

Foundations themselves have been built by "rules of thumb," which have found their way into many building laws in various cities of the United States and have affected seriously the cost of construction. Foundations should be factory made, transported and erected with proper machinery as a part of the building plant equipment.

Timber framing has been used for practically all housing work since the Civil War days by "rules of thumb," and not in accordance with engineering principles. Joists and studs have been placed 16 in. on centers, principally for the reason that the waste lumber which is made into wood lath will not span any greater distance with safety; whether the span is large or small, the normal spacing in the house today is 16 in. Although some variation in the depth of the joist has been made, this variation is not in accordance with the load requirements.

Framing methods are fairly well established, but the cutting of timber in the forest still follows largely the 13-ft. rule. Tremendous waste is caused by the cut-off ends of lumber. The whole lumber industry and the use of lumber in buildings should be standardized and put on an engineering basis.

Plumbing

Little work has been undertaken for standardization in the plumbing industry, and that little has been resisted by the plumbing trades at every turn. Sanitation of cities outside of the buildings has been given intimate study by expert professional men; and there are many notable examples of the progress made; whereas practically no progress has been made toward the solution of the problems of plumbing, or inside sanitation. A great waste in this field can be overcome by standardization of plumbing and heating layouts, so that full requirements can be shipped to the job by the factory, ready-cut for installation and largely fabricated, or assembled.

Plastering

Plastering by the present wet process in average buildings constitutes a setback by bringing water into the building at a time when everything needs to be dry, wetting the timber and trim members, and causing a delay and serious damage to the plaster itself on account of the swelling of the materials to which it is applied. Plastering by the wet process is wrong, and the

dry finished product substituted therefor is most urgently required.

The objection to the wetness of plaster is only one minor objection. The more important objection to plaster as now applied is its continuing destruction in the house itself, which constitutes one of the most serious items of depreciation.

There are substitutes on the market which are being largely used, but they have not been developed sufficiently, either as to quality or as to size of sheet. Co-operation of the manufacturers of plaster substitutions and architects is necessary to develop to full value the substitute materials which can be used for the inside walls of buildings. A suggestion to architects and builders in this particular is to divide, so far as possible, the inside surfaces of rooms into panels with the use of door and window trim extending from floor to ceiling, and to return to the extensive use of a proper wainscot, simple in form and developed to work satisfactorily with the plaster substitute.

Shop Methods Coming

By this method a large part of the house areas would be reduced to small sized units, easily transported and simply installed. The ideas of our ancestors in the exterior form of the building is returning, and if these important details are emphasized on the interior, a large number of plaster difficulties will be eliminated.

Fabrication (assembling) of house parts in the shop in the locality of the building site is the next important item. By this

A demonstration of these principles describing how a prominent Southern speculative builder is applying them practically will appear in the May issue of National Builder.

s meant such items as door frames and trim complete, window frames in like manner, and all dormers complete to the last detail, including the window, with the hardware installed. These fabricated parts of building, to be made by standard shop drawings, transported in the fabricated state, and installed by men trained in this kind of work, will lower the cost of construction and, at the same time, give the architect or builder an opportunity to express himself, because his work is done under mill or shop conditions and is therefore more easily controlled and executed.

In the construction of all small buildings there are hundreds of items which lend themselves to the same analysis as the few mentioned.

On Financing, John Ihlder Says:

The cost of a house is not its purchase price alone. A house is not immortal, though some owners of antiquated structures would have us so believe. There are no mortality statistics of houses to guide investors. If the life of a house is 30, 40, or 50 years, the cost of the house is its total cost for that period—costs that include (a) interest on investment; (b) taxes, (c) repairs; (d) fire insurance; (e) depreciation and obsolescence reserve fund which at the end of its life will equal the first cost of the house. If the house is built to rent, or as an investment further allowances must be made (f) for periods when the house will be tenantless; (g) cost of management; (h) water rent (unless paid by tenant).

Housing as a rule has not been financed on any such scientific basis. Speculation and sentiment have been the mainsprings of action so far as one-family and two-family houses are concerned, and speculation alone so far as multi-family houses are concerned. Most of our troubles come from a disregard of these economic factors in housing.

There was once a time when men of moderate means and men of wealth invested their surpluses in housing property. In the older cities are still remnants of large estates which consisted in great part of dwelling-house properties, groups, rows, or blocks of houses built or bought as an investment. Recent sales prices were too much for human trustees to resist and these holdings have been scattered.

A change in housing investments has long been in progress. The newer method is for the investor to buy a row of houses from the builder and hold them for 10 years. He then sells to home owners and buys a new row. His explanation is that repair bills begin to increase after 10 years. The home buyers, being amateurs, do not know this.

This explains a large part of the difficulty in present-day financing. The old-time investor went out of the market because deterioration in quality of houses was forcing him to become not an investor, but a trader. This deterioration did not affect the mortgage market so greatly because mortgages usually run only for a short period; they are practically never as long lived as the shortest lived house. So the mortgagor like the trader usually got out before serious trouble began. In some localities, however, the deterioration both in construction and in type was so rapid and so widespread that long before the war certain bankers in New England, for ex-

ample, began to refuse even mortgage loans on wooden "three-deckers."

Here is the key to the financing problem. Make housing once more a good investment, and capital will be available. The appeal of housing investments does not and should not be in an expectation of large returns, but in an expectation of sure returns and on security for capital invested. Investors have been led away from this conception by "get-rich-quick" schemes, by tales of fabulous increases in land values that more than made good depreciation of building values; and so they have come

Houses will become a good investment and capital will be available when houses are properly located, well designed and well built. Their depreciation will be minimized — they will have a stabilized value.

near to wrecking the house-property market.

If there is anything sure in this world, it is that not enough houses will be secured if home buyers are depended on. But honest, substantial construction is essential to success in tempting investment money back into this field, construction which recognizes that the cost of a house is not fully paid until the house is scrapped, that repair bills are an important item, and that even more important is the decrease in value due to the hopeless shabbiness of a "jerry-built" house after it has lost its first freshness. In housing codes and zoning ordinances municipal authorities are aiming at *stabilization of value*. *These efforts will be useless unless they are supplemented by good construction.*

If success in financing housing is to be attained we must:

1—Give housing property a real investment value. This is being helped by housing codes and zoning ordinances. However, honest building must supplement these. Honest building means sound construction plus good planning and adequate provision for such essentials as outdoor space, light, air, and sanitary conveniences.

2—By study of housing property management; office building managers are working out the principles of their business. During the last two years a few apartment-house managers have contributed a little from their experience. As yet, how-

ever, the small-house managers have not appeared.

It will not be enough to encourage the individual buyer to re-enter the field. In other lines of industry the individual has been supplemented by the corporation, and in the apartment house field the corporation has indeed appeared. It should now enter the small-house field, and with its entrance should also come the tenant stock holder. Other lines of business have found it good policy to have participants become

stock holders. Apartment house corporations are trying the experiment. In their case there is not much hope of substantial and long continued success. The apartment house has so little of the home appeal, and is so essentially a mere stopping place, that most of the attempts to make it co-operative will prove short-lived. With the one family dwelling, however, the case is entirely different. There the prospects are bright, once traditional attitude of mind is overcome.

Method in House Building Starts in New York

NEW JERSEY lumber men at a recent convention in Atlantic City heard one of their number explain how a group of capitalists had turned the assembling principles of Ford automobile production into house manufacture at the rate of one a day.

It developed that experiments have been made with 18 houses in the vicinity of New York this winter. They were the forerunner of several thousand, for which materials are now in course of production. The order for doors alone will call for scores of thousands.

The house, according to one of the capitalists in the group that has perfected the plan to a point of actual operation, contains six rooms and bath. Figuring a 30 ft. lot at \$30 a foot and counting \$200 for cost of street and water connections, cement walks and final grading, the individual house, capable of a wide variety of architectural designs, can be erected complete, including lot, for less than \$6,500, or not over \$6 per month per room, on a 6 per cent basis, exclusive of taxes, insurance, depreciation and repairs. Figuring the average taxes on these houses at about \$100, insurance at \$8 and the depreciation and upkeep at not more than \$100 a year, this house can be rented for \$50 a month, over a trifle over \$8 a room, and still leave a profit of 6 per cent on the investment. The usual speculative built home costs the owner an average minimum of \$11.

This is to be accomplished by standardization. The saving in different localities will be from 30 to 40 per cent under the ordinary method of building. There is to be no cutting on the yard and very little on the job. Every board and part will be cut at standard lengths and widths and some Eastern city like Hoboken or Jersey City will be the location of a vast stockyard from which will be shipped by auto truck the complete parts of one house, say five miles away. Work of erection will start, say at 9 o'clock and by 12 a fleet of trucks will pass the scene for another home seven miles from the distributing point. At 3 another fleet of trucks will pass by for

delivery of material for a home 10 miles from the plant.

One gang finishes the framing of the first house, for instance, and then the finishing gang comes in, then the roofers, plumbers, cement layers. Each gang passes on to the next operation via auto. Material is handled by trained men. It is unloaded in the order of its use, thereby saving extra handling and as a consequence three days will be required to erect a home, with a minimum output of a house a day anywhere in the metropolitan district of New York.

Kills New Jersey Tax Exemption Act

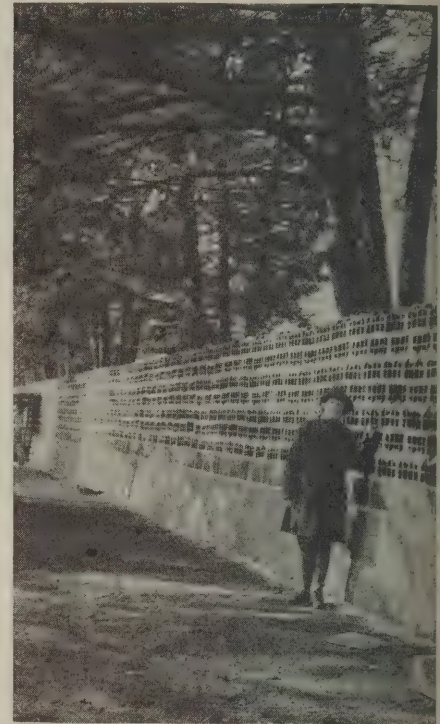
THE New Jersey five-year tax-exemption act of 1920, exempting dwellings constructed between October, 1920, and October, 1922, from taxation, was declared unconstitutional by the Supreme Court March 1. The court held that "this classification of property constructed between certain periods is arbitrary and amounts to special legislation in violation of the constitutional prohibition."

Resistance of Redwood to Rot

THE resistance of redwood to rot is demonstrated in a remarkable fashion by the record of some water pipes of this material which has recently been put forward. These pipes were not of the stave type, but were actually bored from the logs. They were in use for 16 years on the underground water system of a Western ranch. This system was torn up, and the pipes piled in the open where they remained for 10 years more, weathering in the sun and rain. They have recently been examined with the view to putting them in service again, and are found to be in a condition fully justifying this step.—*Scientific American*.

Hollow Tile Used in Making Novel Wall

THE use of ordinary hollow tile is hardly to be expected in the making of a garden wall, especially if the open ends of the tile are exposed, but just that form of construction has been employed very effectively by a Pasadena, Calif., builder. The wall consists of a cement foundation rising about 24 inches above the ground, on top of which is laid the hollow tile to the desired height, no coating of any kind being used to conceal the exposed tile ends.



Wall made of hollow tile laid with ends exposed. This type of construction has been found to be particularly suited for walls over which vines are to climb. The cost is very much less than any other kind of masonry wall

The explanation of the use of this kind of a wall lies in the fact that it has been found that this construction is particularly suited for climbing vines. It has been found that ivy vines and other climbers will quickly spread over this kind of a wall, making a very beautiful addition to a yard or estate.

The cost item is an important consideration since this type of barrier can be constructed for much less than a finished wall, of either brick or stone.

Apprentices!

ACCORDING to labor leaders, there are only 1800 bricklaying apprentices in the 947 locals of 90,000 mechanics. Because of labor shortage, plasterers are getting as high as \$18 a day in New York.—*Bulletin of the Federation of Construction Industries*.

The Highest Concrete Building

By Gilbert I. Stodola

Builders of Concrete Structures in General Will Find Valuable Suggestions in the Many Novel Methods and Expedients Developed in This Construction

ONE of the most interesting achievements in concrete construction is the recent completion of the tallest reinforced all-concrete building in the United States. This is the Hide and Leather Building in New York City, of which Thompson and Binger, Inc., were engineers and contractors and Starett and Van Vleck, the consulting architects, both New York City firms. The building is an 18-story structure, 225 ft. high, owned by the Hide and Leather Realty Co., an association of prominent hide and leather corporations. It is located in the heart of New York's hide and leather district and is intended to be used for both loft and office purposes.

Besides having the distinction of being "the tallest concrete skyscraper in the country," there are a number of interesting features connected with its construction that make it of peculiar interest to architects and builders.

Built on a Swamp

The building stands at the corner of Gold and Frankfort streets, that is to say at the Manhattan Terminal of the old Brooklyn bridge. The two structures are in interesting contrast. The first represents what might truthfully be termed the climax in one particular branch of concrete construction; the other, built largely of massive granite blocks, stands for a passing order of things, having been completed almost before the possibilities of concrete for office buildings was even dreamed of.

The Hide and Leather building stands on what is popularly known as "The Swamp." This is a piece of filled-in ground with top layers of peat overlying fine and coarse sand and similar material of varying depths to a total of 100 ft. before solid rock is reached. Under such conditions, the decision as to the best form of foundation to be employed presented something of a problem. This was especially so in view of the fact that all the floors of the building were intended to hold quantities of leather, a very heavy material. The sustaining power of the floors had thus to be at least 200 lbs. per sq. ft., and as a matter of fact on some of the individual interior columns the load runs to 1,250,000 lbs.

"Pre-Test Foundation"

The type of foundation decided upon, after a considerable study of conditions,



Hide and Leather Building, New York City, N. Y.

was that known as the "pre-test." This is a method of foundation construction which was worked out six or seven years ago, but has been used only infrequently, so that it is little known, even among builders. However, it has been found very efficient for building foundations on sand or soils other than rock.

By this method, concrete cylinders about 20 in. in diameter and 3 ft. in length are jacked into the ground by means of hand-operated hydraulic pumps, using the foundations of the building itself as a reaction.

The actual procedure is as follows: A thin sheet-steel cylinder 3 ft. long is driven into the ground by means of hand hammers. The soil inside it is excavated with shovels and "spoons." The cylinder is then filled with concrete, which is allowed to harden. It is then covered with a heavy steel bearing plate, and on this are placed the twin rams of hydraulic jack. It must



The entire curtain wall, lintels, mullions and columns from floor to floor were poured at one time



Shows method of shoring, which made it possible to strip the greater part of the shores under floor slab and still leave sufficient form work undisturbed to carry slab with absolute safety, when the steel forms and shoring were needed for upper floors and the concrete had not set sufficiently to be left unsupported

be understood that the concrete footings and foundation walls have previously been shored up so that all this work is done in a working chamber about 3 ft. deep under the foundations. By means of a one-man hydraulic pump, the jacks are made to force the concrete cylinder into the ground. The actual resistance which the cylinder meets is registered by a gauge on the pump. Of course, the man operating the pump does not have to be in the working chamber, as the pump is connected to the ram by means of a flexible copper pipe.

Whole rows of these cylinders are tested to a fractional part of the load, which they will eventually be required to take. A shore in the form of a steel I-beam is always placed between the twin rams before the jack is removed, so as to prevent any rebound of the cylinder, thus preserving the pressure bulb at its foot. As soon as

the jack has been extended for a sufficient distance it is entirely removed and a new 3-ft. sheet-steel tube placed (above the cylinder already in the ground) and promptly filled with concrete. A bearing plate is put over the green concrete and the work proceeds, it being apparent that the sheet steel tube acts only to take care of the bursting stresses caused by the wet concrete, and does not carry any of the load. When a new cylinder is thus added, the neighboring piles are, of course, pre-tested and shored to take the entire load.

The object, which this system so well accomplishes, is that each cylinder shall be made to carry an exact, pre-determined load, regardless of whether or not it must be driven into the ground deeper or not so deep as the other cylinders, according to the variations of the sand strata. Thus you literally begin the erection of your building before you have put down your foundation, at first glance a somewhat



Showing steel form for column



Laying down plates of steel floor forms. Copyright International

startling and seemingly topsy-turvy arrangement.

Frost Had No Terrors

The erection of the Hide and Leather building again demonstrated the feasibility of carrying on concrete construction in the winter months, and proved that such work can be conducted with great speed if things are well organized. The first floor was completed in October, 1920, and the sixteenth floor was completed four months afterwards. During this period fifteen complete working days were lost on account of inclement weather. Thus one floor was poured every six calendar days.

The method employed to facilitate the pouring and prevent frozen concrete proved thoroughly efficacious.

As soon as construction had reached the first floor, the latter was adequately shored, to enable it to bear the load which it was to be called upon to sustain. Planking was now laid down, upon which a system of perforated steam pipes (about 12-in. centers) was arranged. These pipes served to warm the aggregates stored on this floor, which usually held enough material to pour two whole floors, or about 600 yds. By means of suitable valves the steam could be turned off or on at will in any bay desired. Planks placed between the pipes en-

abled trucks to drive over the pipes without damaging them. The material was wheeled from the piles as needed and pumped into a hopper, through which it fell directly into the mixer in the basement, which had been set up in what was to be the elevator shaft of the building.

Up this shaft ran the usual wooden hoist tower, the mixed aggregate being drawn up in the customary bucket. The adoption of the chute system proved a great help in facilitating the work of pouring, because of the small floor space (the plot is only 70x80 ft.). Thus it was possible to pour concrete over the heads of men working on the floor and so prevent crowding, which would have ensued had the concrete been transferred in buggies.

A water tank was constructed capable of supplying sufficient water, without replenishing, for the preparation of four or five batches of concrete. This water was kept almost at the boiling point by the introduction of live steam and thus the concrete reached the forms steaming hot.

Immediately after a bay had been poured 4x4's were set down, sloping from the surface to the dowels of the columns, and specially prepared tarpaulins were battened down. Further, a hole cut in the steel slab form in the center of each bay, with a box built over it, permitted the heat from the salamanders to circulate between the canvas and the concrete surface. As a further precaution heavy tarpaulins were hung over the outside walls of the building and additional salamanders installed just inside the walls. A thermometer registering maximum temperatures was on the job and both these temperatures were noted in the daily report to the office. In addition, wooden-enclosed thermometers, similar to those used in bathtubs, were set about the job and the concrete foreman was constantly reading the temperature of the fresh concrete. These measures proved so effective that there was not a single instance of frozen concrete.

Unique Strength Test Method

Naturally in erecting a concrete structure of such unusual height, and with such rapidity, great care had to be exercised, especially during the winter months, to make sure that the concrete was not subjected to undue strain before it had properly ripened. The customary plan of keeping the floors shored was of course followed, five floors being usually shored at all times, but as it was desirable to remove the shoring as rapidly as consistent with safety, a simple but novel plan was worked out to enable the engineers to determine, when desired, the exact condition of a particular section of concrete. Immediately after the placing of a floor slab, twelve galvanized iron cylinders of 3-in. diameter were pressed into the soft concrete and permitted to remain there for definite periods. To facilitate the removal of these test pieces each cylinder



The building had reached the fourteenth story. Note the method of protecting the concrete from freezing. Also that the lower floors have already been glazed, making it possible to advance the interior finish along with the structural construction

was first put into a pasteboard mailing tube, which, rotting in the course of a few days, permitted the easy removal of the cylinder with its enclosed concrete as desired. These test cylinders of 1:2:4 concrete were removed after periods of 7, 14, 21 and 28 days, and crushed by a testing laboratory. The tests showed a strength as high as 1,800 lbs. per sq. in. after 28 days.

In addition to the foregoing, daily slump tests of the consistency of the mix were taken.

Space Saved in Column and Wall Construction

One of the noteworthy features of the Hide and Leather building is the smallness of the columns. Opponents of concrete construction have frequently pointed to the necessity of large columns in concrete buildings, as a wasteful feature, with respect to space. In this building that fault has been entirely overcome. The columns on the ground floor are only 38 in. in diameter, whereas in many lower loft and office buildings of other types of construction the columns are at least a third larger, even in some cases where they are not required to sustain such heavy loads as those of this building. The reduction of the size of columns is therefore a distinct achievement

and was made possible by the use of a special reinforcement combined with the employment of a very rich concrete, a mixture 1:1½:3. The reinforcement consists of cold drawn steel hoop spiral and the maximum vertical steel in bars allowed by the New York City building code. A further saving of space was effected by using 8-in. concrete curtain walls instead of brick: had the latter been employed a 12-in. wall would have been required by the building code.

An interesting instance of the care exercised in putting up this building and to which may be attributed a good deal of its workmanlike finish, is shown in the fact that a comprehensive survey of the floors had been mapped out before the column forms were set, at which time accurate foresights and backsights were established on surrounding buildings. Transits were placed on neighboring structures and readings were taken at frequent intervals during the course of construction, in order to check up the alignment of all important columns.

By the exercise of the same accuracy in connection with the construction of the elevator shafts, it was possible to place a definite order for the elevator cars when the construction of the building had reached the second story. The elevator guides were installed in the shafts as each floor was poured, the contractor guaranteeing the verticality of the shaft itself, with the result that the elevators in two of the shafts were in operation a full month before the completion date for the building, called for



Ready for pouring the special facing concrete. Note expanded metal attached to reinforcement



Basement, showing the method of jacking down the pre-test piles

in the contract. Ordinarily the shafts would have been measured after completion and the cars ordered to fit the smallest opening.

Attractive Surface Finishes

The possibilities of attaining pleasing finishes in concrete are well exemplified in this building. The interior is of flat slab design and the depressed panels are octagonal. Special forms of exceptionally attractive design were used for the heads of the columns. After completion the interior concrete was sand floated, subsequent to the removal of board marks and other blemishes. Berg electric rotary surfacers with carborundum stone were employed for the purpose.

The exterior surface merits special mention because of its unique character. As concrete workers know, it is not easy to obtain a pleasing effect in concrete exteriors. Frequently limestone or cast stone blocks are used for facing the lower floors of concrete structures, but the engineers did not look favorably upon the plan in this instance, as it was desired to preserve the monolithic character of the building. As the finished building stands today, the lower two floors give the impression of having been faced with a beautiful pinkish granite. This unusual effect was produced by casting the surfacing in place, using the following ingenious plan worked out by the engineers.

After the steel reinforcements had been fabricated as usual, half-inch expanded metal was wired to the rods, leaving a varying distance of from $1\frac{1}{2}$ to 2 in. between the expanded metal and the outer form, this being the space usually devoted to the so-called "fire-proofing." Into this outer space a special surface concrete was

poured, consisting of one part Atlas white portland cement and two parts of a colored aggregate, the latter being composed of green stone chips, feldspar and quartz, running in size from $\frac{1}{16}$ to $\frac{1}{4}$ in. This surface concrete, which was hand-mixed and of dry consistency, was guided into the front space by a broad, flat chute and



Placing building load on pre-tested piles by means of hydraulic jacks. Note that the piles are being jacked down against footing slab above. Courtesy, Spencer White Curtis, Inc.

tamped in place with a special T-head tamper, the latter being made by fastening a 1-in. flat, 6-in. long to a $\frac{1}{2}$ -in. bar about 12 ft. in length.

The larger space, that is, the space between the expanded metal and the rear form, was of course poured with the usual coarser aggregate. Precautions were taken to have the facing concrete pile up about 1 ft. higher than the structural concrete during the process, to prevent the common aggregate from flowing to the outside face. After the forms for the exterior surface had been removed and the necessary patching done, the concrete was permitted to season during the winter; in the early spring it was ready to receive its final finish. The lower two floors were bush-hammered by stone masons, the upper sixteen being surfaced by the Berg machine, after which a colorless waterproofing was applied over the entire exterior. This treatment has insured the walls being thoroughly waterproof, and was done mainly to prevent the elements from attacking the surface of the concrete.

Steel Forms Prove Advantageous

Throughout the construction, flat-steel slab-form plates (the Deslaurier system) were employed, instead of the usual wood forms. As these were available in large sections—2x8 ft.—their use made unnecessary much of the patching and working-over usually required, a specially advantageous feature in the case of the ceilings. The steel forms, likewise, because of their superior heat-conducting qualities, facilitated the drying and setting of the concrete. Another meritorious feature was that the use of steel forms resulted in a financial saving, besides insuring that the upper floors had as good ceilings as the lower, since these forms do not deteriorate with use.

The Hide and Leather building may truthfully be said to be a concrete skyscraper, as practically every item that could desirably be made of concrete was poured off that material, even including the 10,000-gal. tank under the roof. Incidentally, the walls of this tank are at the same time used as part of the structure, the very small flat section at the extreme top of the roof resting on the tank.

The construction of this building demonstrated that a reinforced concrete can be erected as rapidly as a structural steel building after the plans are ready. Although the actual erection time of the steel building is less, the period between the start and completion is prolonged by the necessity of waiting for steel members to be fabricated.

Two other facts in connection with the construction of this remarkable building are of interest. One is, that, because of the extreme care taken for the safety of the workmen, there was not a single accident other than the usual minor bruises and

abrasions. Another is that the building was kept glazed as the work progressed, an unusual proceeding in concrete construction. Although a little glass was broken,

this slight additional expense was amply compensated for by the facility with which inside work could be done without interference from the elements.

Combination Napery Closet and Work Table

THE accompanying photographs illustrate a clever space-saving device found in a California house. Closed, the effect is that of an ordinary built-in cabinet of good design, with drawers below and paneled doors above. Upon opening the upper part, however, what was apparently three doors proves to be one large one, which is hinged at the bottom instead of at the side and lets down to form a wide shelf. The two uprights which serve to separate the panels swing out from the top and down, forming legs to the shelf and thus converting it into a firm, well-braced table. These same uprights, when the shelf or door is shoved back into place against the wall, act as automatic locks or braces, while their simple and well-designed metal hinges have a distinct decorative value.

While the original of this combination cabinet-table was designed for a small sewing-room, the idea can be utilized to advantage in breakfast alcoves, children's play-rooms, and so on. Care should be taken that the shelves in the wall are not made too deep, as the wide table in front would make very deep ones almost inaccessible.



Fig. 1—A built-in cabinet of good lines and proportion



Fig. 2—The door of this cabinet for holding sewing-room supplies becomes a cutting table when opened

Sales Value of a Well-Designed House

By Edward F. Hammel

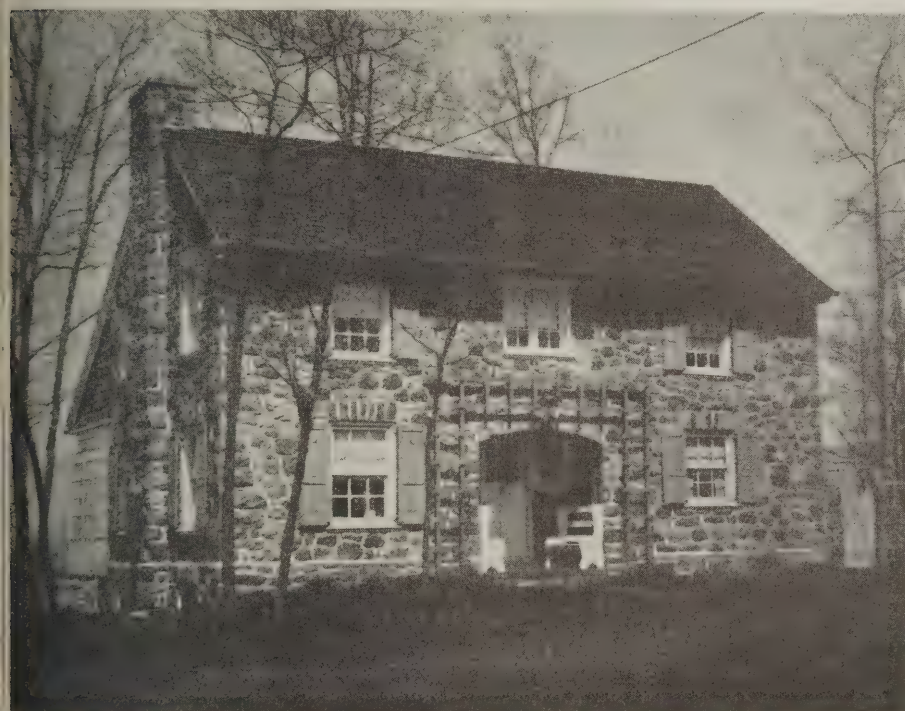
A Good Design Makes Houses More Attractive and Adds to their Value Because they are More Easily Sold as Described in this Article

SOMETIMES a builder takes a lot or two in part payment on some job and builds on them to get his money out. Occasionally he conducts a profitable business of building and selling houses, or he may just build to keep his organization busy.

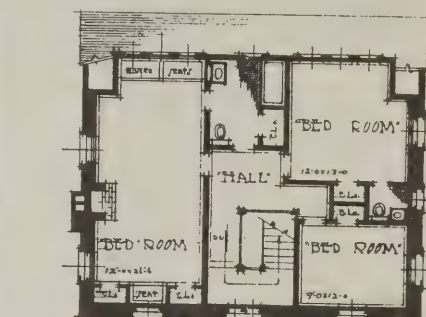
One concern, with whom I am familiar, built fifty houses in 1919 in a town of moderate size and has sold every one of them,

ing in a profit. I am not advocating the construction of such high priced residences, but simply point out that it can be done. They are excellently designed houses. This particular man has been selling houses for years and knows what he is talking about. When I asked him what, in his opinion, accounts for the fact that some houses are sold almost before the plaster is dry while

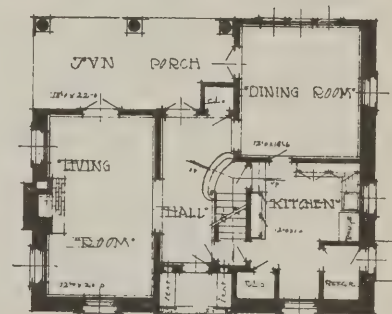
sum. The first house was completed and still unsold when the second was finished and easily sold, by my friend the real estate agent. It was sold at a figure somewhat higher than anticipated. Finally the first house was sold, with much effort—to a less discriminating buyer, and at a price \$600 lower than that obtained for the other. Both houses cost the builder approximately



House of Leslie Winpenny at Essex Falls, N. J.



SECOND FLOOR PLAN



FIRST FLOOR PLAN

Plans of Leslie Winpenny house

while several other builders in that same town still had the few houses they erected unsold and on their hands. They expect to sell at a loss. Perhaps, Mr. Builder, you have seen the same thing. Have you ever asked yourself why? *There is a reason.*

The other day I was talking with a real estate man, who for the past year has been connected with a large home building corporation. This firm has been building and selling houses during these high price times in which many are afraid to embark on a building venture. These houses have been selling as high as \$20,000 each and bring-

others are a drug on the market, he answered, "It's a matter of good or bad design." And then he told me of just one case—he could have cited a hundred, I suppose, where this fact was clearly brought out. A certain builder of his acquaintance recently built two houses—one he started according to a design worked out by the draftsman in his office. Later he saw a most attractive house illustrated in one of the building magazines to which he subscribed. He liked it so much that he got in touch with the architect responsible for the design and eventually secured from him a set of plans of the house at a nominal

the same amount to build. In that case, "good design" was worth in cash just \$600.

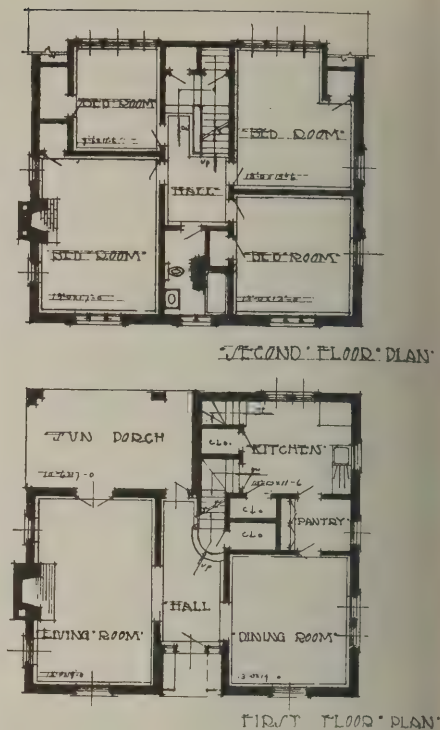
Accompanying this article are illustrations of a few of the many houses designed by Mr. Kenneth W. Dalzell, a successful country house architect of New Jersey. Many of the houses were built for clients, but some were constructed by home building companies as development projects and sold at a fair profit.

All are excellently worked out small houses and it is interesting to note the method of handling the different materials in each case.

Where local stone was available it was



House of Douglas Griesemer, Maplewood, N. J.



Plans of the Douglas Griesemer house

used in the wall construction, and in the case of the Winpenny house, made very attractive by the use of a wide white joint.

The house of Douglas Griesemer at Maplewood is very similar to the Winpenny house in design, but the plan is different and the material of the exterior is Fisklock brick laid with a wide white cement joint.

This house faces southeast, therefore the dining room was placed in the front and the kitchen to the northwest. The living room has the south and west exposure. A short rear stairs meets the front stairs on the landing. The hall runs through to the porch. Under the porch is a garage made possible by the sloping grade to the rear. The fireplace is of red brick with a Colonial mantel. The dining room has a low wood wainscot painted white. Above is a hollyhock paper which is so decorative that no pictures or other decorations are needed on the walls.

The second floor has four rooms and bath. Though nothing is finished on the third floor, there is ample room for two more rooms and another bath, the roughing for which was installed when the house was built. The floors throughout are double, the finish floor being oak. The leaders, gutters and screens are of copper, which, with the brick exterior puts the cost of maintenance at a minimum.

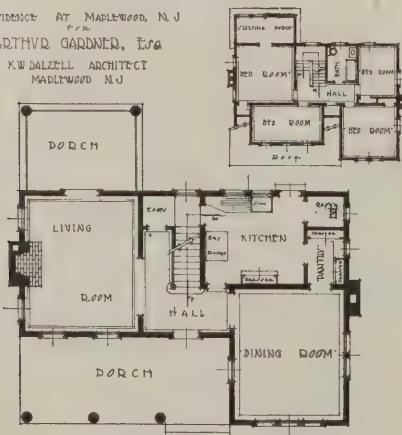
Both of these houses follow Colonial precedent in design.

The house of Mr. Gardner shows good treatment, the roof extending over the porch with dormer above, thus permitting an extra bedroom in the second story. Here wood shingles have been used to advantage.

The house of Mrs. Lawton is after the Italian type, and here stucco on hollow tile has served best to carry out the design.

RESIDENCE AT MAPLEWOOD, N. J.

ARTHUR GARDNER, Esq.
KIMBALLZELL ARCHITECT
MAPLEWOOD, N. J.

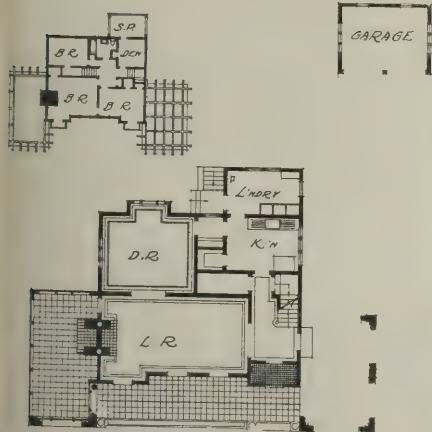


House of Arthur Gardner, Maplewood, N. J.



Residence of Mrs. Henrietta Lawton, Maplewood, N. J.

The iron balconies, pergola and sun porch are attractive features. It is unfortunate that the photographs cannot be reproduced in color, as the color scheme, in each case, is excellent. The use of color adds much to the attractiveness of



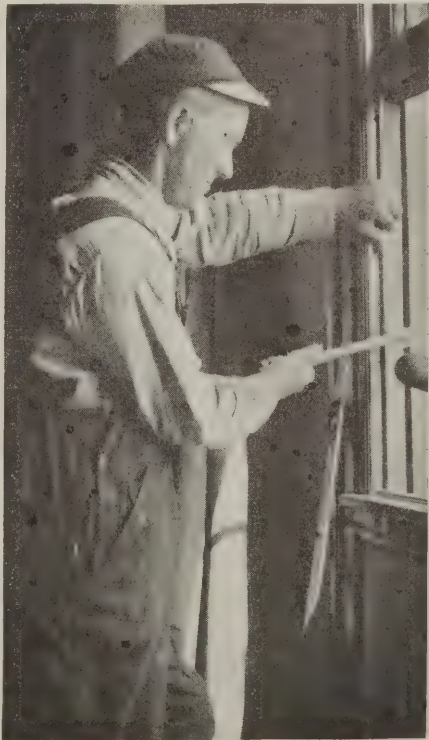
Plans of Mrs. Lawton's house

a house if correctly selected—otherwise it is a positive detriment. Now, Mr. Builder, learn a lesson from the real estate man and don't go building any kind of a house just because the country is—well, some go so far as to say a million and a half homes short—but build houses that are so attractive that they can be sold at any time under any market conditions, in fact, build houses that will sell themselves and bring you a profit.

WATCH FOR THE MAY ISSUE—
The May issue of NATIONAL BUILDER will mark another notable advance in its service to builders.

Weatherstripping

WEATHERSTRIPPING has been and is likely to continue to be an "after-building" job to a considerable extent. The



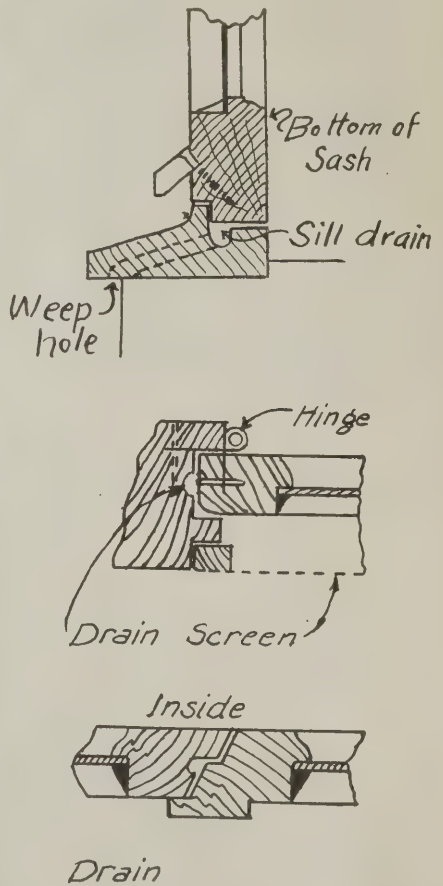
Advertise your careful and competent workmen

best designed plan of weatherstripping may be bungled by incompetence or carelessness, and it is for this reason that specially

trained men are employed so largely for this work. The interest in a builder created in the mind of the average citizen through the skill and care of the man sent to do the work is a big asset, and some contractors in a large way of business make it a point to advertise their workmen and their long terms of connection with them and find it good business.

Weatherproof Casement Window

IN his interesting volume on "Small Houses," Ernest Flagg, architect, New York City, shows great partiality for inward-opening casement (or French) win-



dows. Their advantages of easy cleaning, without interference with the screens, the opportunity of opening the whole window at one time, etc., are generally appreciated. The prejudice against these windows in America, Mr. Flagg says, is wholly because they are not properly constructed. They should be built as they have been built in France for many years. He says they can't be made to exclude water entirely and it is vain to attempt to do this. The trick is to catch the water that does seep in and lead it away before it gets in where damage will be done. The accompanying sketch shows how he does it.



Styles in Houses

Introducing a New Feature of "National Builder"

ARCHITECTS, builders and contractors who continue in business 10, 20 or 30 years are of course aware that styles in houses change from time to time, almost as radically, if not so frequently, as styles in clothes. A builder of discretion will avoid extreme styles, but he must nevertheless know and keep in harmony with the essentials of the best current style.

*

Current style varies not only with time but locality, or at least has in the past varied considerably in different sections of the country; but whether this is due to fundamental local requirements, or a real lack of knowledge of what was good style elsewhere, is a questionable point. Today the tendency of wide-awake builders is to watch for style everywhere and to try to be leaders in style in their respective localities, just as does the wide-awake merchant of any commodity.

*

So with this issue of NATIONAL BUILDER begins a "style sheet" for modern houses. It will be filled each issue with the very cream of attractive houses from every corner of the United States and Canada. Its purpose is to post our readers on what are new and attractive and popular creations in the realm of house-building art—and to furnish them with ideas for architectural features that they may incorporate in their own creations.

*

One of the most successful builders in Houston, Tex., makes an annual pilgrimage to California for no other purpose than to see and take pictures of what California builders have been doing in the past year. We believe it would be good business for every house builder to do the same, for in California there has arisen *keen competition for attractiveness* in house exteriors and interiors, that inevitably leads to new ideas, new styles and *selling points* which are priceless to the forward-looking house builder everywhere.

*

However, all good house designs do not come out of

California by any means. The same spirit for competing to build the most attractive small house—the most stylish—is arising in every locality. But every builder can't get away to visit California once a year. Maybe he can't get away to visit work in his immediate locality. So NATIONAL BUILDER is going to bring this work to him in the finest pictures the photographic and engraving arts can produce.

*

Floor plans and construction details vary so much in different localities that the editors doubt the utility to our readers of such plans in the case of these "Style Book Houses." However, that is a point on which we should like to hear from our readers. The plans can of course be obtained in most cases if it is essential, but, as already stated, the main purpose of this style book is to inform our readers *what is up-to-the-minute style*, and to furnish them with *architectural ideas*, rather than detail plans.

*

For publication in these pages the houses illustrated must be new, attractive, well built and stylish. The pictures are gathered from various sources—most of them at present are from photographs taken by the editors in their travels. But we want to show the houses our own readers build, wherever possible, and therefore make the following standing offer:

Every reader of NATIONAL BUILDER is invited to send a photograph of his best house, together with such details regarding its price, popularity, floor plan, etc., that will enable the editors to form their judgment of the merit of the house for inclusion in the *National Builder Style Sheet*. If accepted for inclusion in the *National Builder Style Sheet*, we will pay for having an artistic photograph made by your local photographer, and under the picture published in NATIONAL BUILDER will appear the name of the architect, builder or contractor who is responsible for its design or construction. This is an all-the-year-round National Exhibit of House Architecture, open to every NATIONAL BUILDER reader. Small apartment house views will be included.

National Builder Style Sheet



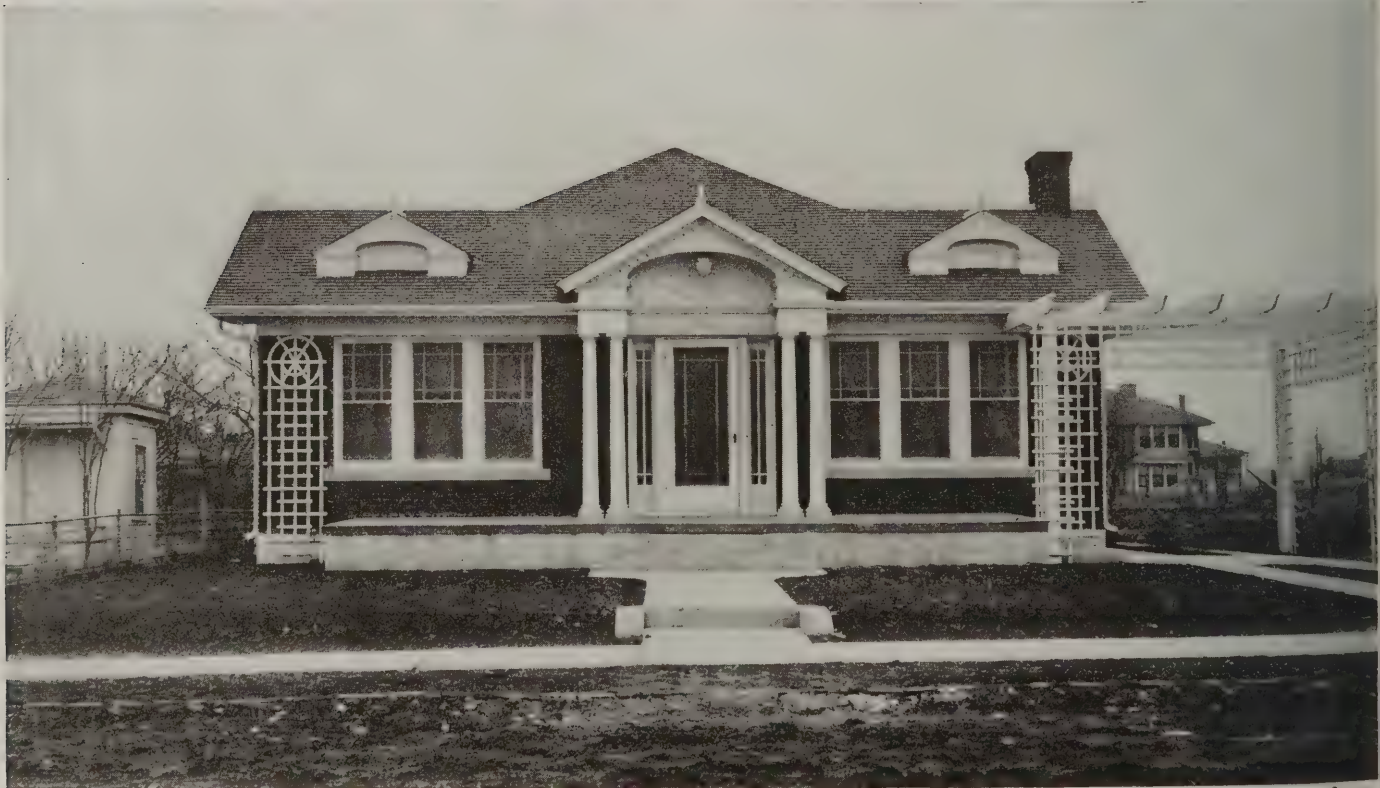
Attractive story-and-a-half house in Houston, Texas. Small but "homey" looking—due probably in some degree to the shrubbery. Wood shingled roof



A double bungalow. Apparently a recent creation in Dallas, Texas, where they have become quite popular in the last year or two



A high-roofed bungalow in California—the higher the cooler



A very popular bungalow in Dallas, Texas. Red face brick with white trim and Colonial atmosphere



California cottage showing English influence



A bungalow in the Belmont section of Dallas, Texas. Full length windows on porch, with door screens, give individuality



Suggesting an Italian style for sunny days in California



The French windows add to the air of dignified hospitality of this California home



A "Nelson" bungalow, Indianapolis, Ind. Note how the squatty effect, often too apparent in a bungalow, is overcome by the high roof and dormer windows. In a grove of tall trees like this an ordinary bungalow would have been squatty indeed. Mottled composition red and green roof



A bungalow of distinction



A composition showing French influence



A modern effect



Slate-roofed, white stucco bungalow in the Highland Park section of Dallas, Texas. Small but aristocratic looking



Dutch Colonial in California



Showing Dutch Colonial influence in California



A snug-looking "farm" house in Dallas, Texas. "Homey" effect produced without shrubbery or trees

Sanitation, Heating and Lighting for a Suburban or Country House

No. 5, Continued—By Edward E. Ashley, Engineer,
Starrett and Van Vleck, Architects, New York City

THE sand filter is extensively used in connection with large plants, and may be successfully used in connection with a small plant, especially where ground conditions will not permit of subsoil irrigation. These beds are of sizes dependent upon the number of persons served by the disposal plant. They are always built in several units, to permit resting and drying out, arranged so that the effluent may be turned on any section at any time. (See table, Fig. 18, page 39, in March issue, for sizes.)

The dosing chamber for filter beds must be proportioned so that they contain sufficient effluent to completely cover the filter area in one dose. When these filters are artificial, it is then necessary to provide an under drain to take away the filtered effluent.

Construction of Tank—The tank should preferably be constructed of reinforced concrete with bottom sloping to one end, and provided with a drain for sludge. The top

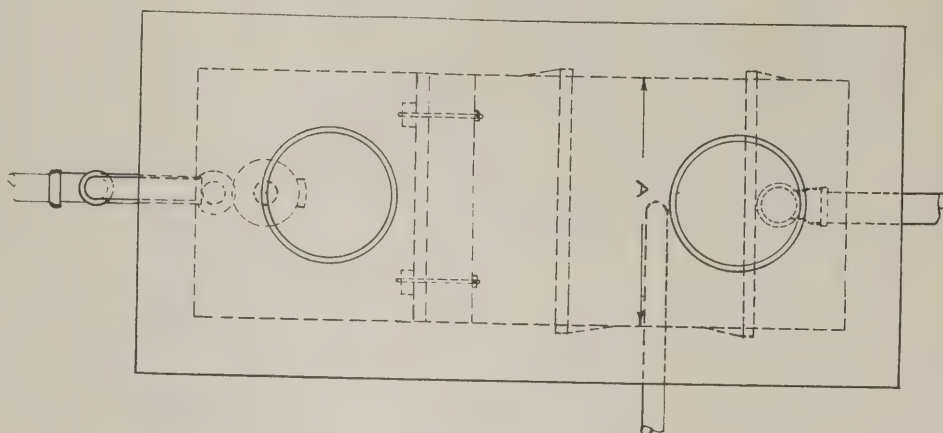


Fig. 20—Plan of septic tank

of tank should be provided with two manholes, one near the inlet pipe, and one near the syphon chamber.

The inlet pipe should be so installed that the incoming sewage will not disturb the contents of the tank. Baffle boards should

be provided at both inlet and outlet, to avoid any possibility of cross currents and a weir board should be provided at the discharge to the syphon tank. Provision should be made to carry off the gases and to allow a supply of fresh air. It is important that

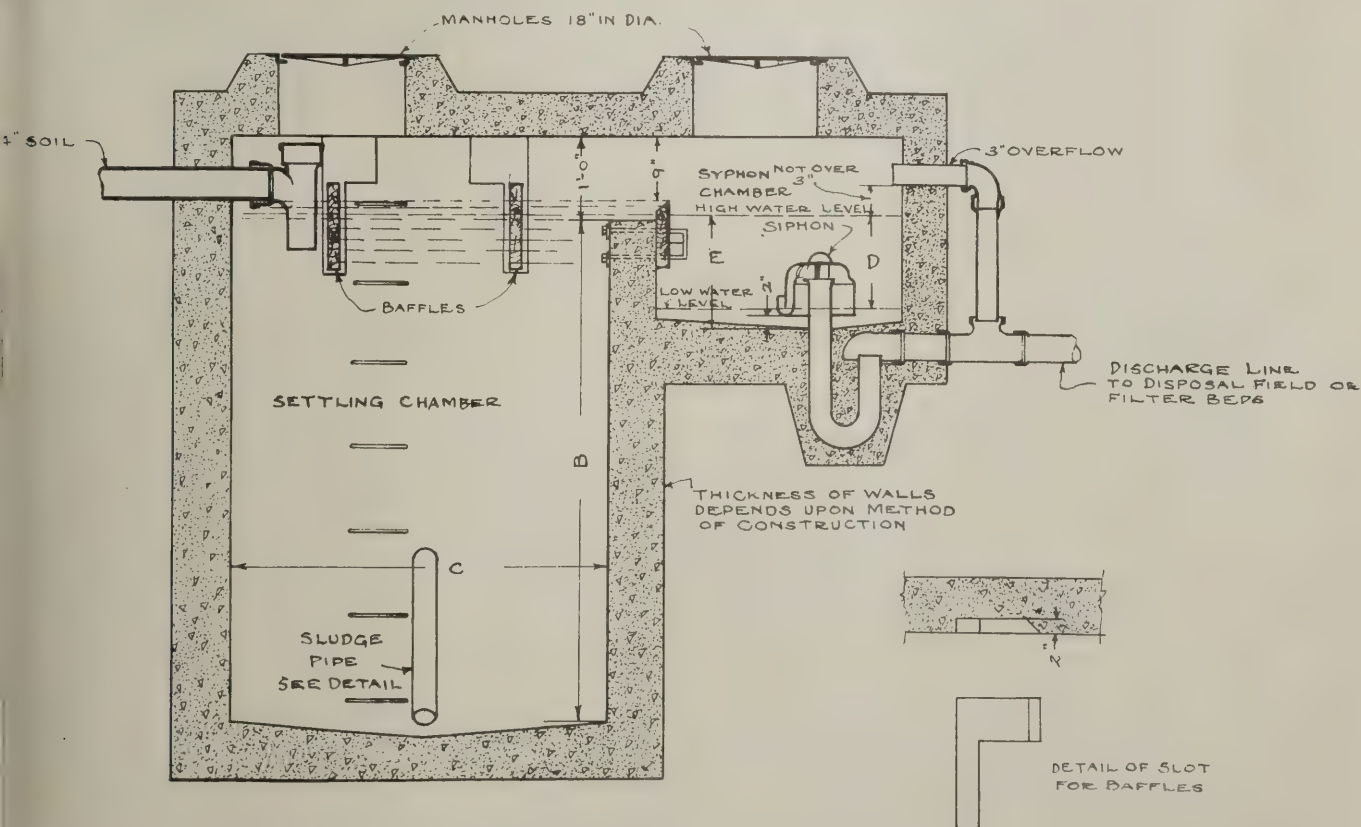


Fig. 21—Sectional view and details of septic tank

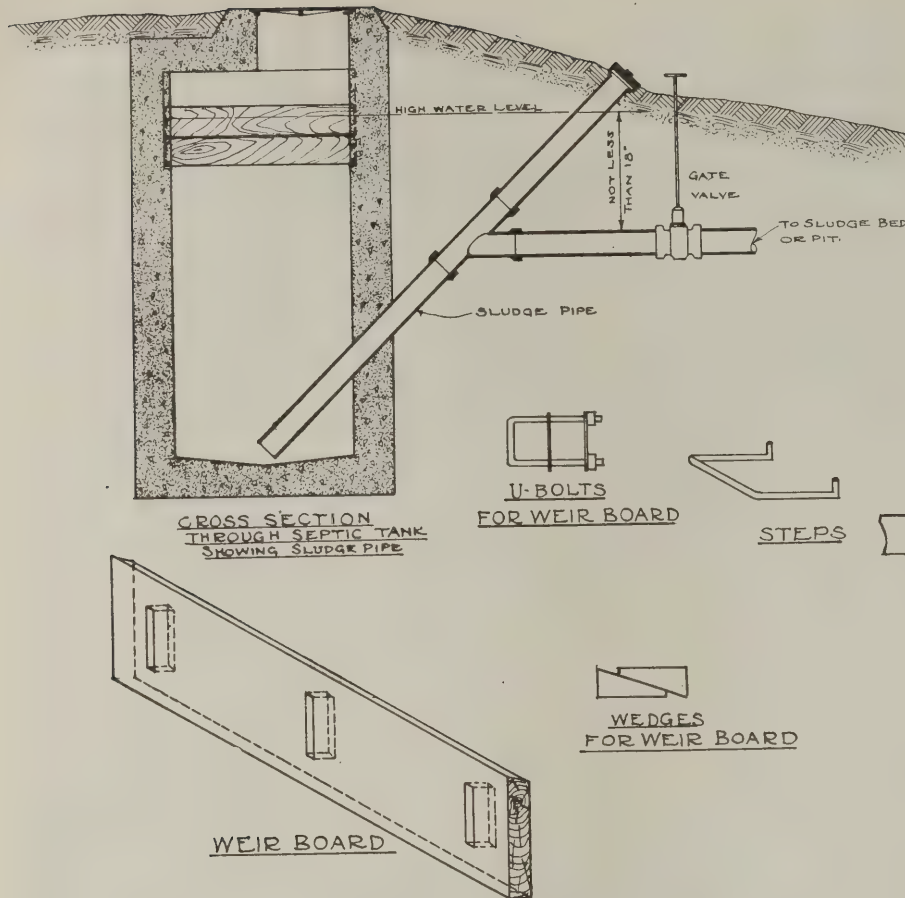


Fig. 22—Cross section of septic tank and details of fittings

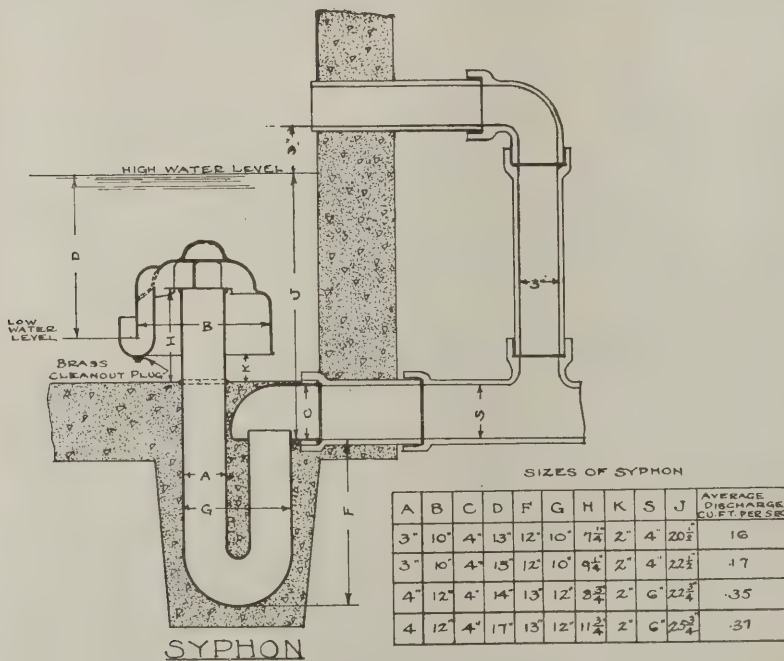


Fig. 23—Section of dosing chamber showing syphon

all openings to the tank and syphon chamber be screened.

The tank should be so located that the top of it will come about level with the ground, allowing just enough above the top slab to permit of planting grass.

The average tank should be proportioned

to allow from 10 to 20 cubic feet for each person served, which will allow a detention period of not less than 6 hours or more than 24 hours under the varying conditions imposed by the usual household. The tank should be, at least, 6 feet deep, and the length should be at least twice the width

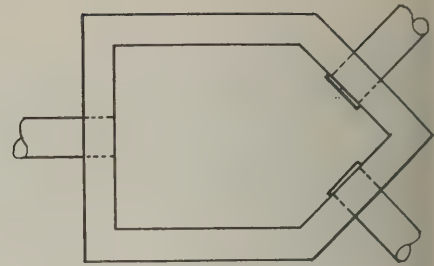


Fig. 24—Plan of diverting chamber

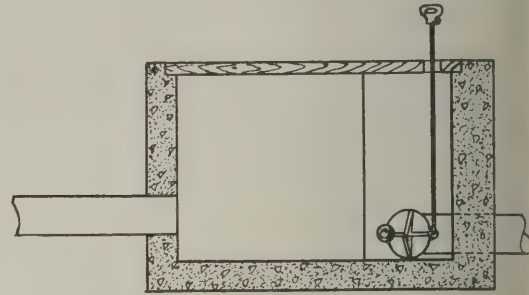


Fig. 25—Section of diverting chamber

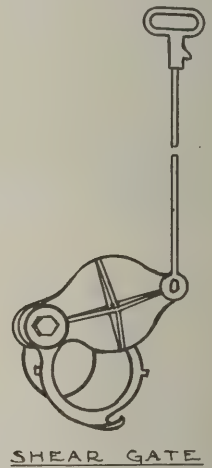


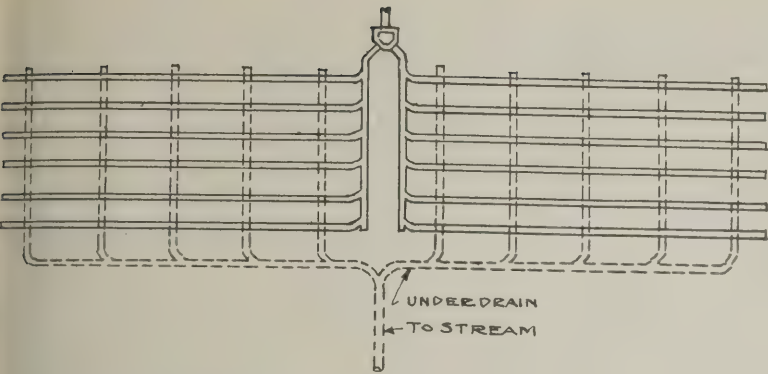
Fig. 26—Shear gate of diverting chamber

which should admit of a velocity of the liquid through the tank of about 5 feet per hour. (See Figs. 20, 21 and 22.)

The sludge pipe should be provided with a gate valve, and be arranged so that the sludge will flow by gravity, or may be pumped into a drying bed or carted away.

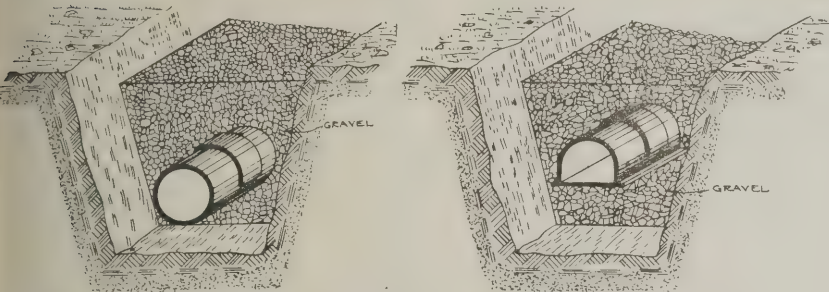
The syphon or dosing chamber should be kept as shallow as possible, but with sufficient capacity to completely dose the irrigation field or bed. However, this should never necessitate retaining the effluent over two hours, especially in warm weather. (See Figs 21 and 23.)

From the dosing tank, the effluent drain should be run to the filter or irrigation field. This pipe should be salt glazed, vitrified tile sewer pipe with cemented joint and run at a fall of about 9 in. in 100 ft. and should be two sizes larger than the syphon to which it connects. It should dis

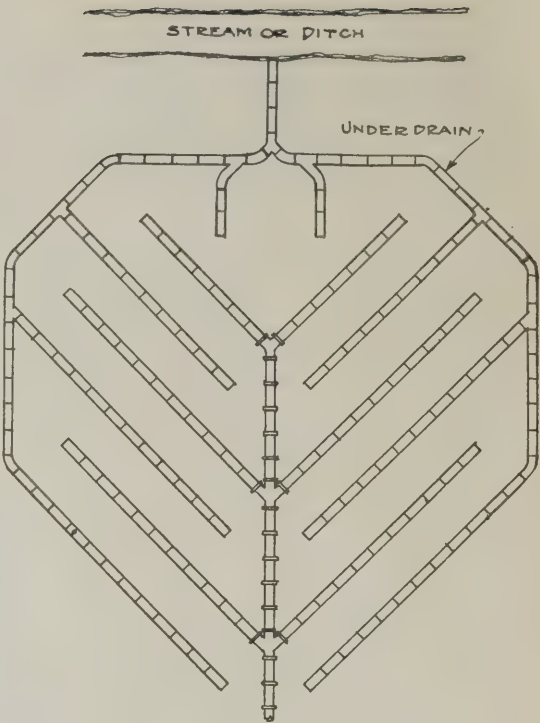


DOUBLE SUB-SURFACE TILING SYSTEM WITH UNDERDRAINS FOR LARGE INSTALLATIONS BEING USED FOR COMPARATIVELY SHORT PERIOD DURING EACH YEAR

Fig. 28



Figs. 30 and 31—Types of drain tile laid in gravel, broken stone or cinders



SINGLE SYSTEM WITH UNDER DRAINED FIELD FOR CARRYING OFF THE PURIFIED WATER IN HEAVY CLAY SOILS

Fig. 29

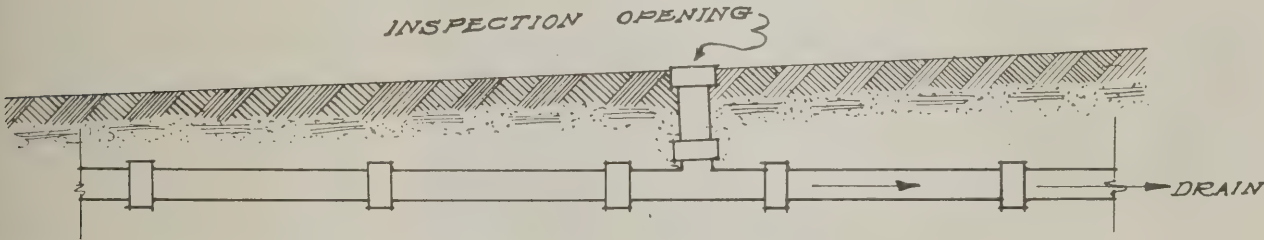


Fig. 32—Inspection T and air inlet

charge into a diverting chamber (Figs. 24 and 25) from which the pipe lines lead to the two or more sections of the irrigation or filter field. This chamber may be kept close to or be an actual part of the syphon chamber, although it is preferable to have it at a little distance from the syphon to allow for a slight velocity head.

From the diverting chamber the drain is split into two sections. These pipe lines are likewise of vitrified tile with "Y" branch outlets spaced on laterals, which are porous tile, better known as agricultural tile, laid with open joints and cover plates. Some firms specializing in disposal plants have "V" shaped tile with a flat bottom which they use in place of the ground tile. Generally the lateral drains are run at 45 degrees to the branch mains but variations must be made in order to have drains keep near the surface of the ground and therefore keep parallel with its contours.

The number of lineal feet of agricultural drain materially depends on the porosity

of the ground and the number of persons served. Experience has shown that there should be at least 40 feet of drain for each person and not more than 2½ gallons of effluent per lineal foot per day. These drains should be spread at least 6 feet apart in good loams and sandy soils, and at least 9 feet apart in heavy ground. Where the soil is heavy it is desirable to excavate the lateral trenches about 12 inches deeper and 18 inches wider than actually required by the drain and fill this space with either gravel, broken stone or cinders. (See Figs. 30 and 31.)

This allows the effluent to sump away more rapidly and cover a larger area, although the action will not be as good as in soil of greater porosity. Increasing the quantity of pipe per person will not prevent the appearance of the effluent on the surface of the ground when the soil lacks porosity. All tile drains should be laid so that the top is at least 9 inches below the surface of the ground. They should have a fall of

at least 16 inches per 100 feet in good sandy or porous loam and about 8 inches in heavier soils. When the irrigation field is laid out in a location where water is near the surface so that good drainage is not obtainable, it is necessary to provide paralleling lines of underdrains (see Figs. 28 and 29). These should be at least 3 feet below the level of the irrigation field and carried away to an open ditch or drain. Inspection opening should be provided every 75 feet to allow for examination and to determine if the system is working properly. These openings may be made by providing ten branches in the lines with extension branches brought to the surface of the ground. (See Fig. 32.)

It is highly desirable to select a site where underdrains are not necessary, as they are not safe from the attacks of burrowing animals which often make direct connections between the irrigation field and underdrains, opening the way for direct pollution of streams, wells, etc. Sometimes under-

drains can be avoided by building ditches along the sides of the irrigation field. The sections of the irrigation field should be operated alternately, allowing about a week resting period for each field. Care must be exercised in selecting the site for an irrigation field to avoid locating near trees or shrubs whose roots would choke the tile lines.

When local topographical conditions or the planting program make a sub-soil irrigation system impracticable, leaching wells may be constructed of porous tile or brick with a sand bottom about 18 inches in thickness. These wells should have an area of not less than 50 square feet per person served, and arranged in 3 or more beds, so planned that one bed may be resting while the others are in service. The syphon chamber should have capacity to dose two beds to a depth of 1 to 2 inches or approximately 3.5 cubic feet per person served. These wells will require occasional cleaning, that is the top of the sand will have to be raked off for after being used for some time a papier-mache like crust will form which must be removed and new sand spread over to replace that taken out. These wells should be located so that there will be a good fall from the disposal tank preventing complete flushing or flooding of the surface. These should be provided with a dome top with manhole frames and cover set flush with ground. (See Fig. 15, page 38, March issue.)

It is sometimes impossible to use either sub-surface irrigation or leaching wells, and a sand filter must be provided either by uncovering a natural bed or building an artificial one. A location should be selected that will drain well, with ground sloping away from the plant. A plot of proper area is then leveled off and a three-foot bank built all around, with subdivisions so that the filter will be in two, three or four sections. Then some coarse one-half inch gravel or broken stone is evenly placed over the beds to the depth of 4 inches and over this is placed 4 inches of finer, one-fourth inch, gravel or broken stone. The bed is then covered with 18 inches of clean gravel sand that will pass through a 3-16 inch screen. Upon this 4 inches of fine sand is placed to regulate the flow of effluent through the filter. It is sometimes desirable to place a 6-inch sewer tile in beds at intervals to give ventilation to the bottom of the filter and thus help the nitrification. The area of a filter bed should be approximately that given in the table for sand filtration (Fig. 18, page 39, March issue). The beds should be provided with a drainage ditch entirely around them with the main drain running to some ditch, garden patch or run off. If filters are occasionally raked over and the top crust removed and allowed to thoroughly dry out, excellent results will be obtained. (See Figs. 16 and 17, page 39, March issue.)

(To be continued)

His Worst Year the Most Successful

W. H. Parsons, Builder, Topeka, Kan., Heartens Fellow Builders by Telling How He Won Success from Adversity

IF it were not for the difficulties and hard knocks one experiences to win success, one would not appreciate so much the winning of one's objective. The only way to succeed in any undertaking is to keep everlastingly at it, after finding out for certain that you are on the right road. There are

better and better, and I often wondered when success would come.

Success is usually knocking at our door long before we recognize it. An apparent failure may in reality prove a success. I invested quite heavily in real estate upon the advice of one who had never succeeded and that brought me success. The experience of investments in oil stock and automobile stock stamped one lesson indelibly upon my mind, and that was and is to invest my money in myself.

The year 1917 brought the greatest loss a man ever sustains, the loss of my wife. She left me a legacy of six children, all under age, to care for. So I had one of the greatest tasks that ever befell any man; that of being both father and mother to children; something which no one can take lightly. In 1921, like thousands of others, I did not know which way to turn, as money was hard to secure at any price. The loss on investments and all the disappointments had taught me the lesson which nothing but experience can teach. I had been a practical builder and foreman and had a world of experience in the finest work. From this came my success.

My banker told me I could not succeed in the building business as the reaction was too great, but I determined to try—succeed or fail. On the ninth of July, 1921, I began the excavation for a five-room bungalow, and before completion I had it sold at a handsome profit. Since then I have built a number of others. I have no difficulty in finding buyers, even before the house is very far along. I found out what the people wanted; I built in a good, substantial way, and I had no difficulty in finding a market for my work.

What promised to be my worst year has turned out to be my most successful. It is claimed that America is one million homes short, and for my part I am going to help reduce the number as fast as I possibly can.

SAMPLES AND BUILDING LITERATURE WANTED—Van Tanner Building Company, Inc., by R. L. Van Vliet, secretary and treasurer, announces organization for the purpose of constructing suburban homes in all the nearby boroughs of New York and in the state of New Jersey, and wishes to receive booklets, pamphlets and samples from all manufacturers of materials and equipment which is used in the construction of the modern home. The address of the company is 116 West 39th street, New York City, N. Y.



W. H. Parsons, Builder

"It is claimed that America is one million homes short. For my part I am going to help reduce the number as fast as I possibly can."

no lines of work more interesting that I know of than the building industry. To plan and build what is termed a home, is a wonderful thing, not in itself, but in the making for the spirit and building up of America, the real bulwark of our civilization.

With this idea in mind, but not fully developed, I began some years ago to make my first stand, as an amateur carpenter. I secured a college education in the corn field and potato patch, and with no experience at all, but with the future looking bright with possibilities, I began.

Well do I remember the time when I was doing a piece of work that the man in charge complimented me upon it. I always tried to do a good job, but this compliment stiffened my resolution to do

Thirty-Five Years' Experience in Building Houses for Sale

A. J. King Realty Company of Kansas City Profits by Study of the Characteristics of Home Buyers Past and Present

A POPULAR impression is held that speculative builders are in business to make as much as they can, as quickly as they can, and then to disappear before depreciation of their buildings reacts to the detriment of their reputations. Doubtless there is some foundation for this belief or it would not exist so widely and so per-

sistently; nevertheless, it has been the experience of NATIONAL BUILDER's editors that there are few more honorable and conscientious business men than representative builders in many of our large cities. When such a building company has been in business for 35 years and has in some cases dealt with the same customer in the

This 35 years' experience of the A. J. King Realty Co., Kansas City, Mo., has shown that in no field of the merchandising business is service, quality and satisfaction to the purchaser more important than house-building and real-estate development. For in no other field is the thing sold intended for so long a life; automobiles, fur-



5703 Oak street

purchase and financing of twelve successive homes, it is pretty good proof that the builder is giving service and full value.

niture and chattels generally are intended to last 5, 10, 15 or maybe 20 years at most, but a house built by a conscientious builder



5703 Oak street, back view



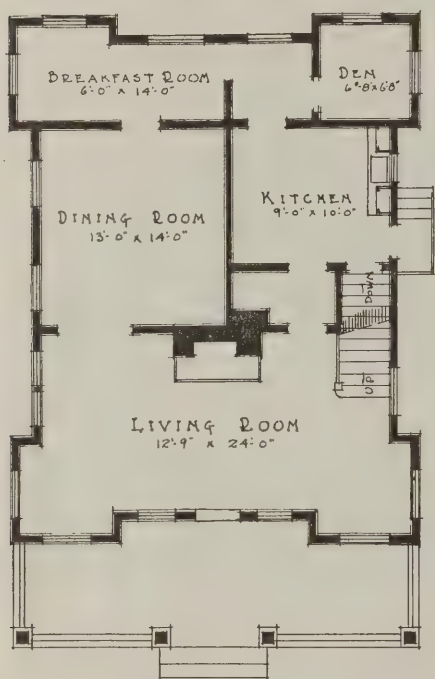


5701 Oak street

his own work. Also the saving in cost of building under such conditions is easily demonstrated.

To do business on a very large scale as the A. J. King Realty Co. does, of course requires a large amount of capital, but the experience of this company shows why it is that to build efficiently and economically a professional builder must have considerable capital that he is willing to tie up for 4, 5, 6 or more years. A merchant handling ordinary merchandise may turn over his capital at least once a year, probably much oftener, but a man who is building and merchandising houses can not turn over his whole capital oftener than once in five years, unless he is willing to pay, under most present conditions, exorbitant discounts or commissions.

Possibly this feature of the building busi-



FIRST FLOOR PLAN



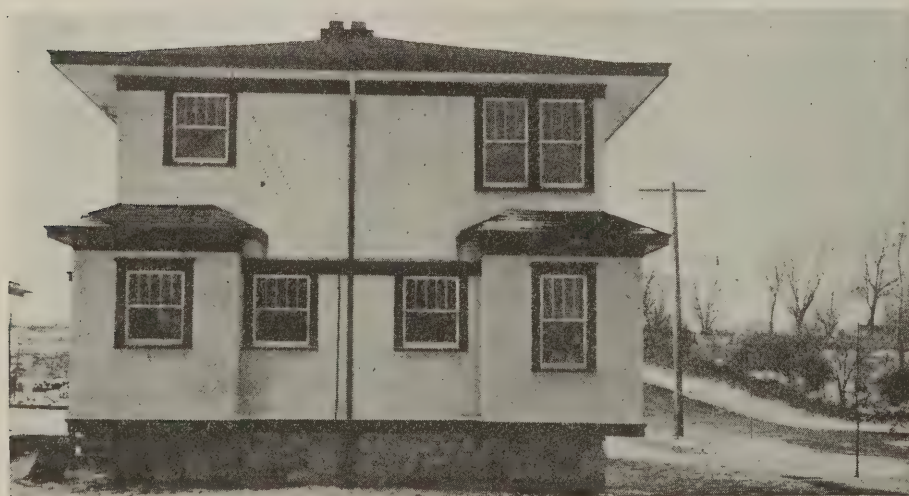
Side and back view of 5701 Oak street

is intended to last a lifetime.

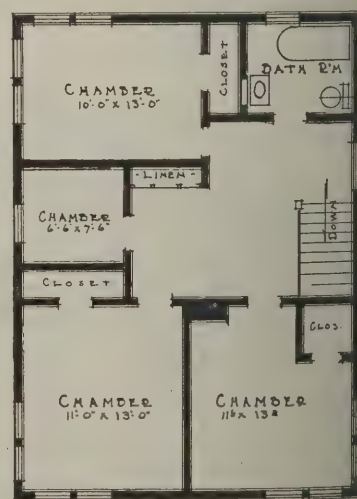
Does Own Financing

Possibly no small factor in the success of this organization is its method of financing and dealing with its customers. For there is no intelligent home buyer but would be impressed by the integrity of a builder who is content to invest his own profits in

ness has not received the emphasis that it should; and it is obvious to any one familiar with the building business that there are few other industries where it is easier to begin doing business "on a shoe string"—without any capital at all, to speak of.



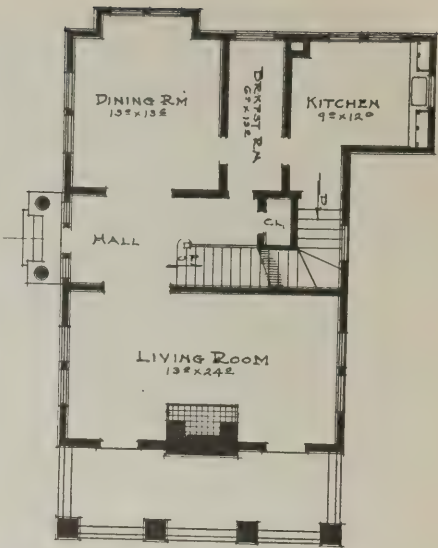
Back view of 5701 Oak street



SECOND FLOOR PLAN



5709 Oak street, front and side view



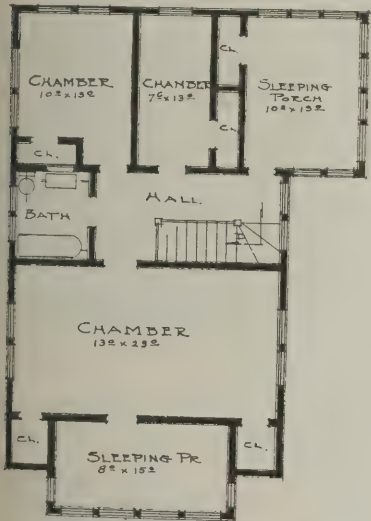
Yet the experience of the A. J. King Realty Co. (and without doubt many others) shows that one must have an all-round good business organization, a reputation, and plenty of capital to make a 35-year success in the building game.

Scheme of Operation

The A. J. King Realty Co. buys outright in fee simple large tracts of land in outlying parts of the city, suitable for

development into housing projects. *It never undertakes to develop but one tract at one time.* Its building work is always concentrated in one locality. The economy of this is evident to any builder of experience. At present the company is developing a tract of 60 acres in the Country Club district of Kansas City. This is possibly the twelfth

or fifteenth such tract it has developed and completely built up with single family houses. This section is known as Kingston; is located from 56th to 59th streets running north and south, from Oak to Holmes, east and west, making about 300 homesites.



Front view of 5709 Oak street



Side and back view of 5709 Oak street

The A. J. King Realty Co. has always specialized in houses for the average city salaried-man. These houses, with lot, formerly sold from \$5000 to \$7000. Now the same size and quality of house sells for from \$10,000 to \$16,000. The present average price is between \$9000 and \$14,000. The lots are quite generally 50x150 ft. The company's aim has been to give standard and uniform quality, and let the price correspond; it has not attempted, in these high priced times, to lessen the price by cheapening the quality, for the company recognized it has a reputation to maintain, and that reputation depends on quality.

The next step after the purchase of the ground is to subdivide it and make all improvements. Of course this work is under



5711 Oak street

way before the company cleans up on its previous subdivision, because it aims to keep its large construction organization

continuously busy. This part of the company's organization comprises a general superintendent, who has been with the company for 17 years, and employees in all the building trades.

The building work is so planned and carried out that some 20-odd houses are always in progressive stages of construction. These are not necessarily adjoining houses, as in many cases lots are sold in advance and houses are built on those lots to suit the purchasers, either in advance of, or following, the development of the tract as a whole. The majority of the houses, however, under ordinary conditions are built to sell after they are completed, or what is generally known as "on speculation," although in this case "temporary investment" would be a better description.

Variety One of the Aims

In 35 years' experience dealing with home buyers the A. J. King Realty Co. has found out that there are about as many tastes in houses—exterior and interior—as there are individuals. Consequently one of the prime objects in the development of the Kingston tract, or a city block which forms a part of it, is to have built, or in the course of building, such a variety of types of houses that the most finical individual will find one



SECOND FLOOR PLAN



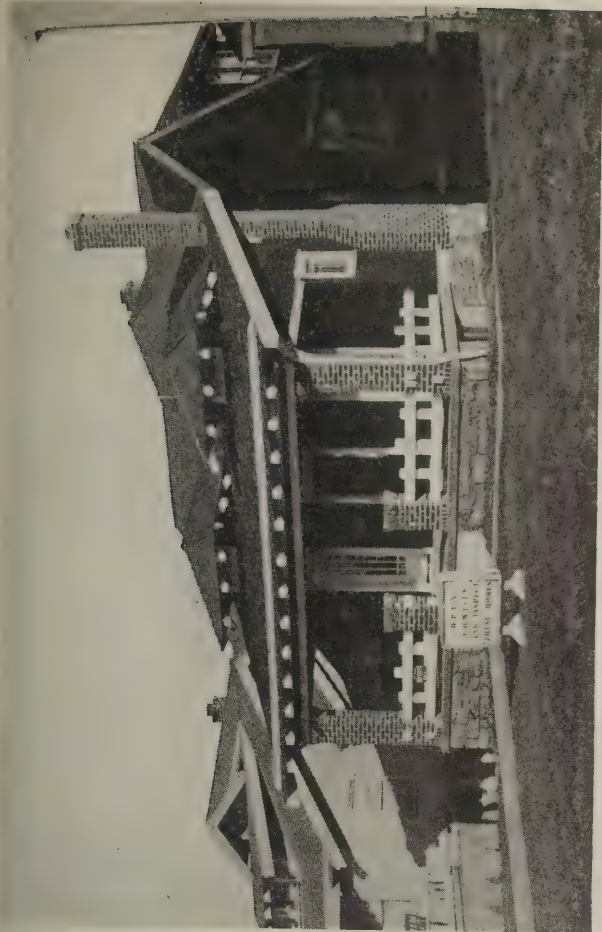
FIRST FLOOR PLAN



Side and front view of 5711 Oak street



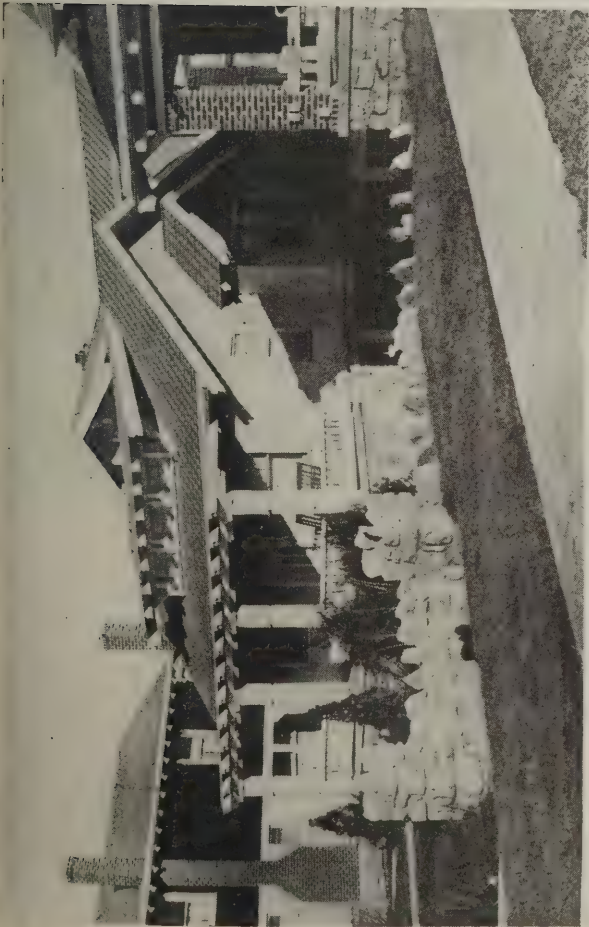
Back and side view of 5711 Oak street



5707 Oak street



5717 Oak street



5705 Oak street



Back view of 5705 and 5707 Oak street



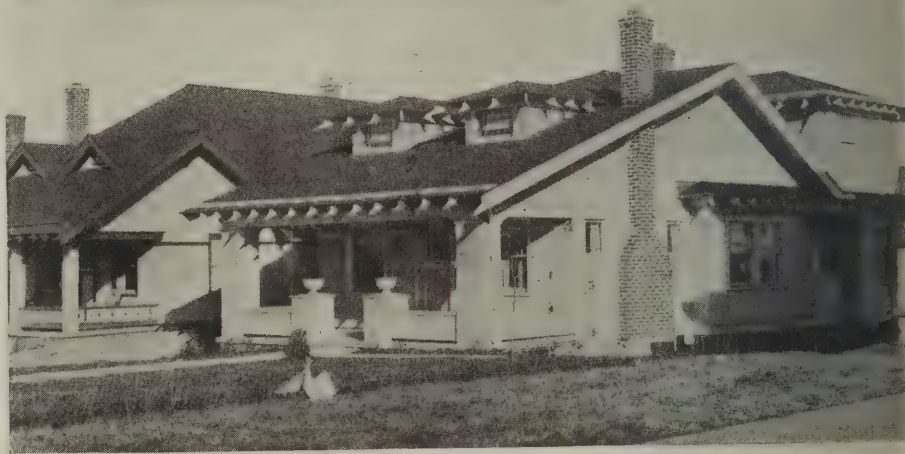
5719 Oak street



Upper floor plan of 5705-7-17-19 Oak street



First floor plan for 5705-7-17-19 Oak street



Side and front view of 5719 Oak street



Back view of 5717 and 5719 Oak street

that satisfies his tastes or desires, or at least find in realities enough of his ideas so that they can be incorporated for him in a house on some other lot in the development.

Incidentally, it seems, methods of house buying have undergone a revolutionary change in the last few years. The old order of things was for the wife and husband to visit the builder's office and pore over plans and blueprints and pick out a house that seemed to be laid out to suit them. The bathroom must be here, and the closets

there, etc. The advent and great popularity of the motor car has changed these customs very materially. The new order of things is for husband, wife and family to hop into their car on a Saturday afternoon or Sunday and drive through the new sections of the city where houses are for sale. And such and such a house, because of its attractive exterior, or lines that appeal to individual tastes, is generally half sold before the prospective purchasers have seen the interior.

Catering then to this phase of house

building means giving extraordinary attention to the treatment of exteriors, not only to make them attractive but to avoid repetition of the same details in houses at least in the same immediate locality. Reproduced herewith is a complete city-block of houses in the newest development of the A. J. King Realty Co. How well this treatment for individuality has been carried out will appear from an examination of the pictures. Several have identically the same floor plan but this is not so important a detail. The pictures and floor plans show every single

house in the 5700 block of Oak and Locust streets, Kansas City, as of December 15, 1921.

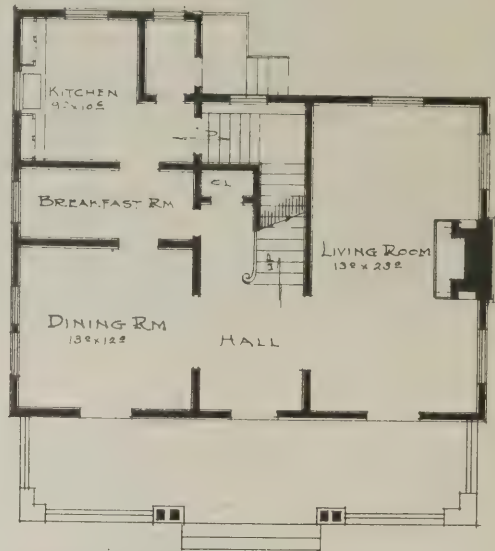
Attention is also called to the pictures of

ors to harmonize with the woodwork and wall decorations. They also have wallplugs for electric appliances so that a coffee percolator, toaster and broiler may be used.

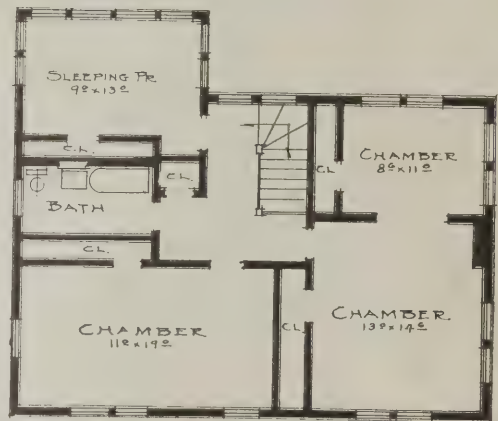
on the property when it is turned over to the purchaser. The purchaser is financed by the realty company as follows: A first mortgage loan is obtained on 50 per cent



5715 Oak street



Side and front view of 5715 Oak street



veranda railing detail, shown on a separate page, as this is one of the minor ways that difference in exteriors is accomplished. These various details and the houses themselves are the more remarkable, because few of them are "designed" in the ordinary sense of the term. They are the creations of the building superintendent of many years' experience and many of them were never committed to paper except possibly in the form of pencil sketches for the use of the carpenters. The same applies in many cases to the floor plans and interior details.

The present-day prospective purchaser having taken a fancy to the exterior appearance of a house is generally won over to the closing of the bargain if the interior details include (1) a very large living room with a fireplace, (2) a breakfast nook, (3) a modernly-equipped kitchen. This appears to be about the relative importance of the details mentioned. Perhaps the most conspicuous feature in all the new houses is the breakfast nook. These are furnished with tables and benches and finished in col-



Back view of 5715 Oak street

Method of Financing

The A. J. King Realty Co. finances the purchase of the subdivision and the building of the houses out of its own capital and resources. Hence there is no incumbrance

of the value of the house and lot. These mortgages bear interest at 7 per cent, or the prevailing rate of interest on real estate, and are sold by the King company to its own clientele of investor-customers—the result



5723 Oak street



Side and front view of 5723 Oak street

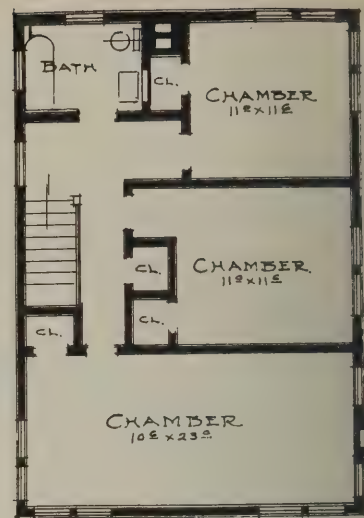


Back view of 5723 Oak street

of its long years of successful operation and the reputation it has acquired for "good houses" and general business integrity.

For the convenience of these customers the realty company maintains a banking department, or counting house, where it makes all collections of interest and prin-

cipal on these mortgage loans, as well as the brokerage business in the mortgages themselves. The realty company makes no charge of the house buyer for placing these mortgage loans, and no charge of its investing customers for interest collections. The balance of the purchase price of the



house is made up of the cash payment, which of course varies in nearly every case, and of a second mortgage at 6 per cent, payable with the interest in monthly installments at the company's office.

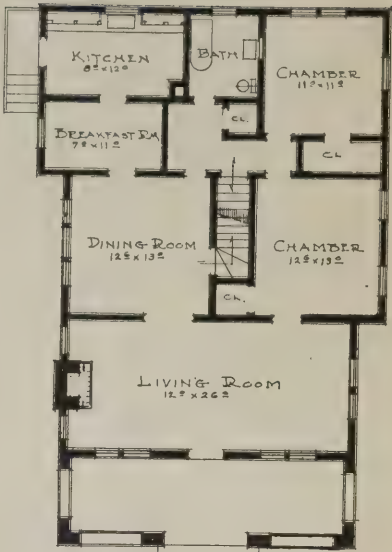
The amount of this second mortgage, the amount of the monthly payments, and the subsequent term of the mortgage are not standard. They depend on the individual bargain in each case and the ability of the purchaser to redeem the mortgage. The second mortgage may run for any predetermined period, and is not in any way governed by the term of the first mortgage.

The second mortgages are never sold. They are accepted by the realty company at their face value and held until paid off.

Under present conditions the monthly payments are sufficient to pay the operating costs and supply necessary new capital for continuing building operations. Thus by being financially strong enough to hold its second mortgages the realty company saves its customers excessive discount or com-



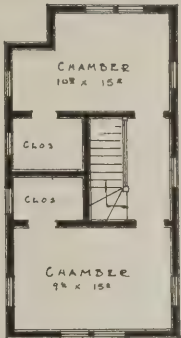
5727 Oak street



First floor plan
5727 Oak street



Back view of 5727 Oak street



Second floor plan
5727 Oak street



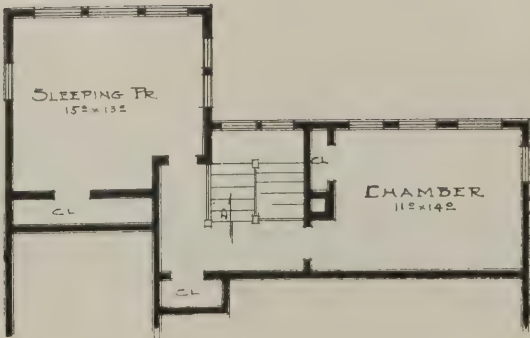
5731 Oak street



Side view of 5731 Oak street



Back and side view of 5731 Oak street



Second floor plan of 5731 Oak street



First floor plan of 5731 Oak street



5700 Locust street



Back view of 5700 Locust street

mission charges and exorbitant interest rates.

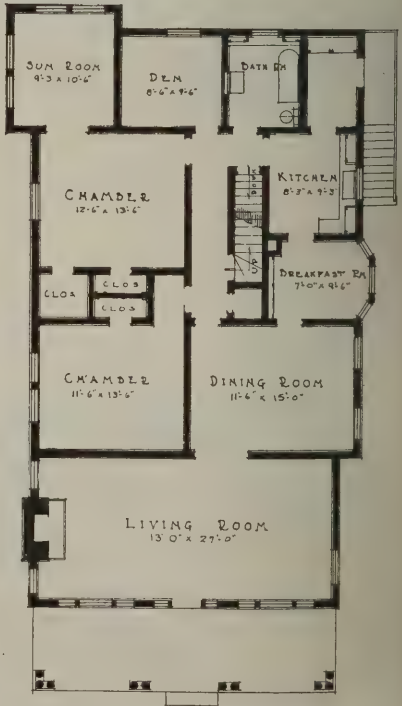
For its own protection the company keeps a close record of its second-mortgage debtors, so that none of them is permitted to fall behind in taxes or assessments nor allowed to have liens made against the property. The company's scheme of business organization makes this a comparatively easy accomplishment. It has been proved that under such conditions these second mortgages are absolutely safe investments. Very exceptionally a house will be turned back upon the company's hands, but in such a case the realty company is of course exceptionally well organized and equipped to resell it. The A. J. King Realty Co. does not do a general real estate business and deals only in its own houses.

Present Styles in Kansas City Houses

As already noted, the company has no standard designs. Having built houses continuously for 35 years at the rate of several hundred per year, the company's salesmen



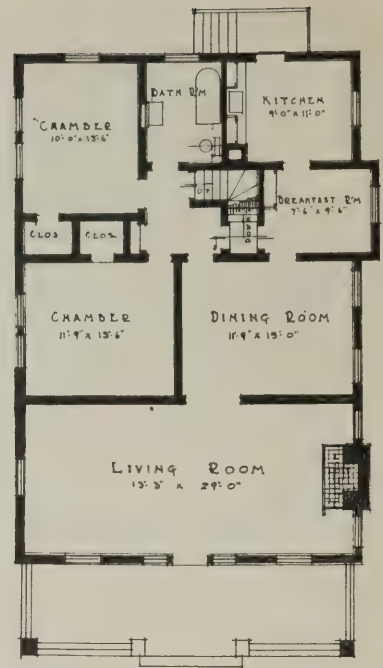
Plan of sleeping porch of 5700 Locust street



Floor plan of 5700 Locust street



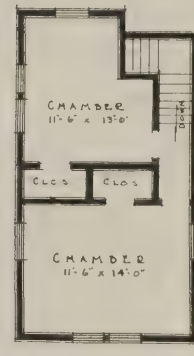
5702 Locust street



First floor plan of 5702 Locust street



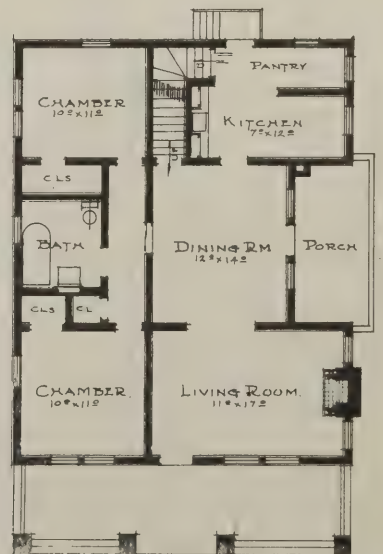
Back view of 5702 Locust street



Second floor plan of 5702 Locust street



5706 Locust street



First floor plan of 5706 Locust street



Back view of 5706 Locust street



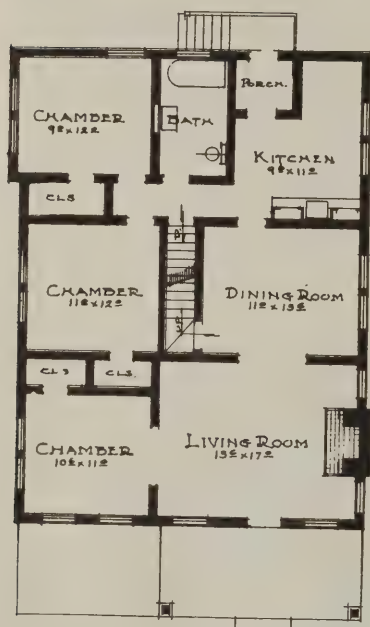
Plan of sleeping porch of 5706 Locust street



5708 Locust street



Back view of 5708 Locust street



First floor of 5708 Locust street



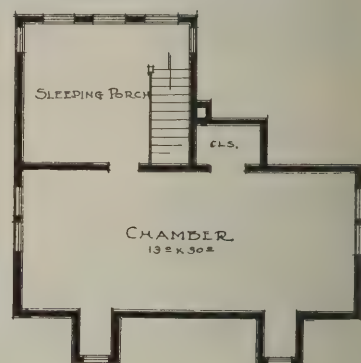
Sleeping porch of 5708 Locust street



5712 Locust street



Back view of 5712 Locust street



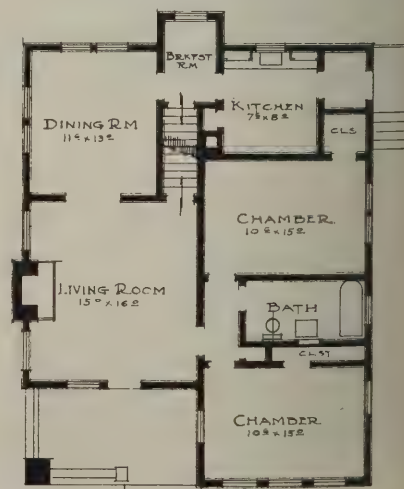
Second floor of 5712 Locust street

stucco, native stone, an occasional colorful magnastone and old-fashioned brick with new facing now called wire cut or tapestry brick. Nearly all the wood houses are painted white or buff, using this same or similar delicate coloring for the wood trim on houses of the other materials.

The interiors are very tasty as compared with the houses of 10 years or so ago. Much attention is paid to dainty lighting fixtures, hardware, wall paper, etc. White-enameled kitchens, with extra deep sinks, built several inches higher than regular, doing away with the old back-breaking sink of former days. There are built-in cupboards, combined refrigerator and preserve closet room, and many features, etc. All the houses have fireplaces, for gas, coal or wood.

have become rather expert in analyzing people's tastes and demands, and their aim is to keep ahead of these demands. Consequently the houses illustrated in this issue may be said to represent the latest word in popular tastes in Kansas City.

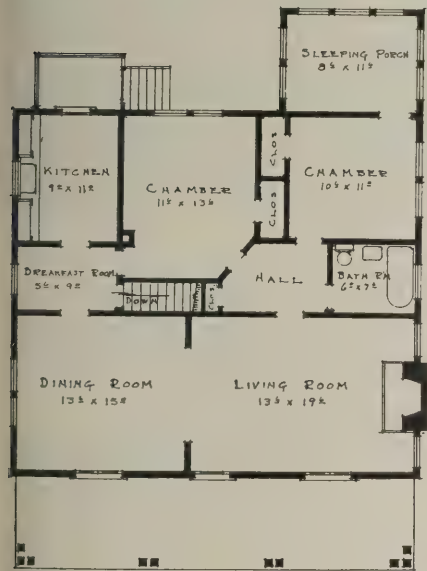
The bungalow type is popular, but not exclusively popular. With this class of houses bright colored green or red-stained wood shingle roofs are most popular, although the composition shingles are also beginning to come into considerable popularity. The majority of the houses are of wood frame construction, some are covered with wood siding, white portland cement



First floor of 5712 Locust street



5714 Locust street



Floor plan of 5714 Locust street



Back view of 5714 Locust street



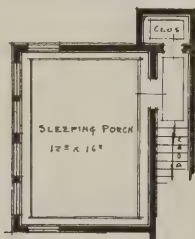
Back view of 5710 Locust street



Back view of 5718 Locust street



Floor plan of 5710-5718 Locust street



Sleeping porch plan of 5710-5718 Locust street



5710 Locust street



5718 Locust street



5716 Locust street



Floor plan of 5716 Locust street



Sleeping porch plan of 5716 Locust street



Back view of 5716 Locust street

Most of the houses have basement garages. The topography of Kansas City makes these easy to construct and they have been constantly growing in favor for the last ten years, until today it would seem that about nine houses out of ten are so equipped. Even where the ground is level



5728 Locust street



Back view of 5728 Locust street



5730 Locust street

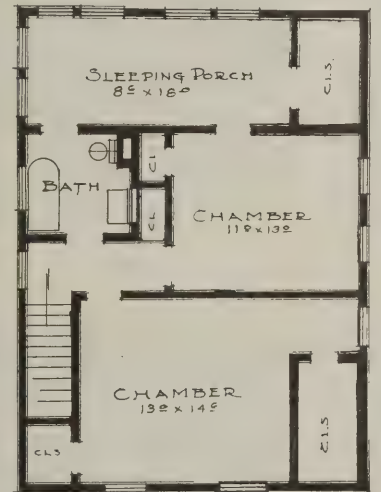


Back view of 5730 Locust street

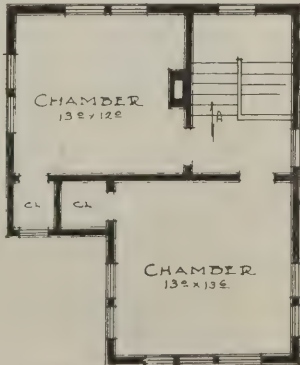


First floor of 5728 Locust street

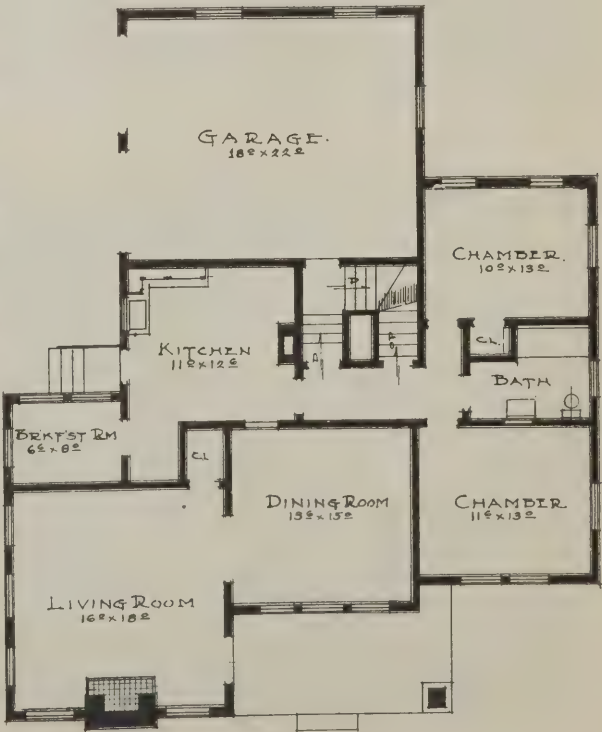
the garages are often made part of the house, as one or two of the houses shown illustrate. No attempt is made to fireproof the floors above the basement garages, but it is said that the additional cost of insurance for such houses is only \$2 per year over that for the house without the basement garage, so the fire risk is evidently very small, and, inversely,



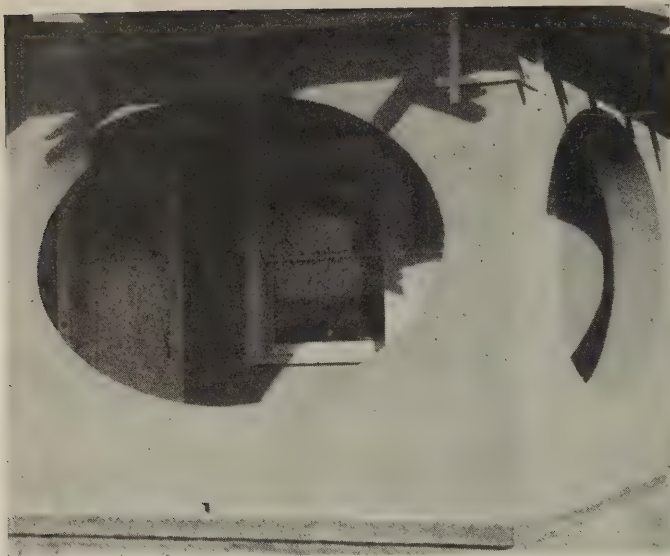
Second floor of 5728 Locust street



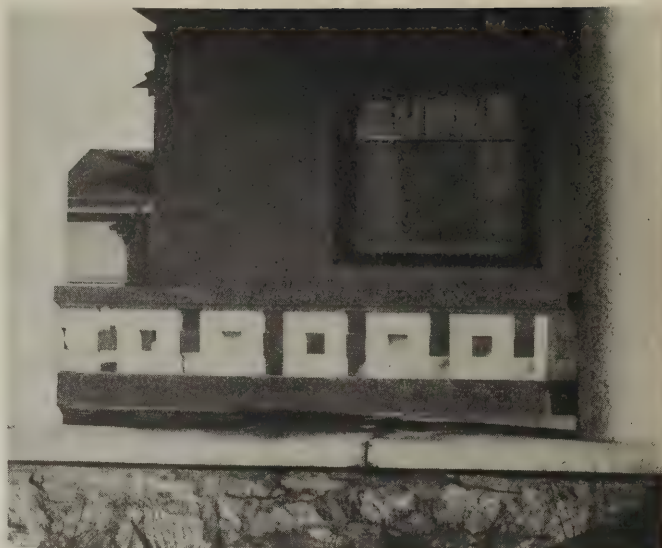
Second floor of 5730 Locust street



Floor plan of 5730 Locust street



Porch railing details of the various houses shown



Porch railing details



Concrete steps and porches are very popular



Finishing a concrete porch floor



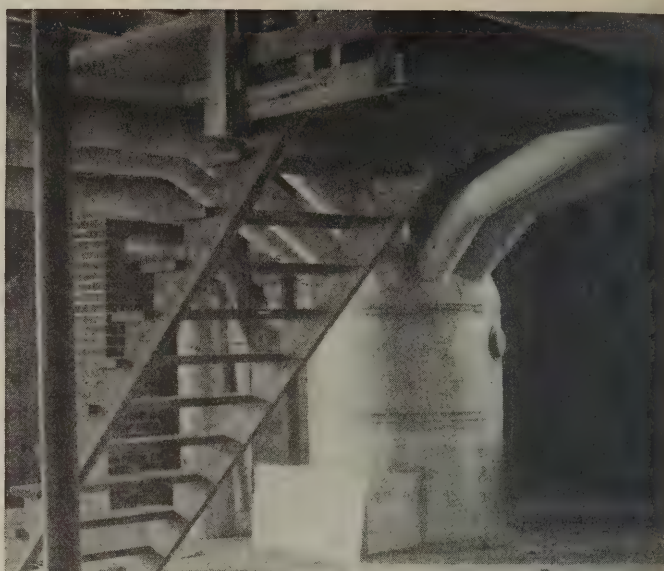
Cellar-garage detail, showing sump under car stand for draining wash water



Cellar walls are invariably built of rough ashlar laid in cement mortar



Cellar-garage detail showing clothes chute and entrance



Cellar-garage detail showing arrangement of furnace and stairway

the convenience is certainly very great. These houses are all equipped with hot-air or vacuum steam heaters, clothes chutes and every city convenience. Where possible the builders like to sell the house be-

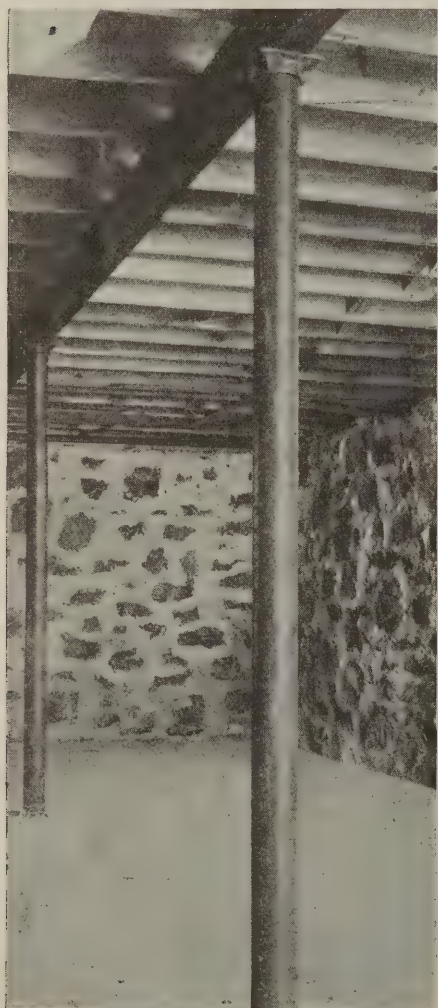
fore it is completed and to do the interior decorating to suit the purchaser; but the completion of the houses is not delayed on this account.

As already noted, the houses range from \$9000, or a little less, to about \$16,000. Those on Oak Street, in the accompanying views, range mostly from \$12,000 to \$14,000. Those on Locust Street range from \$10,000 to \$12,000. These prices, it must be remembered, include a lot 50x150 ft.,

valued at \$30 to \$35 per front foot (\$1500 to \$1750 per lot), a garage and all the before mentioned built-in features. Moreover, the lots are fully graded and sodded and street improvements are all in.

High Lights on the King Company Operations

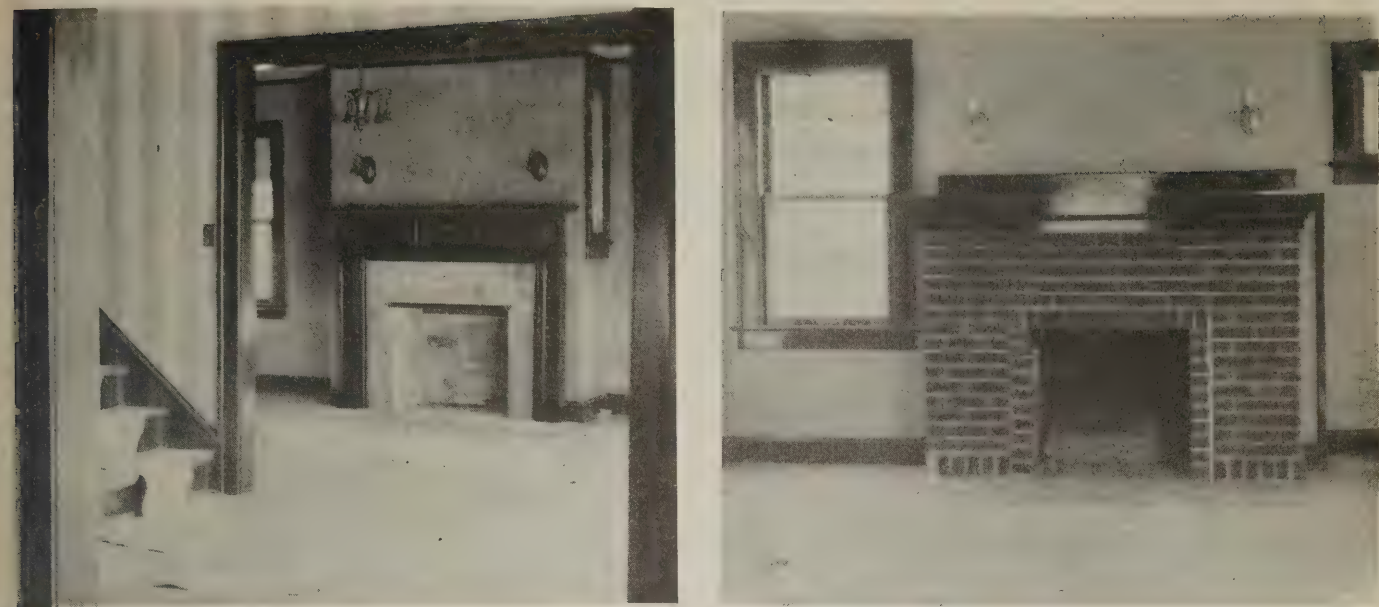
Work of the character and quality done by the A. J. King Realty Co. has proved very profitable to it. Building up a repu-



Cellar-garage detail showing use of steel I-beams for girders and pipe-posts to save overhead and elbow room



The King Realty Co. believes in labor-saving machinery



Fireplace details

tation and giving a high quality of service and value have made it possible for the founder of the firm to retire and devote his time to farming and stock breeding, and to pass on to the active management of his son, M. A. King, a business with a splendid reputation and prestige.

His work has left a lasting impression in the residential sections of the city, and he has the comfort and satisfaction of knowing he has made a substantial contribution to the solution of the better housing problem in his home city. Undoubtedly his work and methods have had a marked influence on the work of newer builders, in that he has set a pace of quality and service. Mr. King's organization has never had to do any extensive advertising; it has had no desire to grow faster than the principles of its operation justified. Too rapid development would have defeated the economy of the scheme.

The A. J. King Realty Co. has also built up an organization of building-trades mechanics who are skilled and loyal. It operates open-shop, but pays the prevailing union wage. Many of its workmen have been with the company many years. The company buys and installs everything that goes into the houses. So far as a careful inspection goes, it is one of those building companies which has already eliminated the much talked-of "wastes of the building industry."

Finishing Club-Room Floors of Maple

ASOUTH Dakota subscriber writes us as follows: "Our local commercial club rooms are used for all kinds of public meetings and for regular club rooms. These rooms have good maple floors, but have



Built-in kitchen details

never been finished. Now what we want to do is to take my electric sander and dress them down to the natural wood and finish them so they won't get so dark and dirty-looking and will be good to dance on. Could you suggest anything for this purpose or put me in touch with some one that makes anything of that kind?"

The paint authorities to whom we referred this request reply: "After your maple floors have been sanded with an electric sander they may be finished as new. For a natural finish we recommend a coat of floor finish No. 1 and a coat of prepared

wax paste. Allow the wax several days to harden thoroughly. The floor is then ready for dancing and may easily be kept in perfect condition by an occasional application of powdered wax. The wax should be sprinkled lightly over the floor just before the dance. The feet of the dancers will spread the wax, polishing the floor and producing a perfect dancing surface."

Acme Cement Plaster in Cold Weather

P. P. K., Du Bois, Ill., writes: "Should I like to hear from some one who knows best about Acme cement plaster; how to use it to get best results from it in cold weather, and how much time to allow between two coats for drying. Also when using a hard white finish coat, should it be put on before the second coat is very dry or not? We use lime and plaster of paris for the hard white finish here."

The Gypsum Industries Association report:

1. How to get the best results in cold weather? *Answer.* The building should be closed and heated, windows should be lowered from the top to allow the circulation of air through the rooms.

2. How much time to allow between coats for drying? *Answer.* To work, scratch coat should be about two-thirds dry before second coat is applied; same should be thoroughly dampened before second application.

3. For lime and plaster finish, for hard white finish. *Answer.* For lime and plaster finish, brown coat should be about two-thirds dry. For a hard white finish, the brown coat should be thoroughly dry. If through any cause the brown coat should become frosted or frozen, some smoke fire should be used to thaw out before finishing.

Questions, Answers, Kinks and Discussions

Edited by V. L. Sherman

Herein is a Department of Mutual Help for the Exchange of Experiences and Ideas. It is Not Only Well Worth Your While to Give Your Experiences for What You Get Back from Others, but National Builder Pays You for Doing So in Good Hard Cash

When Roofing a Bungalow

J. J. L., Halbrite, Sask., Canada, writes: "I am enclosing a sketch of a method I use for a bungalow roof which may interest someone. See Fig. 1. I cut my barge boards or end fascia of my rafters pattern and add $\frac{3}{8}$ in. (or one-half the width of the ridge) to the top end. Add 4 in. to the bottom end, if a 4-in. eave trough is to be used,

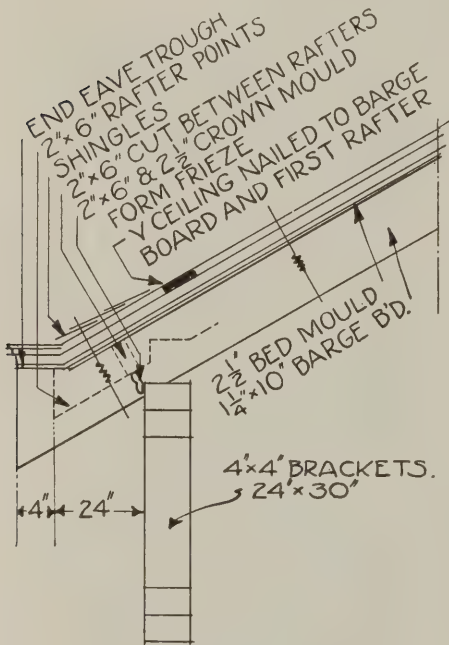


Fig. 1

making a finish end for the eave trough. Cut the bottom notch $1\frac{1}{2}$ in. below the notch for the plate in the rafter pattern. This brings the bracket even with the two-ply lumber. I put on $2\frac{1}{2}$ in. bed mold $\frac{3}{4}$ in. above the edge to cover the end of the V ceiling, used from the center of the end rafter for the soffit. When the building is boarded in, tack boards to the gable end level with the rafters. Nail the brackets in the notches and slide out to place. By putting the V ceiling on from the top the cornice is finished and ready for shingling."

To Construct a Curved or Concave Hip Roof

W. T. C., Excelsior Springs, Mo., writes: "Carpenters are some times called upon to construct a curved hip roof, and as this type is used too seldom to allow the average carpenter much experience in making it, the following method of cutting out such a roof on the ground all ready to nail up may be of interest to NATIONAL BUILDER readers, especially to the younger ones. This style of roof is used more especially on porches, bay windows, domes and pagodas. Using a scale of 1 in. to 1 ft., lay off on a smooth board or drafting board the plan, 6 ft. wide, as in Fig. 2. Draw the hip and main rafters as shown on the plan. Then space the run or width in equal parts—we will say six in this case—and draw lines through these points parallel with the plate line running from the incline of the Square from these points to the hip.

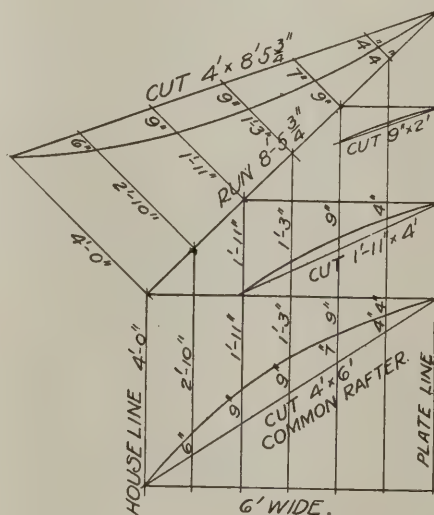


Fig. 2

common rafter to the base line of the hip. Determine what curve you want and lay off your common rafter. Measure up from the base or run line to the curve line and mark it on the plan, remembering that

every inch represents a foot and every 12th represents 1 in. Now get the points to curve the hip, measure up from the base line of the hip, making each one the same as the corresponding line of common rafter. Trace a line through these points and you have the curve for the hip. Lay off your jack rafters the width you want them—say 2 ft.—and make the rise of each one the same as shown at this point of the hip. Draw a line from this point to the foot of the jack; this is the length. The pattern of the common rafter may be used for the jack, always using the outer end. The bevel for the jack may be obtained in the usual way, or by the short cut method described by S. W. Jackson in the February NATIONAL BUILDER, page 37. These instructions hold good on roofs of any curve, either convex, concave, or ogee, the latter being a combination of the concave and convex. The next thing is cutting it out on the ground, all ready to nail up. First take the common rafter, get a board wide enough for the pattern, make the top edge straight, cut top and bottom same as you would for any ordinary rafter. Now step off the length in six equal parts, as this is the number of spaces on your rung. Mark down on the sides of the rafter and parallel with the plumb cut, making the distance the same as indicated on the corresponding lines on the plan. Set brads at these points and bend a thin strip around them and mark around the same. The curve for the hip is obtained in exactly the same manner. The pattern of the common rafter may be used to get the curve of the jack, always using the outer end. After the pattern is obtained $\frac{7}{8}$ in. boards may be used, nailing them together and breaking the joints if it is found that one piece is not wide enough to get the desired curve. If you take a sharp knife and cut out on the curved and also the plumb line or vise of rafters on the plan and crease the base line, the rafters can be raised to the position that they will occupy when placed on the building. This may assist the beginner to understand more clearly the above instructions."

The Saw Tooth Roof

R. T. R. requests information on the saw-tooth roof and the why of the angle. The roof is used a great deal and especially for lighting one-story plants. The skylights are admitted into the north side of the tooth, or south side if you are south of the equator, and that side is placed at such an angle that no direct sunlight passes through. The explanation is this: When the sun is farthest north on the 21st of June the rays of the sun strike the earth perpendicularly at the Tropic of Cancer, which is 23½ deg.

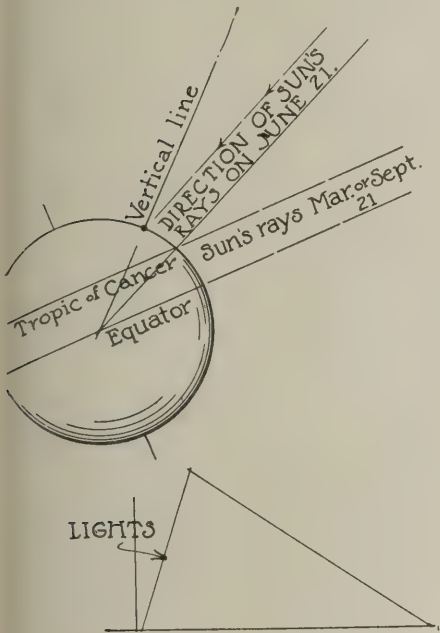


Fig. 3

north latitude. (See Fig. 3.) The difference between that number of degrees and the number of degrees in your own latitude marks the declination of the sun where you are on that date, June 21. Hence the angle to pitch the saw-tooth is that same difference in the angles, taken from the vertical.

Garage Rafters

The span of a certain garage roof was 20 ft. The builder assured me that by using

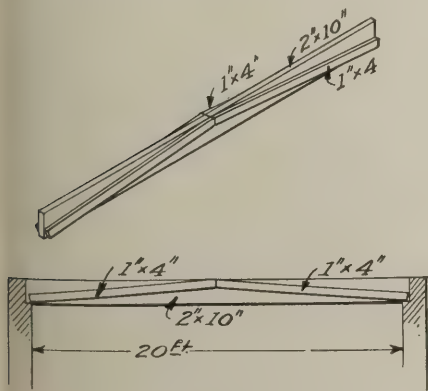


Fig. 4

single 2x10-in. timbers, "stiffened" by nailing 1x4-in. pieces on both sides, as shown in Fig. 4, he secured a beam that was well equal to the load. Some doubt was cast as to the strength of such rafters, placed 16 in. on centers, especially when garage owners make a habit of hanging a good deal of paraphernalia from the roof. The main point was, however, what good did the 1x4-in. side braces do? Did they stiffen the member? They may have to a small amount, but as nailing or spiking does not form a very close bond for such a purpose in comparing loads, cross bridging would probably act better. If the 2x10-in. failed, the 1x4-in. could only serve as a sea anchor.

The diagonal position of the 1x4-in. gives the appearance of a truss, but can only act as a truss of the beam itself. The thrust must be taken by the 2x10-in. at the nailing points, and cannot be allowed at the walls. In this case the smaller pieces are the compression members and the 2x10-in. the tie.

The editor would be glad to hear from builders who have used this makeup of timbers or anything similar. Wood-framing for lightness and strength is generally used in construction work and is a very interesting topic.

Standardizing Door Hanging and Lock Fitting

M. C. A., Rochester, N. Y., writes: "The need of a standardized method of door hanging was brought very forcibly to my mind on a large government job, where several hundreds of doors were hung at one time, by perhaps 25 or 30 carpenters, each allowed to perform his work according to his own ideas as to relative spacing of the hinges and the height of the locks. The chaotic result may be well imagined. I have used the following method for a number of years, and though I have worked in many different parts of the country I have never found this method used elsewhere. I have been able to hang more doors than is generally reckoned on as an average day's work, and with less labor. Each door hangs with exactly the same clearance as do all the rest, and if the jambs are set with care the doors are hung with sufficient precision to allow of being interchanged.

"The first thing is to see that the jambs are set straight, plumb and level. Then fit the doors in the usual manner, taking care that they are fitted with precision to the sides and head of the jamb. All the doors should be fitted before starting to hang them, to avoid loss of time in changing tools if one man is doing the work. Two men can work to good advantage, however, one fitting and the other following behind with the hanging. As each door is fitted it should be stood face out against the wall, by the opening into which it goes, so it can be seen at a glance on which edge the hinges are to be set.

"For hanging I use a gage for marking the hinges. A satisfactory one may be made from a thin piece of stuff about 6 ft. 6 in. x 2½x½ in. Lay off the location of the hinges from the top and bottom and cut out a piece the exact size of the hinge and the distance from the edge that the hinge sets on the door. (See Fig. 5.) Into the top of this gage drive a 3d lath nail, allowing the head to project 1/16 in. To mark the jamb, place the gage against the head jamb, with the lath nail even with the top and the edge of the gage level with the jamb edge. To mark the door, place the door on edge and keep the gage itself even with the top of the door. The difference of 1/16 in. between the nail-head and the edge of the gage itself provides for clearance at the top of the door. To cut the width of the hinge I use a home-made gage instead of the usual mortise gage, with a piece of jack-knife blade instead of the usual prick point. (See Fig. 5.) This cuts down the depth of the hinge with one marking. Then I cut with a butt chisel the top and bottom marks of the hinge and remove the wood to a depth not quite enough to seat the hinge; to seat the hinge to the exact depth I use a Stanley router, setting the blade to the exact depth required. After trying the

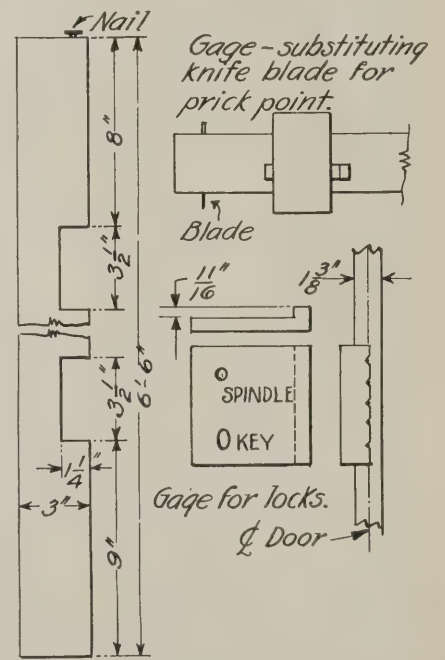


Fig. 5

router on the first door hung and found right I use the same gage-set for the other doors, which will then all hang with exactly the same clearance. I know that this method will increase the production of any carpenter who tries it, and the use of the gage on large jobs would standardize the door hanging throughout the building.

"The gage idea may be carried further for the fitting of the door locks. I find it an economy of time to open up all the locks for a house at one time, unwrapping the

parts and loosening the screw of one handle in the spindle shank. If, as is usually the case, the locks are sent both right and left hand, they may be set down by the doors where they belong and it will not be necessary to reverse more than one or two locks. To mark the doors I use a gage cut out of a piece of stuff about $4\frac{1}{2} \times 5$ in. and wide enough so that it can be cut as shown in the illustration, the distance from the face which lies against the door to the inside point of the v-shaped cuts being one-half the thickness of the door. The notches are for the bit marks and are spaced to take the lock. The spindle and key holes are bored out to correspond with the lock when placed in the angle of the gage. Now cut a stick to set under the gage at the desired height, and mark all the doors at one operation."

Scaffolding Again

The average American first seeing building operations in England or Canada, where spars and rope are extensively used in scaffolding, feels a sag in his lower jaw and wonders what it is all about. Before long he begins to see that the Britisher is less rash in his use of timber, a little more concerned in its quality, and, while slower in operating, is a better insurance risk than the American.

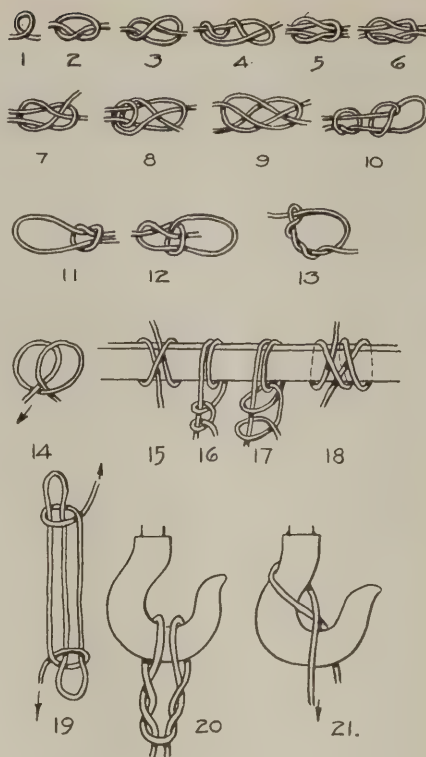
The builders of Great Britain and Canada probably follow along after their ship-building brethren and appropriate many of their ideas. Their lashed spar system of rigging must surely give the builders a feeling of safety that cannot be gotten from the use of new or scrap lumber spiked.

W. J. Thebault, Sydney Mines, N. S., writes: "Please find enclosed a sketch (Fig. 6) of scaffold knots and hitches and also explanations. There is a great lack of knowledge among workmen generally with regard to the tying of rope for scaffolding, and when it is considered that during the erection of a building the workman's life is sometimes jeopardized, it is most essential that the scaffolding should be trustworthy and safe. One of the factors of safety is the correct lashing and tying of the rope, with the manipulation of which the workman should be perfectly familiar.

"As a chain is no stronger than its weakest link, so the stability of the scaffold is dependent to a great extent upon the security of its knots; hence the importance of knowing the best ones to use for the purpose required.

"Although scaffolds are generally erected by qualified men, yet there are occasions when the workman requires some adjustment or addition to the scaffold for a special purpose. He has then to undertake the alteration himself and his knowledge of tying knots can be applied.

The knowledge one possesses in tying knots is not confined to the one vocation of scaffolding, but is useful in all departments



1. Bight of a rope.
2. Overhand, or thumb, knot, to prevent a rope running through the sheave of a block.
3. Figure-of-eight knot, used as No. 2.
4. Stevedore knot; is useful when the rope passes through an eye. It is easily untied after being strained.
5. Square, or reef, knot. This is a most useful knot for joining two ropes of same size. However tight it jams it is easily "upset" and undone.
6. Granny, or thief, knot. *This should not be used, as it will jam tight but not slip (as erroneously supposed), will not "upset" and consequently is difficult to undo.*
7. Single sheet bend, or weaver's knot; used principally for joining two ropes of unequal sizes more securely than a reef knot.
8. Double sheet bend; more secure than No. 7.
9. Carrick bend, for fastening the four guys to a derrick.
10. Flemish loop.
11. Slip knot.
12. Bow line, for making a loop that will not slip. After being strained this knot is easily untied. Commence by making a bight in the rope, then put the end through the bight and under the standing part, pass the end again through the bight and pull taut. This knot should be tied with facility by everyone who handles ropes.
13. Timber hitch; the greater the strain the tighter it will hold.
14. Clove hitch, consisting of two half hitches; used chiefly to tie ledgers to standards. This is the most useful of all the knots used in scaffolding on account of its simplicity and security. (Editor's note: This is a great knot for tent pegs—can be slacked or tightened very easily.)
15. Clove hitch, as No. 14, showing its application around a pole.
16. Round turn and two half hitches, for securing a rope to a ledger or for fastening the guys of derricks, sheer legs, etc.
17. Fisherman's bend; used when a thick rope, such as a fall, is made fast to a ring.
18. Rolling hitch; used in a variety of ways, chiefly in making fast one rope to another that is held taut.
19. Sheepshank, for shortening a rope when the ends are inaccessible.
20. Cat paw, an endless loop, and used where great power is required.
21. Blackwaller; easily applied, but requires watching; has a tendency to slip.

Fig. 6

of every-day life. A great number of knots have been devised for various purposes. The few here illustrated are those chiefly used in the erection of pole scaffolding and comprise nearly all that are necessary. The

tying of these knots should be practiced by the uninitiated, for the process is inexpensive, as the back of a chair may be utilized, a small piece or two of sash cord, with a little persistence being all that is required to make perfect. A very good proof that the lesson has been learned thoroughly is to tie each of these knots in the dark. The principles of a good knot are its facility in tying, its freedom from slipping and its being easily untied. All knots will jam more or less when subject to a strain. In the diagrams here given the knots are shown open before being drawn taut in order to show the position of the parts. The names usually given and their uses are shown under the illustration."

Saw to Cut Off Nails

S. F. B., an Ohio subscriber, writes: "In the August number is shown a saw with teeth on the back edge for cutting nails. I have a Disston rip saw, seven point, and teeth a little over $1/16$ in. rise and filed square across. If I hit a nail I call it a knot and keep going, and if I get that saw in between a casing and jamb I can clip off every nail and not scar the casing at all."

A Gauge for Putting on Sash Lifts

T. O. M., of Edenton, N. C., submits the following kink which he says is a good little time-saver: "I measure the distance between the stool cap and the top of the bottom rail of the sash. This runs usually from $1\frac{3}{4}$ in. to $2\frac{1}{2}$. Then I rip out a piece that measures one-half this distance. For example, if the distance measured is $2\frac{1}{4}$ in., I rip out a piece $1\frac{1}{8}$ in. wide and 12 in. long. I mark this piece for the holes to be bored, as follows: I mark a point 6 in. from the end, then make a mark $\frac{5}{8}$ in. each way from this 6-in. mark. With a bradawl I make a hole in the sash for each hole, then I bore out from these three holes. The 12-in. gauge puts the center of the sash lift 6 in. from the cash stop. This puts the sash lifts right for a sash 2 ft. $8\frac{1}{2}$ in. on up to 3 ft. $2\frac{1}{2}$ in. Then I hold the gauge off from the sash stop 1 in. or 2 in., according to the width of the sash."

A Pitch and Gravel Roof

C. H., Port Lavaca, Texas, says: "NATIONAL BUILDER has been much help to me and I would not be without it. Kindly advise as to how to put on a pitch and gravel roof." Kidder says on this subject: "A better method is to lay two plys of tarred felt lapping each other 17 in. and then spreading a coat of pitch over the entire roof. On this again three more layers of felt are laid, then coated with pitch into which crushed slag or screened gravel is embedded. Each layer of felt lapping another should be mopped 2 in. more than its exposed surface back from the edge."

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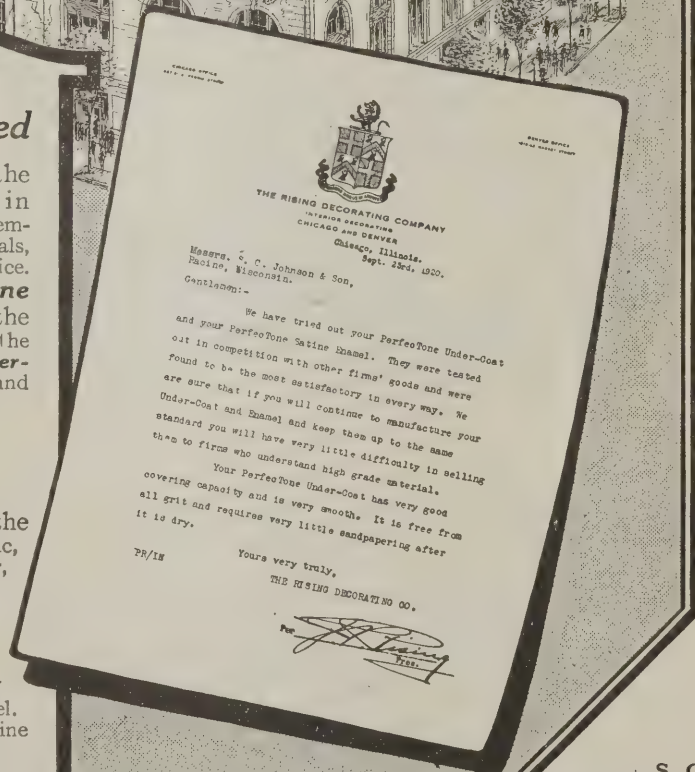
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Regarding the New York house, Architect Dwight James Baum says:

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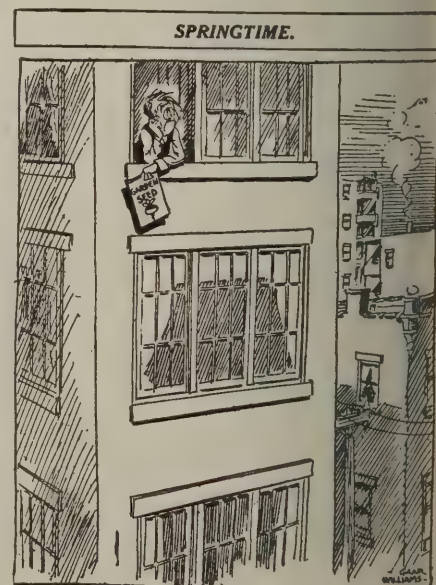
Extensive and informative programs have been planned for these expositions and no one, however ill or well informed, can fail to profit by attendance.



A house to be built for the Own Your Home Exposition, New York City. Dwight James Baum, Architect



Two-flat building erected in three days at Chicago Own Your Home Exposition



"Own Your Home"

Cartoon by Gaar Williams in Chicago Evening News

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NATIONAL BUILDER is placing before an increasing number of contractors, builders, and architects presentations of what is being actually done today in building. In each issue is shown the work being carried on in several cities or localities personally visited by our technical editors.



The design and character of construction, conditions, materials used, methods employed in the construction work and in financing, are fully described and illustrated. The whole gives an admirable survey of how climatic and economic environment is reflected in the styles, character and methods of construction.



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Bishopric used on all interiors and exteriors



Residence Rev. E. O. Tree, Freeport, L. I., N. Y.
Bishopric used on all exteriors



Residence S. H. Morgan, Detroit, Mich.
Architect, Wm. C. Palmer
Contractor, R. M. Rutherford
Bishopric used on all exteriors

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The Situation

THE BUILDING BOOM is on—at least so far as the cities are concerned. The F. W. Dodge Co. reports of building statistics of the 190 leading American cities showed a total value of March building permits of \$262,283,354. This is about double the value for March 1921 and exceeds by some 60% any previous monthly record since 1914.

The city which shows the most gain, in percentage of permit valuations for March, 1922, as against March, 1921, is Reading, Pa., 3119%. This of course, is an exceptional figure but the most encouraging figures are those for Davenport and Dubuque, Iowa, and Topeka, Kan., where the increase is over 500% in each case. These are in the heart of great agricultural sections and very possibly reflect the returning prosperity of the farmers.

Florida, Oklahoma and Michigan are the only states that show considerable decrease in building activities as compared with March, 1921. In Florida, of course, the fall and winter are the months of greatest activity, while the decrease in the petroleum industries may account for the Oklahoma conditions and the automobile industry for the Michigan case. In Los Angeles, Calif., with their usual love for the spectacular, it is announced that March surpassed the cities' previous record month by over \$1,000,000, or at the rate of 4,241 permits per 26 working days meant a building started every three minutes!

Material Prices

The tendency of building material prices at the present moment is a trifle upward. The general average increase in the price of all material in March over February was about 2½%. With the greatly increasing volume of construction, prices of material probably will not go lower and may advance as the season advances. If the coal strike continues, the growing shortage of coal will certainly be reflected in the price of cement, lime, brick and other building materials where the price of coal is an important factor in the cost of production.

Most economists look for an ultimate reduction of present prices but for all practical purposes today's prices are now universally considered stable, in spite of

the fact that building costs as a whole are almost 100 per cent greater in most localities than in 1914.

Range of Prices in March

Brick prices in March ranged from \$12 per M at Saginaw, Mich., to \$20 in some New England cities. An average price was around \$16. Portland cement ranged from \$1.87 per bbl. in Chicago to \$3.50 in the extreme South and West. A \$3 price was obtained in various parts of the country from California to New York. Probably \$2.50 represents a fair average price.

Dimension lumber ranged all the way from \$60 per M in some Massachusetts cities, (yellow pine) to \$15 in Seattle (Douglas fir). An average price of about \$30 would be fair for cities not too far removed from the lumber mills. Toledo and Cincinnati, Ohio, paid the highest prices for common No. 1 boards (yellow pine)—\$60 per M. Seattle with a price of \$15 per M for Douglas fir was low. An average price would be around \$35. Flooring sold all the way from \$48 for yellow pine at Dallas, Tex., to \$100 for Douglas fir at Council Bluffs, Iowa. An average price of \$65 appears about right. Wood shingles (red cedar) are running from \$2.80 (Seattle) to \$7 at Central West and Southern points. The average is about \$5 per M. Composition shingles surfaced with crushed slate run about \$1 more per M in most cities, but in a few cities actually sell for less.

Gypsum wall board in March sold all the way from \$25 at Niagara Falls, N. Y., which is in the heart of a big gypsum industry to \$50 and over in nearby cities like Erie and Cleveland. Gypsum plaster (neat), ranged from \$14 at Dallas, Texas, and Cincinnati, Ohio, to \$25 at Little Rock, Ark. An average price for hydrated lime appears to be about \$17, the range being from \$13 at numerous Ohio cities to as high as \$30 at Niagara Falls. Building sand in most cities was in the neighborhood of \$2 per cubic yard. Crushed stone was about the same, although in some cities a price of over \$3 per yd. was obtained.

Nails per keg ranged all the way from \$3 at Erie, Pa., to \$5.85 at Council Bluffs, Iowa. Window glass (per 50 sq. ft. single A 10x12-in.) ranged from \$2.80 at Pittsburgh, Pa., to \$7 at Waterloo, Ia.

The range in hollow tile was from 12c at Akron, Ohio, to 25c in several widely scattered localities (8x12x12-in. each). Concrete reinforcing bars (¾-in. sq.) sold for \$1.88 in St. Louis, Mo., and \$3.75 in San Antonio, Tex. White lead for 100 lbs. ranged from \$10.88 in Cleveland to \$13.75 at San Antonio. There was more uniformity in the price of this material throughout the country than almost any other material. Linseed oil (in bbls.) per gal. varied from 71c at Kansas City, Mo., to \$1.25 in Dallas.

Tar paper roofing, per 100 lbs., ranged from \$1.25 at Dallas to \$3 in Flint, Mich. Roofing slate, (No. 1 per 100 sq. ft.) was low in Buffalo, N. Y., at \$8 and high in Waterloo, Ia., at \$20.

The price quoted above are those actually paid by contractors as reported to the U. S. Division of Building and Housing of the Bureau of Standards. A study of them shows that freight rates are by no means the sole cause of very wide differences in the prices of the same material.

Wages

There is very little prospect of lower wages. Indeed, the editor of *Engineering and Contracting* predicts increasing wages. He says for 80 years wages have been closely proportional to per capita money and per capita currency in the United States today is 50 per cent and the per capita gold 80 per cent above the amounts in 1913. With a revival of business, the chief difficulty seems to be wages will follow per capita money and consequently will stay high or even increase for two or three years at least.

Money Easier

Money is much easier to obtain than a month or more ago. Since the first of the year both the brick manufacturers and the lumber manufacturers have taken under consideration schemes for handling second mortgages on new construction. One result of these projects must be to make local bankers more liberal or they will eventually lose much local business. The great difficulty seems to be in convincing them that present building costs are likely to endure for several years more. The U. S. Government and nearly every other economic authority is now ready to help convince them of this.



A Small House With a Mansard Roof

WALTER T. STOCKTON, OWNER AND DESIGNER, EVANSTON, ILL.

Full Working Drawings of this House are Given in the Detachable Insert in this Issue. Descriptive Text on Opposite Page

A House With a Mansard Roof

Working Plans of this House Are Given
in the Detachable Insert in this Issue

THE mansard roof is so closely identified with the "mansion" houses built during the much reviled mid-Victorian period of our architectural history that it is difficult for us to realize that this type of roof is appropriate for use in connection with modern work.

As a matter of fact, the mansard roof has much to be said in its favor. It offers a very practical solution for the roof of a small two-story house of square plan, in which the difficulty of avoiding a "pill-box" effect is well known. The steep pitch of the lower slope of a mansard roof affords almost full space for the second story, just as does its near relative, the gambrel roof. Thus the eave lines are brought low and the roof lines are softened.

From the standpoint of appearance—prejudice to the contrary—the mansard roof offers a certain picturesqueness and adds considerable character to a house when properly used. As for good precedent, we have at least one example dating back to Colonial times, viz., "Shirley," a Virginia plantation house of recognized charm which has a roof that is often described as a "double hipped" roof, but is really nothing more or less than a mansard roof, the lower slope of which is of somewhat slighter pitch than is customary.

The house which forms the subject of this month's supplement is undeniably attractive—mansard roof and all. Perhaps it holds the key to the successful use of mansard roofs. That is, the similarity of mansard roof lines and those of the gambrel is self evident. Now, it is well known that a gambrel roof on full two-story houses seldom looks well and it seems logical to assume that the same principle may hold true with regard to mansard roofs. In other words, by confining the use of mansard roofs to one-story houses, placing the second story in the roof, we may expect to produce a pleasing appearance. In any event, the house under discussion seems to justify this idea.

The construction of this house is of frame with stucco applied on metal lath for the exterior walls. Metal lath is also used in connection with the plastered chimney breast, bath room wainscot, interior arches and the ceilings of the first story, thus insuring good bond and reducing the fire hazard, as well as decreasing the likelihood of unsightly cracks and falling plaster. The roof is of shingles, red cedar on the slope and white cedar on the lower, for contrast, and the dormers and other

exterior woodwork is painted white to match the stucco. The front entrance is carefully designed and well suited to the character of the house. Green blinds against the stucco and flower boxes at some of the dormers add interest and domestic character.

The plan is of modified Colonial type, with the front entrance opening into a central hall which in turn opens into the living room on one side and into the dining room on the other. The compactness of the hall is remarkable. It extends full width only to the foot of the main stair, which is carried up between walls from this point, conserving space and eliminating expensive stair work. The hall contains two coat closets and mirrors facing the front entrance, and on the living room and the dining room walls, opposite the arched openings, add to the apparent size of the hall.

The space which is gained by reducing the length of the hall is put to more practical use in the living room, where it forms a nook around the fireplace. Fireplace nooks are usually more picturesque than practical, in that they are usually cramped for space. This one, however, is large enough for one to stretch his legs to the fire without suffering from roasted shins. The fireplace is an interesting design in brick and plaster with a bracketed mantel shelf planted on the breast and is flanked by open shelves for books. An arched opening leads to the hall at one side of the nook and is balanced on the other side by an arched door which leads to the passage between the living room and the kitchen.

The porch, a bit of which shows in the photograph, was not contemplated when the plans were prepared and therefore is not shown in the drawings. This porch is at the rear of the house and adds to the appearance, as well as providing useful space. French doors from the living room open onto the porch and another door, from the passage, makes it convenient to the kitchen so that it may be used as a breakfast porch if desired.

A small pantry with built-in cabinets connects the dining room and the kitchen. The kitchen also contains a built-in cabinet. Access to the kitchen from the rear is through an entry which provides space for the refrigerator with cooling shelves above. The inside basement stair is located under the main stair and leads from the kitchen.

The second story contains four bed rooms, all with cross ventilation, and three

of them have built-in wardrobes instead of closets. Shallow wardrobes of this type are considered more efficient than the deep closets of former years. A linen closet opens from the hall. The attic stair is ingeniously placed to open from a large closet adjacent to the principal bed room. This closet is of ample size to serve as a dressing room. The stair arrangement in this house is excellent insofar as economy is concerned, as the flights are placed one above the other and all are run between walls. This, of course, entails some loss of privacy, as it is necessary to pass through important rooms in order to reach one flight from the other, but in a small house of this character this fault is perhaps of little consequence.

The lavatory in the maid's room is a wise provision, but the location of the maid's bath room in the basement is so unusual that its practicability is open to question, particularly in view of the nature of the stair arrangement of this house.

The basement contains a large laundry and drying room along one side with the heater room along the other. The heater room contains separate bins for hard and soft coal and a vegetable room. A brick wall through the middle of the basement provides a bearing for the floor joists and for the through partition above. An area stairway leads to the rear yard.

This house is located in Evanston, Ill., and was designed for his own occupancy by Mr. Walter T. Stockton, architectural designer.

Bill of Material

I. Masonry—	
Concrete, cu. yd.....	65
Common brick	7500
II. Carpentry—	
Joists (2x12), bd. ft.....	3312
Joists (2x8), bd. ft.....	852
Studding (2x4), bd. ft.....	2800
Sheathing (1x6), bd. ft.....	8800
Furring (1x2), bd. ft.....	300
Exterior cypress, bd. ft.....	800
Flooring (1x3), bd. ft., fir or oak.....	1700
Flooring (1x3), bd. ft., maple.....	300
Shingles, M.....	18
Weathertight paper, rolls.....	10
Flaxlinum insulation (½ in.), sq. ft.....	2361
III. Plastering—	
One coat, yd.....	130
Two coats, yd.....	730
Three coats (exterior), yd.....	120
The cost of mill work was approximately two-thirds the cost of the rough carpentry material.	

Spanish Style of Residence

By John Anson Ford

AN exceptionally attractive seven room residence of fireproof construction and Spanish design is shown in the accompanying illustration. While possessing the plainness of walls characteristic of Spanish architecture, the surfaces have been pleas-

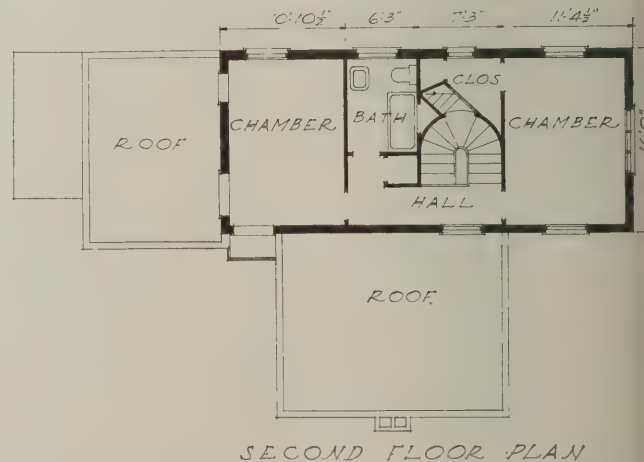
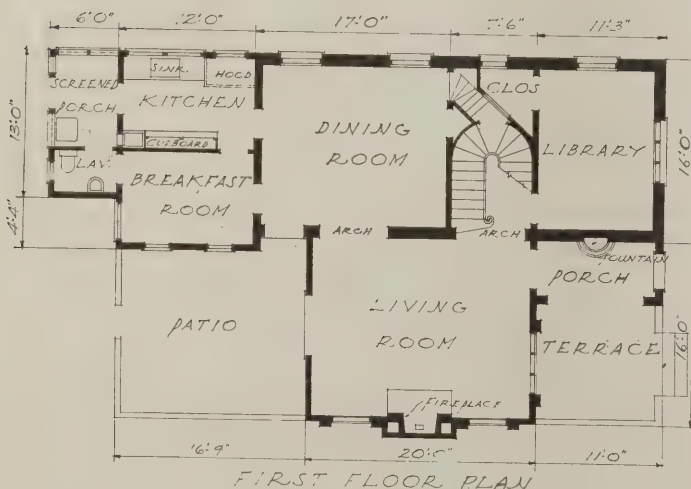
feature which represents special thought and planning.

These stairs, as the plans indicate, reverse their direction half way up. At the point where the stairs turn a back stair connects with the main flight, affording in-

which is well illustrated in this handsome structure is the privacy which it affords the owner owing to the presence of a conventional wall about the front patio and the back yard. At the same time the front yard is open, conforming to the prevalent



This view of the seven-room Spanish residence shows the enclosed back yard, a Latin-American feature that gives the owner the desired privacy without the necessity of enclosing the front grounds



ingly broken up by the introduction of a balcony, front porch, and ornamental casements.

Entrance at the front is through a walled in patio which has a tile floor laid on cement. This is on the same level as the porch floor. Entering the front door one passes directly into the large living room which is lighted on three sides, the windows at the front and rear of this room opening onto patios. At the right as one passes through the front door is the stairway, a

conspicuous access to the dining room from the two bedrooms and bath occupying the second floor. In addition to the lavatory in the second floor bath there is one at the rear of the kitchen.

A wide archway connects the living room and dining room. Special care has been used in locating the doorways to produce pleasing vistas and give a sense of spaciousness which is really surprising in a house no larger than this one.

One feature of the Spanish type of house

custom of today to avoid obstructions barriers at the front of medium sized residences. Owing to the fireproof construction of the dwelling the cost is more than it otherwise would be, \$17,000 being the approximate cost. This particular dwelling probably could not be purchased for twice that figure because of the fine location and special improvements which the owner has installed.

The architect is Ellet P. Parcher, Los Angeles, Calif.

Help Solve Your Local Building Problems!

How to Organize Community Construction Conferences—Interest Business Men and Public Characters in Smoothing Out Your Wrinkles

"HOW can we clean up unfair trade practices?" is the question directed from many cities and communities to the Committee on Construction Development appointed by Secretary of Commerce Hoover.

The committee answers the question in its report to the annual convention of the National Federation of Construction Industries, held in Chicago, April 4 to 6. In this regard, James A. Emery, general counsel of the National Association of Manufacturers, addressing a joint meeting of the Federation and the lumber manufacturers, on April 5, stressing the need for a wholesale housecleaning, urged that each interest consider the cleaning of its own particular house, like the housewife who, knowing better than anyone else where the disorder lay, goes at the job with a good old-fashioned broom.

The Committee on Construction Development recommends that its suggestions be taken as a general basis, to be added to and modified in such ways as the individual community may desire.

The local chamber of commerce or other impersonal and impartial local commercial organization should be called upon to appoint a local committee on construction development, which committee should fairly represent the various important elements in the construction field and should have on it at least one representative who might fairly be considered to represent the public. All members of the committee should be men of unquestioned standing in the community, who are known to be fair and reasonable in their attitude and in whom the public can have entire confidence. It should largely be made up of men who are familiar with the construction interests and who will devote the time necessary to the carrying on of this work. The committee should proceed with the idea that they are planning sound operations, not for the next few months only but for a period of years, in order that greater stability may be brought into the industry. In this connection, the following is quoted from the official report of the President's Unemployment Conference:

The business cycle is marked by peak periods of boom between valleys of depression and unemployment. The peak periods of boom are times of speculation, overexpansion, extravagance in living, relaxation in effort, wasteful expenditure in

industry and commerce, with consequent destruction of capital. The valleys are marked by business stagnation, unemployment and suffering. Both of these extremes are vicious, and the vices of the one beget the vices of the other. It is the wastes, the miscalculations and the maladjustments grown rampant during booms that make inevitable and painful process of liquidation. The most hopeful way to check the losses and misery of depression is therefore to check the feverish extremes of "prosperity."

The members of the committee must start with open minds. A representative of any one group must not start with the idea that his sole function is the collection and presentation of evidence in defense of the group. It is possible that certain bad practices are followed by a small percentage of certain groups and if each group will try to eliminate these practices, much progress will be made.

This committee cannot accept as facts the statistics collected by interested parties in their attempts to prove their cases, but must verify all evidence of that kind submitted.

Work Through Sub-Committees

The committee must be organized to do the work before it. It will need a chairman, a vice-chairman and a secretary, besides committees and probably sub-committees to perform certain work. In one locality they have the following committees: (1) Executive or planning committee; (2) survey committee; (3) building committee; (4) materials committee; (5) labor committee; (6) financial committee.

The planning committee should consist of say seven members, at least one from each of the other committees. It might be well to have representatives from each interest or group on the committee. The committee should outline the work along broad lines and co-ordinate the work of all other committees. It is neither to limit the scope of the work of any one of the other committees, nor is it to limit the amount of work to be done unless such work is already being done by one of the other committees. In the early stages it might be well for all publicity to originate from the planning committee.

The survey committee should determine the conditions as they exist in the district. The composition of this committee should be such that the services of those who are acquainted with conditions in various sections of the city are included, and the mem-

bership should contain at least two persons who are experienced in analytical work. This committee must receive the co-operation of all of the federal, governmental, state or municipal agencies in the district and make a report to the planning committee or the full committee before any constructive program is determined on. The findings of this committee will, to a large extent, indicate the troubles and possible remedies.

Work for the Survey Committee

The committee should at once proceed to: 1. Analyze the local needs for construction and maintenance work of all kinds requiring funds, materials and labor. What are the normal building requirements to take care of growth of vicinity? How many homes, hotels, hospitals, office buildings are needed to make up for years of reduced building activities? What is the extent of housing shortage? What kind of houses are needed? How many buildings whose occupants must find other accommodations are destroyed each year by fire or demolished to make way for improvements? How many buildings need to be rehabilitated or replaced? What is extent of overcrowding? How many buildings and homes need new roofs, sanitary facilities, electric wiring, papering, painting, etc.? How much city paving needs to be redone, how many bridges and other structures are in a dangerous condition, etc.? Has the city a well planned program of school building and rebuilding, of paving and repaving, and other public works over a period of years? Do the building codes and laws conform to the recommendations of the National Building Code Committee and the Board of Fire Underwriters? These and many other questions which will suggest themselves will need to be answered.

2. Learn how much of this work is actually ready to get under way.

3. Ascertain why any necessary or desirable work is being held back.

4. If it is being held back on account of inability to finance, because of high cost of money or reluctance of financial interests to advance funds for construction the financial committee should hold conferences with representatives of local banking and other interests from whom funds should be forthcoming and work out plans for re-

lieving the situation. Money must be made available on reasonable terms and in reasonable volume and free from demands for bonuses and commissions of a questionable character.

If work is being delayed because of high building material costs, the materials committee should hold conferences with supply people to—

(a) Determine if current local prices properly reflect reductions in wholesale prices after allowing for increased freight rates and other advanced costs.

(b) If they do not, the committee should use every proper effort to bring local prices down to a correct level.

(c) If prices are unduly high because of distance from producing points and the raw materials are more economically accessible locally, efforts should be made to have some company build a branch plant nearer to the town.

6. If work is delayed on account of unduly high labor costs, the labor committee should hold conferences with the building employers and employes to develop—

(a) Whether average wages paid local building trades are consistent with wages paid for similar skill in other trades after taking into consideration the fact that workmen in the building trades do not have the same regularity of employment.

(In this connection the following distribution of labor costs for houses as published by the Building and Housing Division of the U. S. Bureau of Standards may help in determining a weighted average of building trades wages.)

TOTAL LABOR COSTS—100%.

Trade.	Frame House.	Brick House.
Carpenters	49.6	32.2
Bricklayers	6.2	21.5
Hod carriers.....	2.2	6.7
Pasterers	7.9	8.8
Plumbers	8.7	7.6
Electricians	2.6	2.5
Painters	10.0	6.3
Common laborers	6.3	9.9
All others	6.5	4.5
Total	100.0	100.0

(b) Whether labor is giving a full day's work for a full day's pay. What are some unit costs, i. e., the cost to lay 1000 brick?

Do Away With Unfair Practices

If wages have not been properly readjusted or if the workers in the building trades are not producing in quantity or quality as they should, the contractors and employers should be called upon to bring about proper readjustments and production by conferences with employes, showing to the latter the necessity for the workers themselves doing their part with all other branches of the industry in getting building costs down to a level which will encourage extensive local construction activities, which in turn will provide more continuous employment for the workers.

Notwithstanding the improvements which have taken place in some instances with respect to the practices in the industry, it is apparent that there still exist trade abuses, waste and unnecessary expense. It is a first

essential of the proper development of the construction industry on a sound basis that all practices which unnecessarily retard the work or add to its cost should be immediately discountenanced and abandoned, if the confidence of the public is to be fully restored.

The building contractors, both general and sub, as well as the employes, must be appealed to take advantage of this opportunity to eliminate all unfair practices which may exist and which either directly or indirectly add to the cost of construction unnecessarily. The employers and the employes will themselves know best whether or not any such unfair practices still exist. In some communities these practices have added an enormous burden of cost to the public and in such communities have gone far to destroy the public confidence in the industry as a whole. Whether it be employer or employe or due to the joint action of both that unfair practices still exist, they must be weeded out once for all if there is to be a renewal of confidence and a revival of construction activity. The public is a deeply interested partner in the construction situation and its interests can no longer be ignored and the public can no longer be taken advantage of by any practices which mean a direct increase in the cost of construction or a more or less indirect increase due to delays and interferences of one kind or another in prompt completion of any construction activity.

If there are other reasons interfering with the starting of construction activities, such reasons should be investigated with the interests affected, along the lines suggested for these three more usual interferences, and every possible obstacle removed.

Then the committee should call a general public community conference participated in by the city officials to give it official standing, and the public will thus be advised of the readjustments which have been brought about to the end that the confidence of the people may be restored in the value of services rendered by the construction industry and the largest possible amount of work be started.

Local newspapers should be kept in close touch with the work of the committee and should lend the committee ample space for publicity of facts ascertained.

Merchandise Your Service

Once the general conference is over, the local contractors and material people should soundly merchandise their services to the local market as brought out by the study of the committee. Constructive measures should be adopted in each locality by contractors, educational authorities and labor to attract and properly train a sufficient number of young men in the building trades to meet the construction needs of that community in years to come.

Once work is started again the committee should study and devise ways and means to obtain accurate employment records of building trades, proper allocation of materials and labor by distributing construction activities more evenly throughout the year to avoid as far as possible the seasonal slump of building activities and to provide as nearly as practicable continuous employment for workers, less congestion of rail facilities and more uniform operation of producing mills, plants and quarries.

The plan of setting aside a small percentage of public works funds and larger industrial or utility maintenance and improvements appropriations to provide a reserve fund for construction in times of depression is worthy of study and application wherever conditions will permit.

In most cities a larger percentage of contracts should be awarded during the fall and winter months.

In towns where union wage agreements are made they should apply for the calendar year and be entered into during the fall of the preceding year so as to avoid delay in starting work in spring on account of wage disputes.

The practice in some localities of obtaining a fixed percentage reduction from building supply dealers and all interests having direct bearing on the cost of construction for a limited period, in order to stimulate construction and bring conditions back to normal more speedily, is worthy of consideration when conditions permit of its application.

Lumber Grades to be Branded

ADOPTION of a resolution placing a self-imposed "pure food law" on the lumber industry marked the closing session of the manufacturers, retailers and wholesalers attending the fourth American lumber congress held in Chicago April 5.

At the same time the lumbermen passed a resolution favoring the repeal of the Adamson law and all legislation preventing the railroads dealing directly with their own employes on questions of wages and working conditions. They blamed such legislation for the high freight rates which have caused soaring building costs.

Ninety-five per cent of the big lumber manufacturers, wholesalers and retailers operating in the United States were represented at the meeting.

The so-called "pure food law" provides for the branding of every piece of lumber manufactured. It also favors the standardization of all lumber and building products so that the retailer or contractor will know just what he is going to get when he places an order.

System in House Building

George T. Broun, of Houston, Texas, Finds No Conflict Between Artistic Construction and Standardization of Parts and Factory Scheme of Operation

COL. GEORGE T. BROUN is a fine example of what a combination of brains, enterprise and business sense can accomplish in the house-building game in an up-to-date, hustling, American city. In the last three or four years he has built and sold hundreds of homes in the Montrose section of Houston—to the value of over \$1,000,000. He has introduced factory methods of handling this construction work which bid fair to revolutionize the house-building industry in his section of the country.

Colonel Broun comes from Beaumont, Tex., where he is in the lumber and building business. Originally from Virginia, he came to Beaumont in 1914. He knows the lumber business as a manufacturer, miller and dealer. In this way he also got into the house-building business in Beaumont before the war. During the war he was in the service and the Beaumont business was turned over to his brother, who is still the active manager there.

Following his army experience he saw the wealth of construction material available at some of the various abandoned army camps, and he bought some of these camps. The dismantling of the camps and the merchandising of the lumber and materials on a large scale gave him a thorough knowledge and appreciation of systematic big business methods. Now he is in Houston, applying those principles to the house-building business.

Special Features of Houston Building Work

The house-building work in Houston, illustrated in these pages, is a good example of how methods of construction vary in different localities. Also it illustrates the fact that these methods often follow precedent without reason until certain ways of doing things become a habit. Then comes an outsider with new ideas and improved methods, who completely changes the old order of things.

In Houston, as in other Southern cities, the rank and file of houses are not provided with cellars. Few of them have furnaces, and those which have are usually provided with a small heater compartment opening off the kitchen or back hall, the floor of which is just low enough to provide for the circulation of the heating medium, air, hot water or steam, as the case may be.

For many years it was customary to build such houses with the foundation sills resting

on posts, and on brick or concrete piers. The soil of Houston building lots is a very fine gumbo for agricultural purposes, but very poor stuff for foundations. While not troubled with frost, hot dry summer weather causes this material to dry out and crack, while rain causes it to swell very materially. The result is that posts and piers, unless their footings are quite deep, have a tendency to move both vertically and laterally. Consequently many of the older houses

sill would answer every purpose. The girders carrying inside partitions are usually 6x8 in. on edge and rest on piers or posts. Under normal conditions not enough water could get under the houses to affect these piers, and of course the soil under the houses does not dry out as it would in the open.

In the ordinary frame house or bungalow there is no sheathing or building paper between the studding and the outside clapboards or siding. These are nailed directly



Geo. T. Broun, Houston, Texas



Ewart H. Lightfoot, assistant

show the effects of unequal settlement of the sills.

Colonel Broun claims to be one of the first, if not the first, to introduce continuous concrete foundations under the sills of ordinary houses. While the footings of these foundation walls extend ordinarily only one, two or three feet under the surface they have nevertheless proved to be a very important improvement in Houston house construction. As yet no attempt is made to make the concrete foundation itself accurately level; the leveling is done in bedding the sills.

A curious holdover of the old method of pier or post foundations is the retention of 4x6-in. sills, when with a good level concrete-wall foundation it is obvious a 2x6-in.

on the studs. In the case of stucco houses it is considered passable construction to apply the stucco directly on lath (metal or wood) nailed to the studding, but in the case of brick veneer the common practice calls for sheathing and waterproof building paper between the brick and the studding. The experiment has been tried of leaving out the sheathing and retaining only the building paper, with apparently satisfactory results. The brick courses are tied to the studs with metal clips instead of to the sheathing, as is usual.

The omission of the sheathing would of course be very bad from a construction point of view if the house interiors were finished with lath and plaster as in the North. The houses would then certainly

lack necessary rigidity. However, very few of the ordinary houses in Houston are plastered. There is a prejudice against plaster, possibly because plasterers demand a dollar-and-a-half an hour, but very likely because the old method of building foundations made plastered walls and ceilings hazardous. The place of the usual plastered walls is supplied by shiplap nailed to the studing and ceiling joists, which gives the building bracing and rigidity as well as a passable interior wall. Over the shiplap muslin cloth is tacked and over this the wallpaper is pasted. The heavier the muslin or "canvas" the better the wall surface and one of Col. Broun's selling arguments

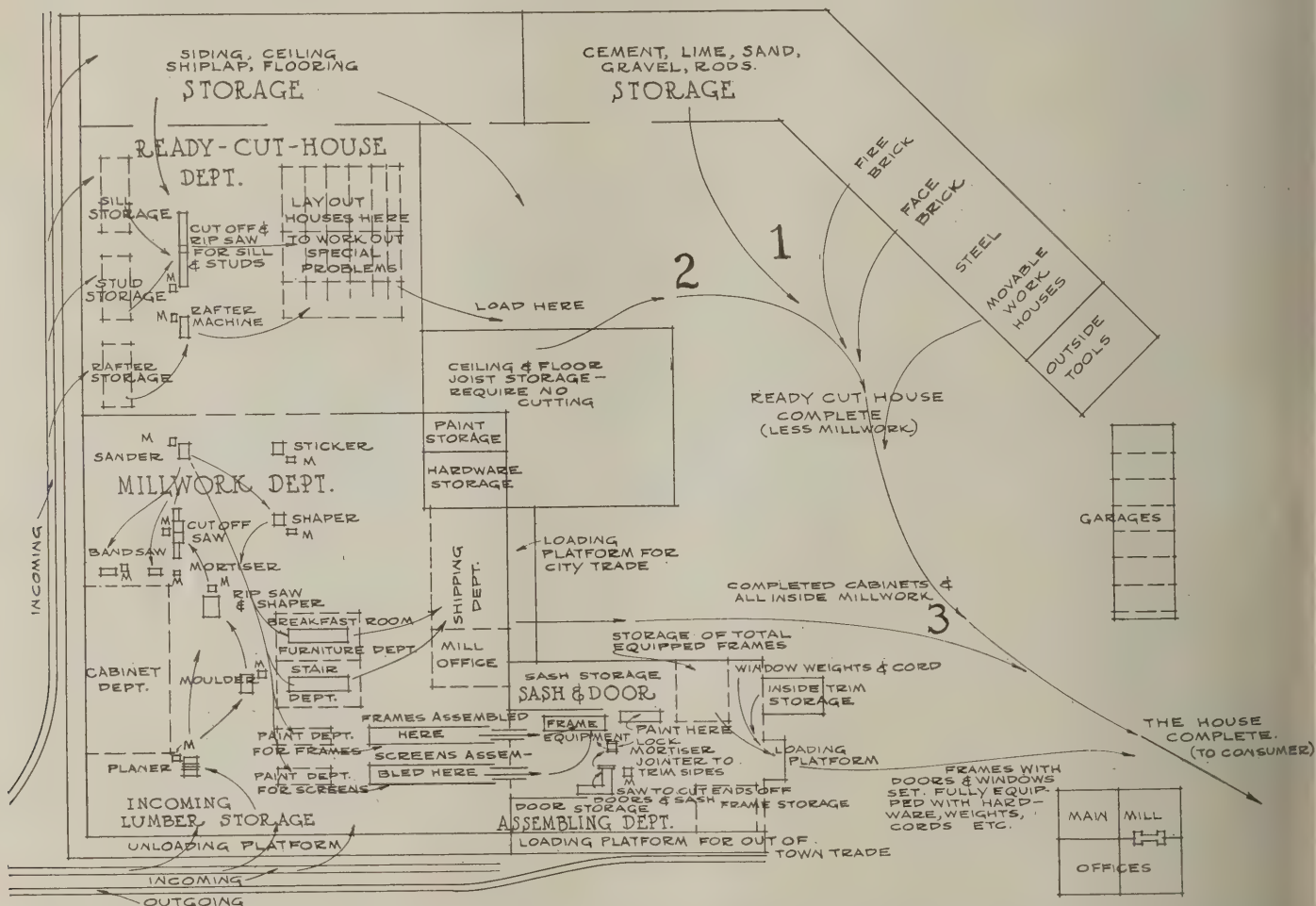
Many Built-in Features—and Other Selling Arguments

A study of the plans and the interior views of these Houston houses will show the popularity of built-in features and adequate closet space. Every house is also provided with screens for every window and outside door as a part of its initial equipment. The all-the-year-round use of screens gives an opportunity to add lines to the window treatment which have an important bearing on the appearance of the house, as the views show.

The prices of the houses given with the views and plans in this issue include, in practically every case, a lot approximately

vided over the garage. In many cases therefore the purchase price mentioned in this article includes a garage with upstairs sleeping quarters for one or two servants. These, however, are not very elaborate structures and are seldom provided with bathrooms or other modern conveniences.

The floor plans of Texas houses vary a great deal. Floor plans of houses in other localities are of very little use to Texas architects and builders. The rooms are larger than usual in the same class of houses farther north. The chief difference, however, is that the floor plan always provides for a southerly exposure of the bedrooms, for in the summer the prevailing



Flow sheet or diagram showing course of materials and finished products of the Broun house-building factory. The large figures—1, 2, and 3—denote three streams of outgoing finished products

is the fact that he uses heavier and better material on the walls than customary.

To keep the interior corners, or recesses, sharp a narrow strip of heavy paper, folded to a right-angle shape, is glued to the shiplap through the muslin. The object of the muslin, of course, is to carry the paper and allow the shiplap to expand or contract without breaking the paper.

In some of his newest one-story houses Col. Broun is substituting gypsum wall-board ("Sheetrock") for the shiplap and muslin, at approximately the same cost and with quite satisfactory results.

50x125 ft. The prices are mostly for the years 1919, 1920 and 1921. Possibly today they would be a trifle less, although the building trades wages in Houston are still at the top figure of war-time days. The purchase price of a "Broun" house also includes a graded lot and shrubbery, for Col. Broun tries in every conceivable way to sell homes rather than mere buildings.

It will be noted that none of the houses have provision for sleeping rooms for servants. This is general in most parts of the South where the servants are universally negroes. Quarters for them are pro-

vided over the garage. In many cases therefore the purchase price mentioned in this article includes a garage with upstairs sleeping quarters for one or two servants. These, however, are not very elaborate structures and are seldom provided with bathrooms or other modern conveniences.

Shop Methods of Handling Work

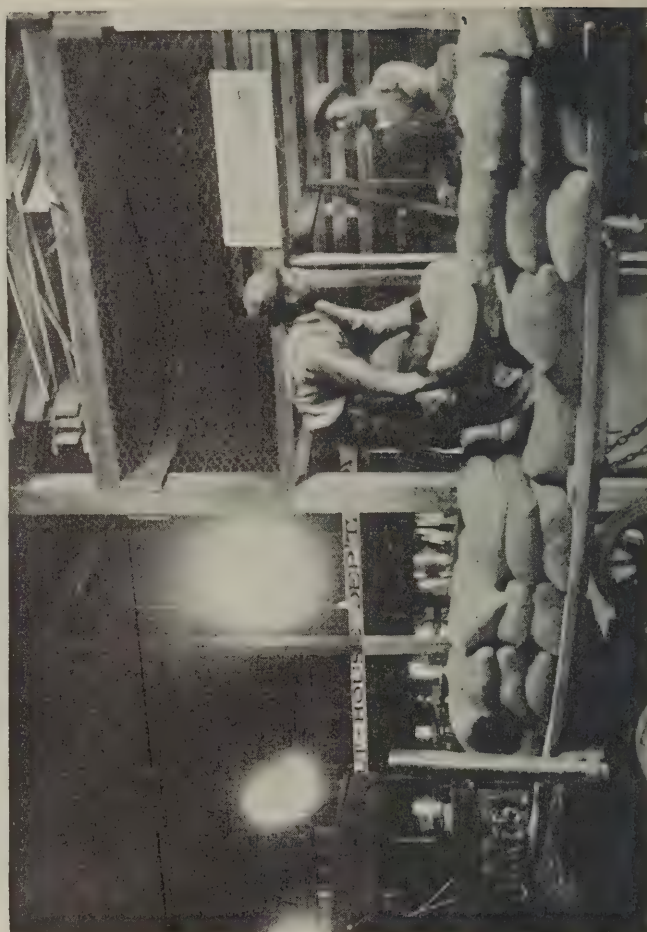
Early in his Houston work Col. Broun realized the commercial value of standardizing certain features of his houses. In this work, as in the development of his operations as a whole, he has been ably assisted by Ewart H. Lightfoot. Together they have standardized not only common features like doors and windows, but a host of little details, insignificant in themselves



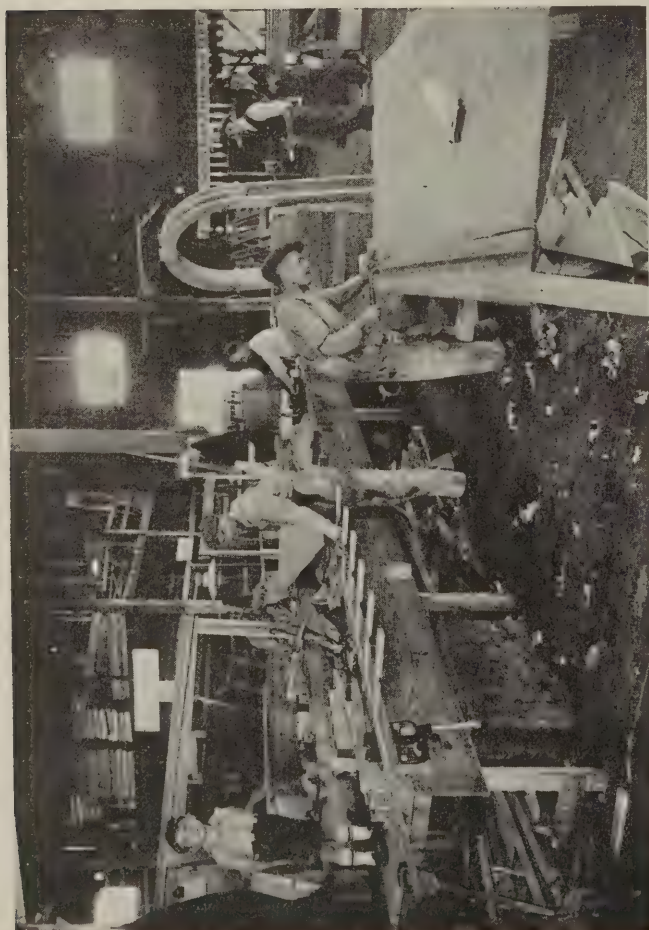
Planing mill and shop of Geo. T. Broun, developer and builder, Houston, Texas



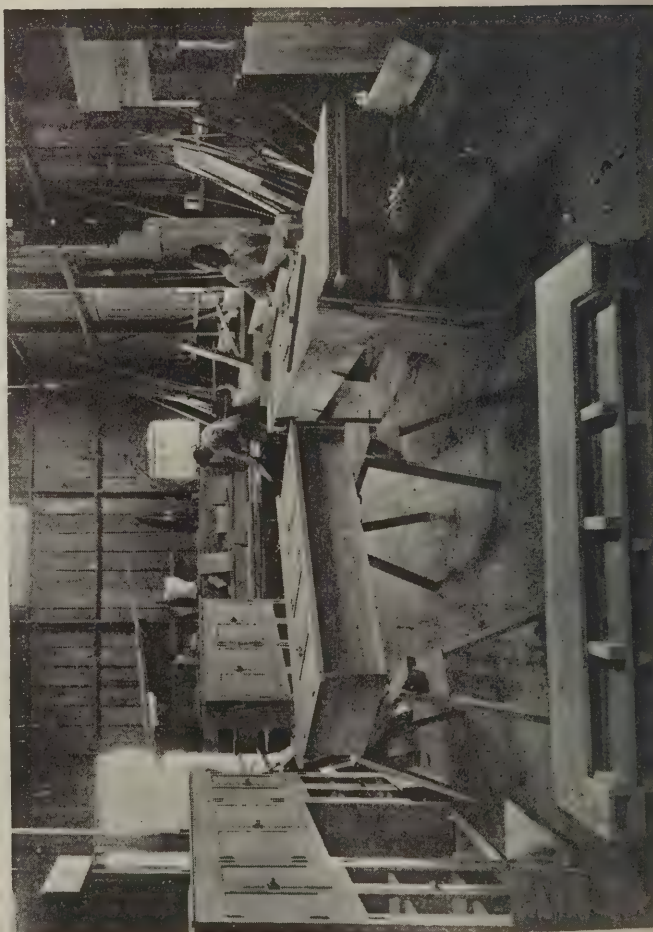
Screen department



Cement storage department



Sash and door department



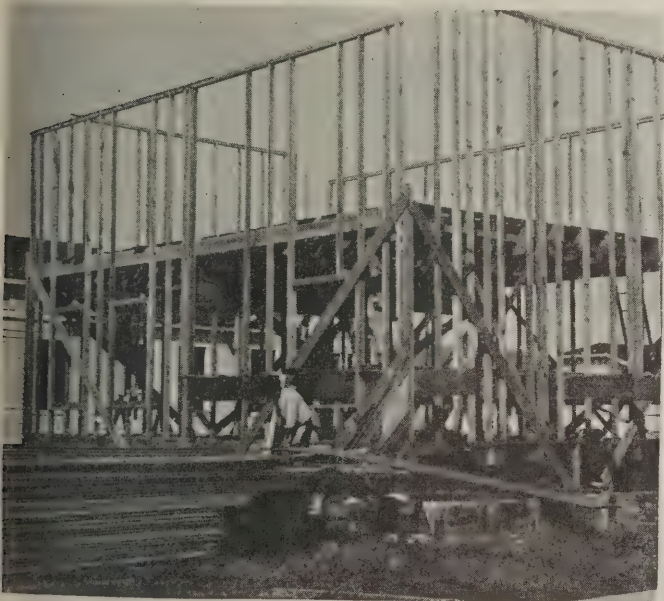
Planing and finishing department



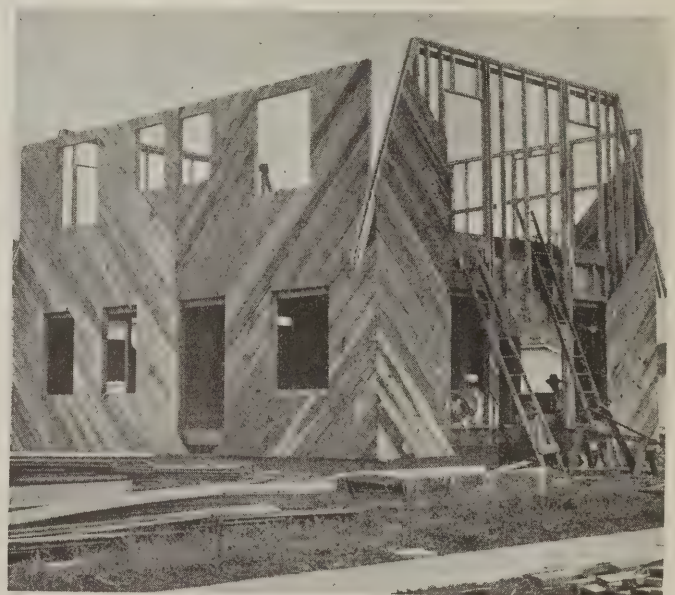
Concrete foundations introduced in Houston. No cellars



4 x 6 sills; 6x8 girders



Houston construction



Dutch colonial construction

where only one house is considered, but effecting a large saving in time, labor and materials when considered in the aggregate. With \$1,000,000 worth of houses to their credit, these facts were strongly impressed upon them.

The drawings herewith show a standard fireplace, which Mr. Lightfoot says is the outcome of many years' experience designing and installing fireplaces in this locality. The fact that the fireplace is "standardized" does not mean, of course, that the fireplaces in all their houses look the same. They are standardized only in essential particulars, the final treatment of them is of infinite variety.

The details of a standard bungalow bathroom are also shown. In this case the various bathrooms, so far as their interior arrangement is concerned, are identical. The

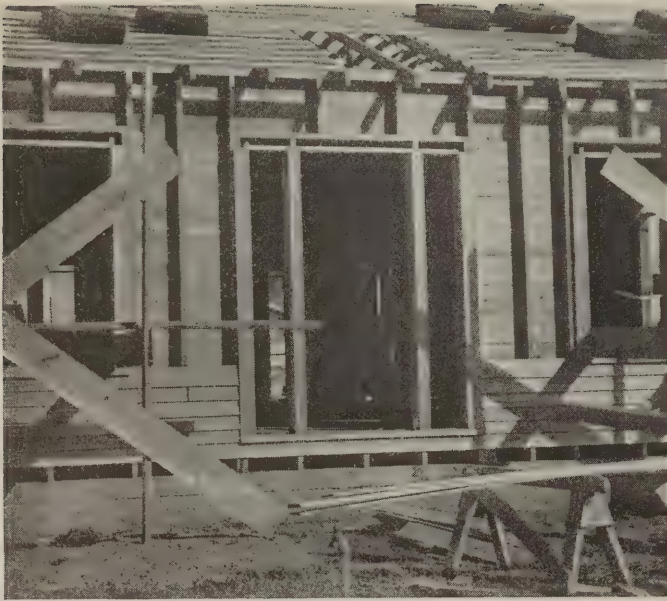
fixtures, of course, may be different in shape and quality, but they all conform to fixed dimensions. It is thus possible for all the plumbing and piping to be cut and assembled in the shop and then partially knocked down and installed in the building at a very considerable saving over the usual methods.

To facilitate the handling of this work Col. Broun operates a lumber yard and planing mill under the name of the Keystone Supply Co., the principal business of which is to take care of his own building operations. This is located in the southwestern part of the city, within easy trucking distance of practically all his building work.

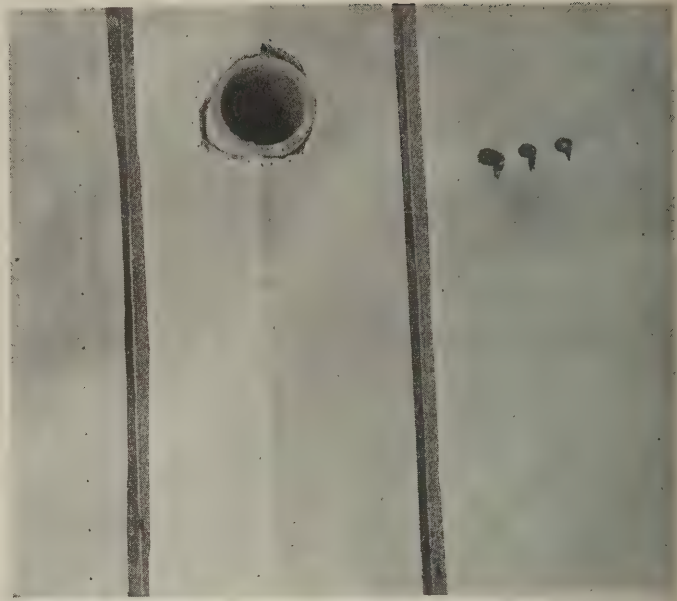
At these shops the raw materials are received by rail and are routed through their respective part of the shop exactly on the

same plan as an automobile assembling plant, or similar manufacturing industry, is operated. The shop includes a large shed like the template shop of a steel bridge plant, where the sills, studs, wall plates, rafters and every other structural part of the house—including the moldings—may be laid out to actual size and cut and framed.

Likewise there is the plumbing layout shop already referred to, where the plumbing of an entire house may be cut and assembled. There is the usual planing mill where all interior details—cabinet work—and the like can be made and assembled by machine methods. Doors and windows are purchased ready-made, but the shop work includes the fitting of the window frames with sash, cords and weights, as well as the screens. These are sent to the job with the inside trim, cut to length, tied on. This



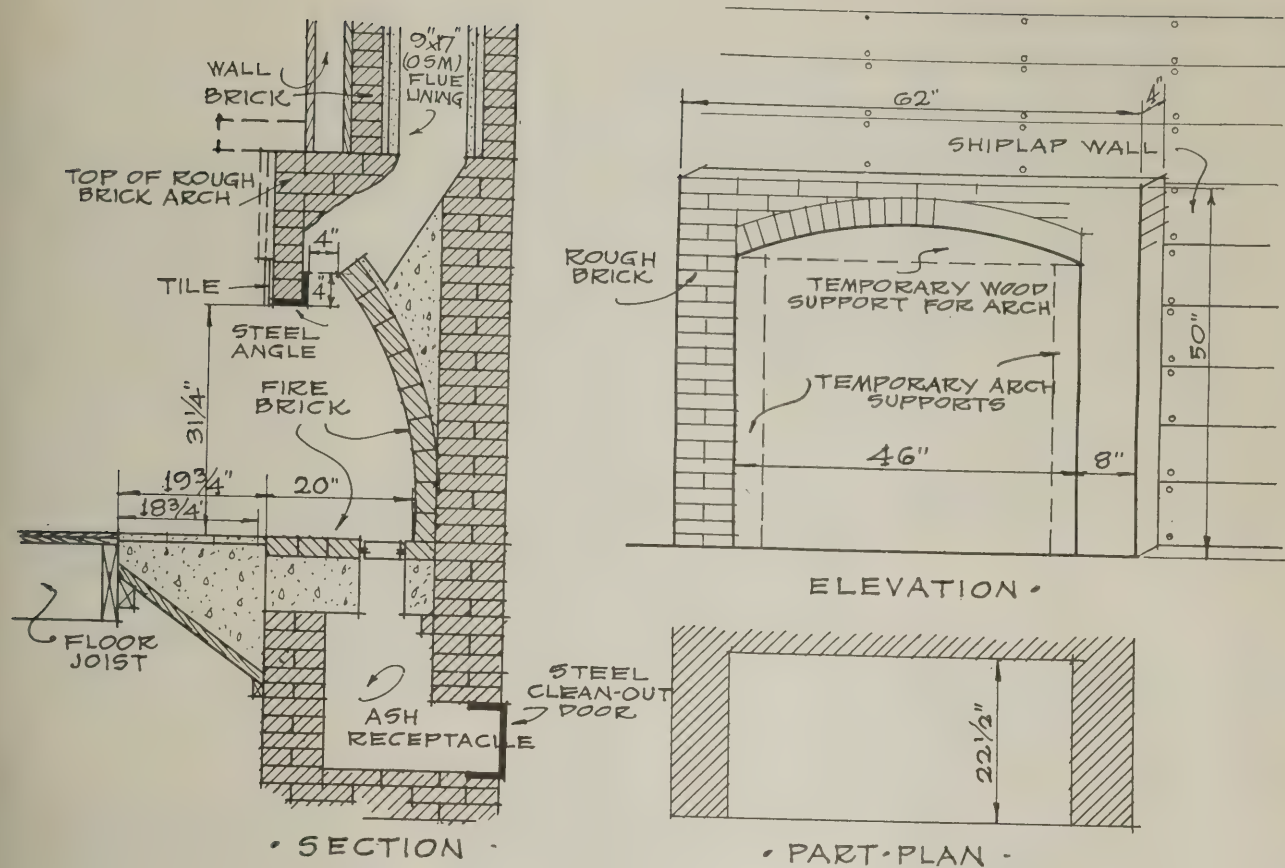
Siding directly on studs. No building paper. Inside is shiplap, wall-papered over muslin. No plaster in these houses



Muslin is tacked over shiplap and wallpaper is applied over this



Typical fireplaces and bathroom arrangement



Typical details of fireplace. Rough brickwork only

has reduced the cost of installing windows, according to Mr. Lightfoot, by 75 per cent. He has cut the costs of installing doors still more by fitting the doors in the shop with butts and lock, and one side of the frame with the trim.

The doors and windows move through the shop continuously just as the assembling plant of a modern factory operates. One workman performs one operation and a conveyor or slide takes the door or part to the next man. When the finished parts get to the side or end of the shop they are ready to go to the job.

As Mr. Lightfoot says: "I start the millwork and the equipment of the frames with ash and doors and hardware the same hour I start the frame of the house through the shop-cut system. And the house complete is ready for erection in record time as a result."

Not Stock-Plan Houses

Probably all that Col. Broun and his organization is doing in a mechanical way has been done and is being done by various manufacturers of stock-plan ready-cut houses. The difference between their scheme and his is that Col. Broun will apply shop methods and system to any house design. He can take any architect's plans and put the house through his shop and assemble it on the ground at a very appreciable saving over the ordinary method.

The saving is not only in time but in the wages paid, for the shop employes receive less than carpenters and outside building mechanics. The shop can run at all seasons and in all weather.

The views accompanying this article are sufficient proof that Col. Broun has not standardized houses. He has merely standardized the method of framing and assembling them and certain other features which do not prevent an infinite variety of house designs. Although born in a family of distinguished lawyers and judges, and himself educated as a lawyer, Col. Broun is too much the artist to standardize houses.

Plans to Extend Operations

A part of Col. Broun's scheme is to extend the field of his operations so as to give small-town builders and contractors the benefit of his reputation, organization and experience. He plans to form connections with local contractors so that he can furnish them with houses complete after his own plans, or take their plans, give them expert treatment and then provide the various structural members ready cut, with erection diagram and expert advice on how to handle the work.

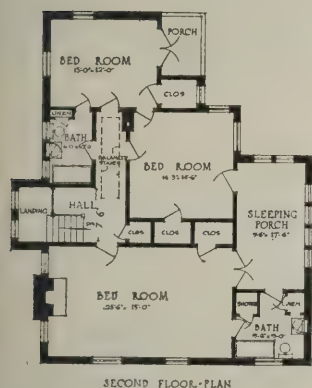
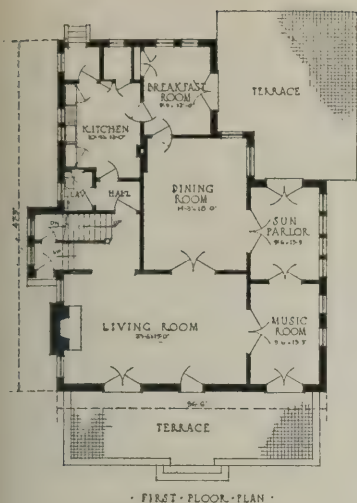
This service, unlike that of most of the ready-cut house concerns, is not intended for the individual house purchaser, but for the building contractor himself. The local contractor will operate just as he does at

present, but instead of ordering lumber in the rough, based on a "rough" estimate, he would send his sketch plans to Col. Broun, who would work them up into regular architectural plans, make the estimate, supply the lumber ready cut, the doors and windows ready to install, and the plumbing cut and ready to assemble. Col. Broun intends to go much farther to help the local contractor build better and make more money. He proposes to help him install a suitable cost-keeping system, or rather to keep his costs systematically, and to help finance his operations, by taking care of the local contractor's paper, saving him excessive discount and interest payments.

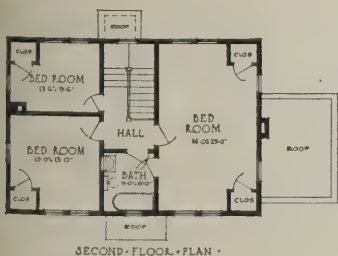
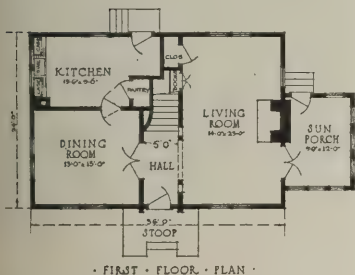
Col. Broun has the laudable ambition of wanting to see the reputation of the "Broun house" spread all over the state of Texas and the Southwest, as it is in the city of Houston today. He hopes to do this not by crowding the local architect and builder off the map, so to speak, but by giving them every possible assistance in putting "Broun" quality and service into their own creations. His experiment will be watched with much interest.

The pages following and merging into the style sheet beginning on page 33 show the types of houses and the plans and details of the interiors of the Broun houses.

The principles of co-operation between architect and builder being worked out by Mr. Broun adds peculiar interest to the



Plans of House No. 10



Plans of House No. 13



House No. 10—Geo. T. Broun's residence



Entrance detail House No. 13, page 33

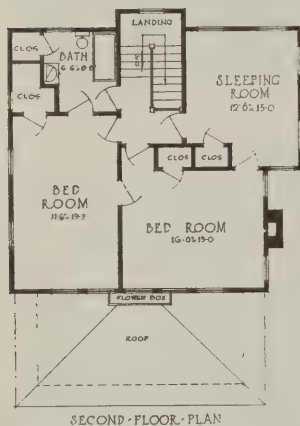
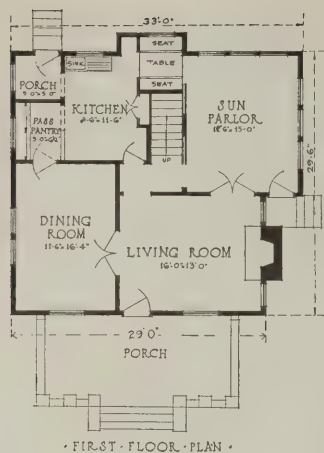
requirement of the various states that the state shall control and regulate those calling themselves architects, and the tendency, too apparent, for builders to disregard laws regulating the profession and to assume that they are a law unto themselves. The most responsible and best-known builders recognize their proper field of usefulness and rarely, if ever, trespass upon the work of the profession, but need I tell you

of the thousands of cases where the contractor advises an owner that the services of an architect are a useless luxury and that he, the builder, can plan equally as well as any architect? I have no sympathy with those who conceive it to be the function of the builder to be also the designer, nor have I any sympathy with the suggestion made in some states that the state should license contractors. I can conceive of nothing more disastrous to the building industry, to the business of builders, to our profession as architects than to place the building industry under state control, as was some time ago recommended in the state of New York when a proposal to create a state trade commission to regulate the building industry was defeated.

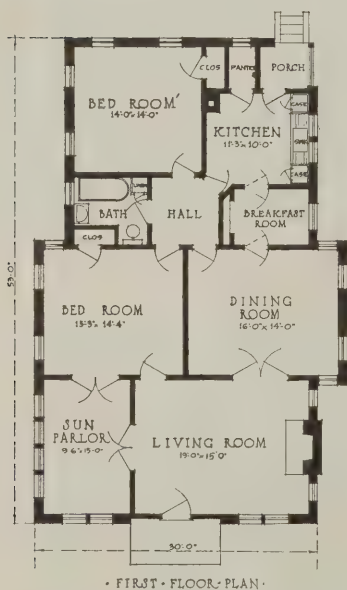
"The profession of architecture is unalterably opposed to the architect who tries to build on the side and may I suggest that

contractors just as unreservedly outlaw the builder who tries to play architect on the side. This is not a trade-unionism doctrine. It is common, every-day horse sense.

"Many builders, while they give lip service and hand applause to the recognition of the field of the architect, alone with the owner forget their Sunday profession by Monday practices in order to get the edge on a competitor. They talk about the architect being necessary only to himself. They tell the owner that they can provide all the plans needed to secure a building permit and to construct the building, and many times, I regret to say, they induce the owner to fall for the 'bunkum,' and with what result? The owner who believes them is either a fool or a crook. He is either a man who knows nothing whatever about planning or building problems, or he is a man trying to get some-



Plans of House No. 15



Plans of House No. 16

thing for nothing, and right here will be seen the danger-signal of trouble head.

"Not knowing the builders' problem, the owner is not sympathetic to it. He has not either the indulgence or the instinct to be sympathetic with them and remember in these cases their appeal to the architect is cut off. An architect in his professional



House No. 15. Price including lot \$8,500



House No. 16. Price, including lot, \$9,000. A larger view of this house appears on page 34. Note the effective use of shrubbery

capacity is an owner's professional personality."

A Contractor's Analysis of Figures of the Chicago Citizens' Committee

IN "The Situation" department last month the comparative figures on the cost of a building built with union labor and the same type of building constructed under the conditions of the Landis award were submitted. The statement was clipped from the daily press of March 22, and referred to Mr. F. W. Armstrong, business manager of the Citizens' Committee, for revision of some minor typographical errors. The corrections were made and the matter returned.

A Contractor Protests

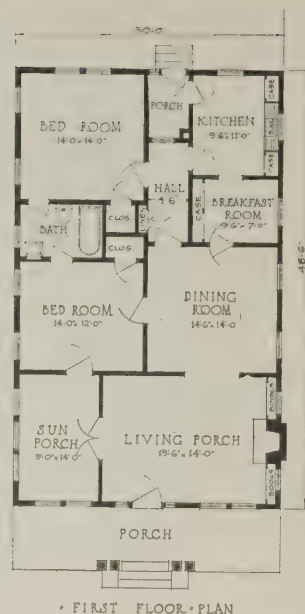
To the Editor: URBANA, Ill., April 11.

I notice in NATIONAL BUILDER a statement

you should hasten to correct, i. e., in "The Situation." The tables given are too ridiculous for anyone who knows about building to consider seriously, and they will mislead people who do not know about building. For instance, take the Landis award where carpenter work is given as \$1,057 on a house to cost complete \$3,738 (which house, I presume, is about a 3 room bungalow). The figures given are entirely too high, even at \$1.25 per hour and such a house could be built from lumber from the pile for less than the amount given for a ready-cut job. It is not necessary to refer to other inaccuracies, but we refer to the heating plant. Under no possible circumstances could the labor have shown such a difference. I have been in the contracting business for about 25 years. I have shown the article in NATIONAL BUILDER to other contractors and all have acknowledged the figures are ridiculous. The \$1,800.00 could represent nothing but



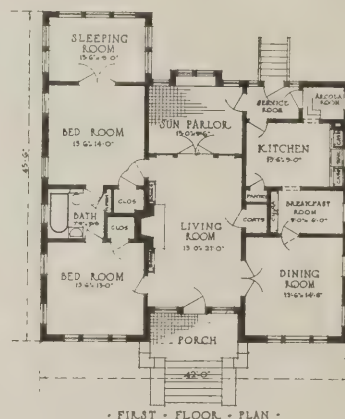
House No. 20. Price, including lot, \$8,000. Well-considered planting of shrubbery is a notable feature of all the Broun houses



Plan of House No. 20



House No. 23—Corner lot. Price, including lot, \$11,000



Plan of House No. 23



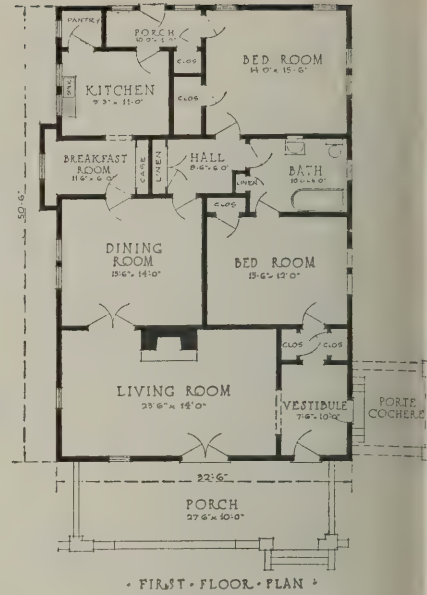
Detail of entrance of house 23. Note the tile facing on steps

labor, and no trades were cut more than 20 per cent, so that if this amount were saved, it represents 20 per cent, or one-fifth of cost of labor, so that the total cost under Landis award would be four times the amount, or \$7,200.00, which is the other four-fifths, or the total amount paid for labor alone. Also take the figures given in the tables for carpenter work. The Landis award job \$1,057.00, the union job \$1,851.34, a difference of \$754.34, or approximately 40 per cent, so that on a union job where the wages are \$1.25 per hour and to cost \$1,851.34, to bring the cost to \$1,057.00 would reduce the hourly wage 40 per cent, or 75 cents.

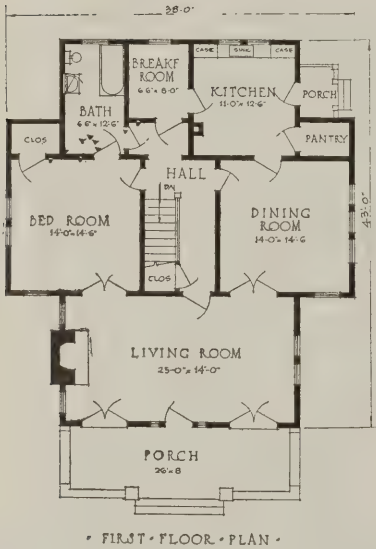
I would like to get something started, but so long as such agitators as the Citizens Committee to Enforce the Landis Award get their stuff before the public, just so long will building be delayed. If they would do something really helpful and something the people would appreciate, let them use their influence toward reducing the cost of building materials. They have a big field there.—E. R. BRANHAM.



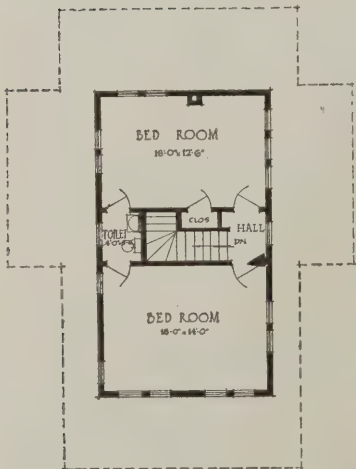
House No. 54—Also shown on page 34. Price, including lot, \$10,000



Plan of House No. 55. See page 35



• FIRST FLOOR PLAN •

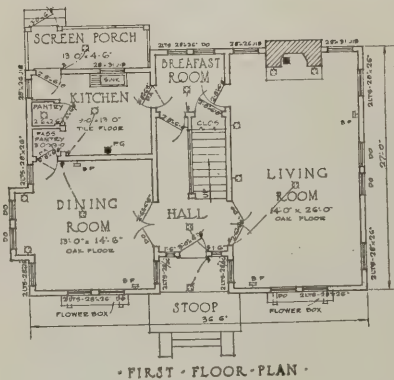


• SECOND FLOOR PLAN •

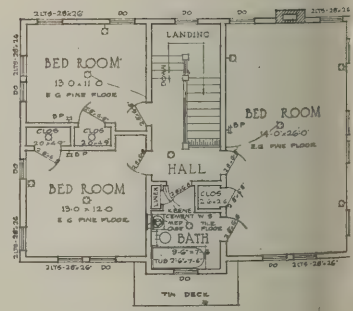
Plans of House No. 54



House No. 56. Price, with lot, \$9,500



• FIRST FLOOR PLAN •



• SECOND FLOOR PLAN •

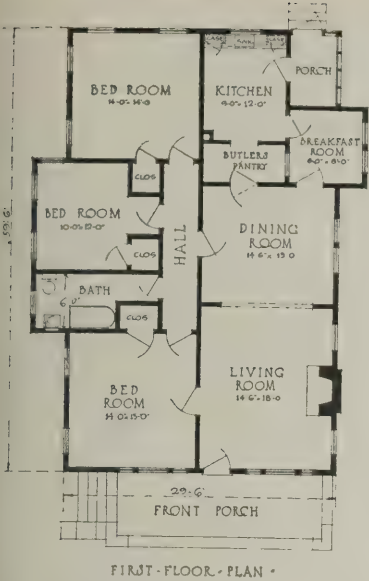
Plans of House No. 56

Prizes for Chimney Throat Designs

THE Donley Brothers Company, Cleveland, Ohio, announce a contest for the best working drawings of fireplaces and chimney throats, offering: First prize, \$40;

second prize, \$25; third prize, \$15; prizes of \$10 each.

The competition is not for external design, but for internal, working features and mechanism, to be judged solely from the standpoint of practical heating efficiency and freedom from trouble. It is not a



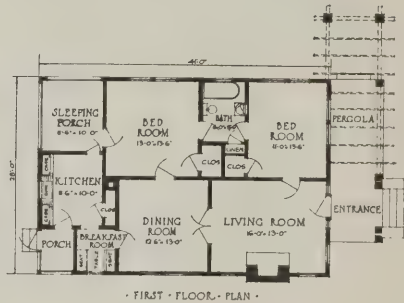
Plan of House No. 110. See page 35



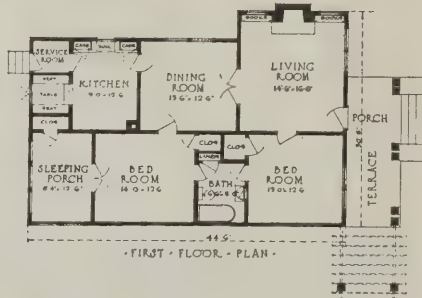
House No. 121—Price, with lot, \$6,500



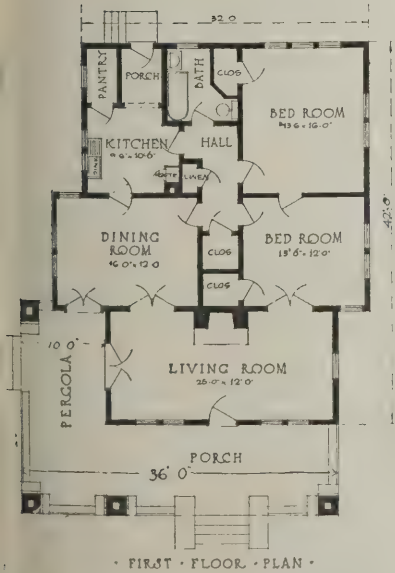
House No. 124—Price, with lot, \$8,000



Plan of House No. 121



Plan of House No. 127, page 36



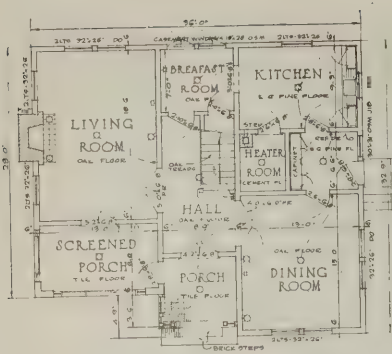
Plan of House No. 124



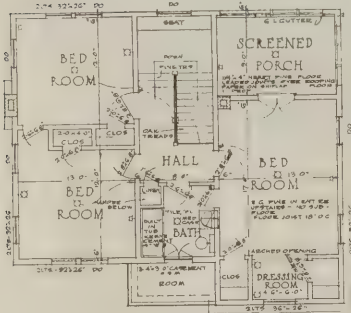
Detail of entrance, House No. 127, page 36. All house numbers are of tile, blue figures on a white ground

quired that the designs be original or exclusive, but contestants must furnish satisfactory assurance before the award is made, that they have a right to submit the design.

All designs are to be submitted on the condition that the Donley Brothers Company shall be free to use them. Exclusive right to the use of any design is not desired. Designs whose merit is dependent upon patented materials or mechanism will not be considered. Original drawings, tracings or prints may be sent in. A brief written explanation telling why any feature is desirable will be welcomed, along with the drawings. The drawings will be judged solely in relation to the problem of making the fire burn easily, brightly, and with maximum fuel for the heat produced,



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Plans of House No. 128

and with total absence of smoke. External design plays no part in the contest.

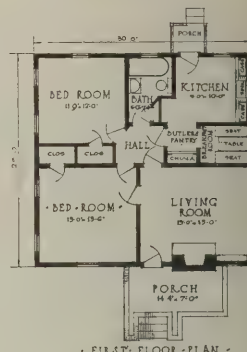
The committee of judges are men having technical experience in the fireplace field, namely, E. A. Dodd of the Art Tile and Mantel Company, a fireplace builder of many years' experience; W. R. Powell, architect, specializing in fine homes; Thomas F. Bolton, of the Bolton-Pratt Construction Company, successful general contractor with long experience in every detail of masonry construction. The Donley Brothers Company address is East 74th and Aetna Road, Cleveland, Ohio.



House No. 128—Price, with lot, \$11,000

The Style Sheet

NUMEROUS inquirers for the plans and specifications of the houses which were shown in the April Style Sheet have been referred to the architects who designed them. Contributors are requested to furnish the names and addresses of both architects and builders for publication.

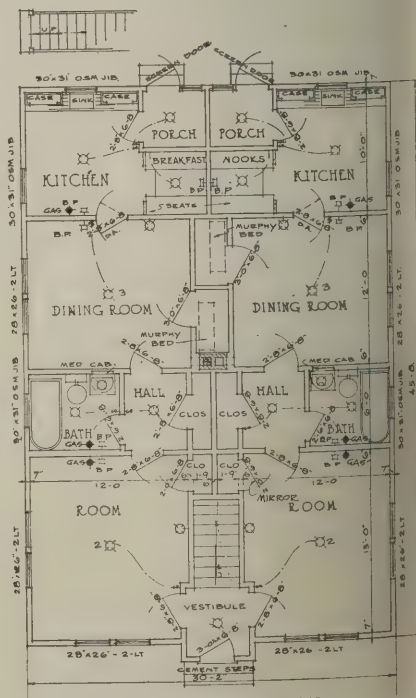


FIRST FLOOR PLAN

Plan of House No. 129, shown on page 36



House No. 202—Four-family flat. Price, with lot, \$12,000



FIRST FLOOR PLAN

Plan of House No. 202—Four-family flat. The second floor is the same

National Builder Style Sheet



Designed and built by Geo. T. Broun, Houston, Texas. Plans not available for publication



House No. 13—100 feet on corner lot. Price with lot, \$10,000. See entrance detail and sketch plans, page 27



House No. 16—Geo. T. Broun, Houston, Texas, designer and builder. Price, with lot, \$9,000. See additional view and plan, page 28



House No. 54—Geo. T. Broun, Houston, Texas, designer and builder. Price, with lot, \$10,000. See front elevation and plans, page 30



House No. 55—Geo. T. Broun, Houston, Texas, designer and builder. See plan, page 30. Price, with lot, \$8,500



House No. 110—Geo. T. Broun, Houston, Texas, designer and builder. Price, with lot, \$8,500. See plan, page 31



House No. 127—Geo. T. Broun, Houston, Texas, designer and builder. Price, with lot, \$6,500. See detail of entrance and plan, page 31



House No. 129—Geo. T. Broun, Houston, Texas, designer and builder. Price, with lot, \$5,500. See plan, page 32



Two-story bungalow type in Los Angeles, Calif.



A cottage showing English influence



Trees, shrubbery and trellis work add to the distinction and home qualities of the houses in Dallas, Texas



An adaptable design in Oak Park, Ill.



A stucco bungalow, Wilmette, Ill.



A pleasing composite of styles, Dallas, Texas



Simplicity and dignity in a small house, Oak Park, Ill.

Typical Chicago "City" Houses

Similar Floor Plan Used for One, Two and Three Family Flats

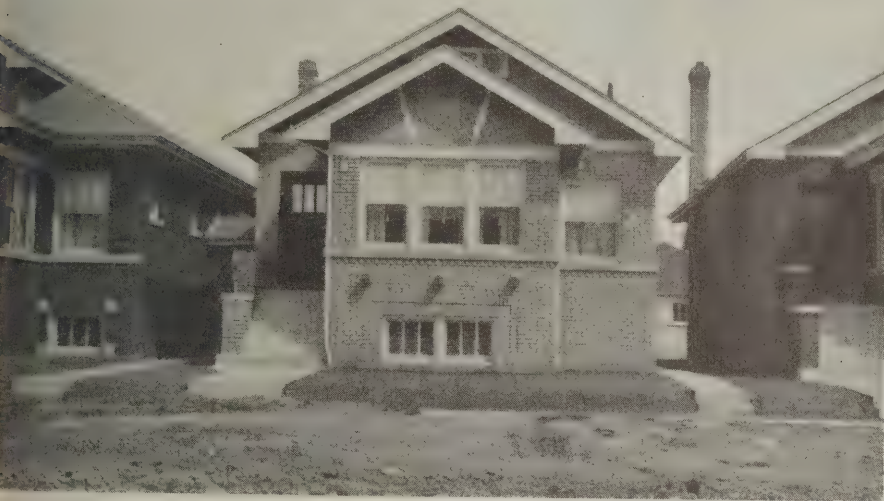
CHICAGO, like most big cities spread over a large area, has within its city limits both a suburban type of residence and a strictly "city" type. The lots nearer the city and near transportation lines are generally only 30-ft. wide and compar-

tively high in value. Their development has given rise to a type of house and flat building that is almost typical of Chicago. Practically the same floor plan is used for a single-story bungalow or a three-story flat. By far the most popular, how-

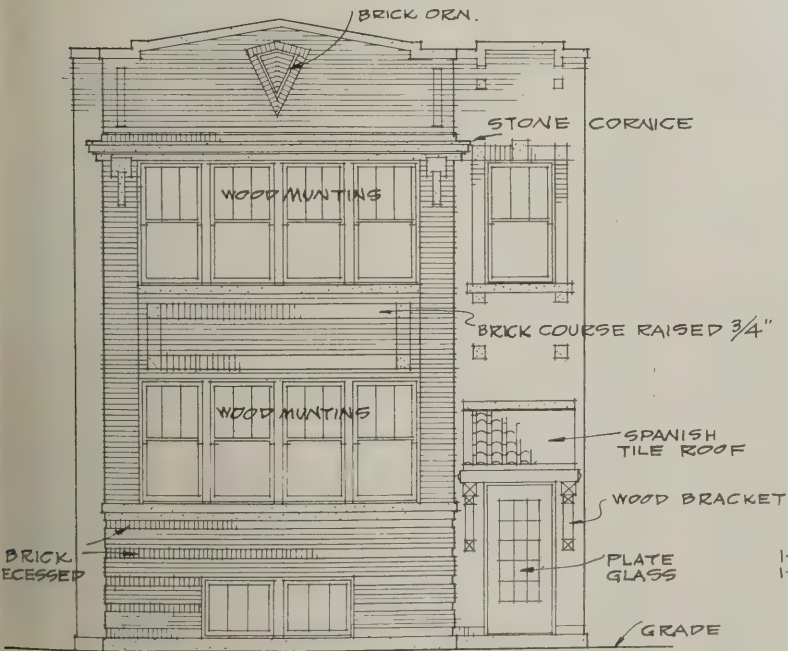
ever, is the two-story building. These have been built in Chicago literally by thousands. They were formerly more popular than they are today because they were better suited to become income producing properties. The increase in lot valuations and taxes has made it necessary in most cases of new construction near transportation lines to build structures to produce a greater income per square foot or per lot. Also the increase in rents has made smaller apartments more popular. A flat like those shown in the floor plans and photographs herewith, in a desirable part of the city, rents now for \$125 to \$150 per month. They used to rent, when buildings of this type were more popular, for \$50 to \$70, or even less.

The two-family house, of which several examples are illustrated, was a favorite type with speculative builders up to 1916 and 1917. Thousands of them were built in wholesale quantities and sold to thrifty owners, who lived in one flat or apartment and rented the other.

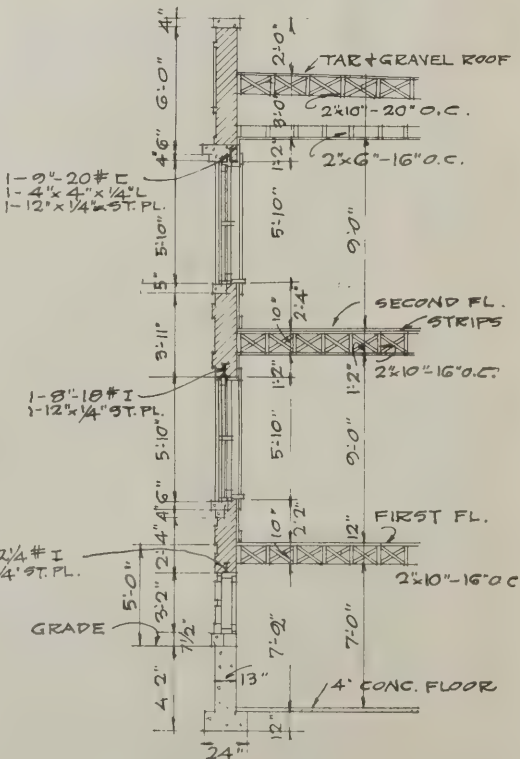
The accompanying floor plans were furnished by John J. Lyons, who prior to 1916 built and sold over 600 of these houses. The plan of the six-room flat has always



Typical Chicago bungalow on a 30-ft. lot. The floor plans are practically the same as the two-flat buildings



• FRONT • ELEVATION •
NOTE: ALL CUT STONE SHOWN DOTTED.



• SECTION •

Typical elevation and section of two-flat building. John J. Lyons, builder, Chicago



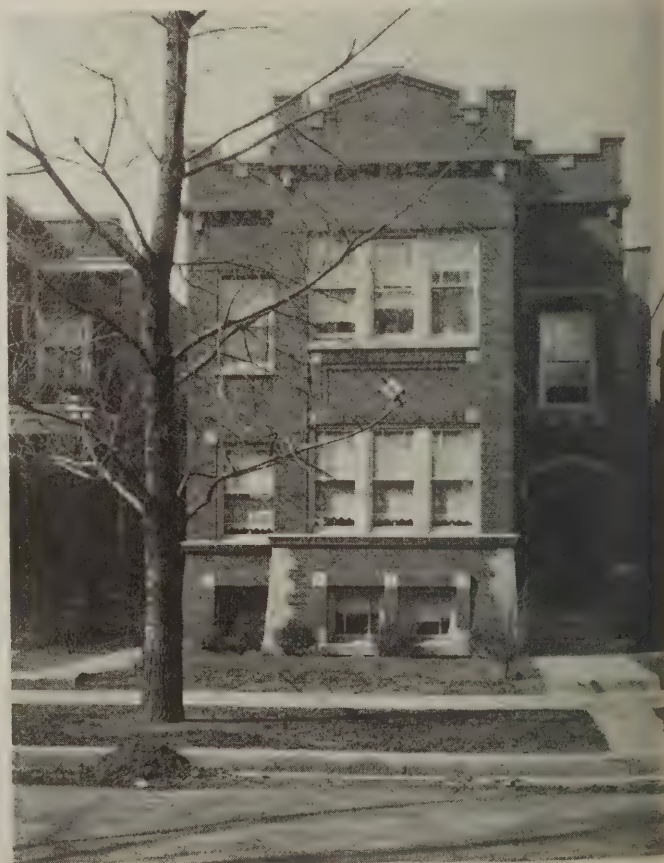
Typical two-flat building just completed



Another two-flat variation



One of the Lyons two-flat buildings

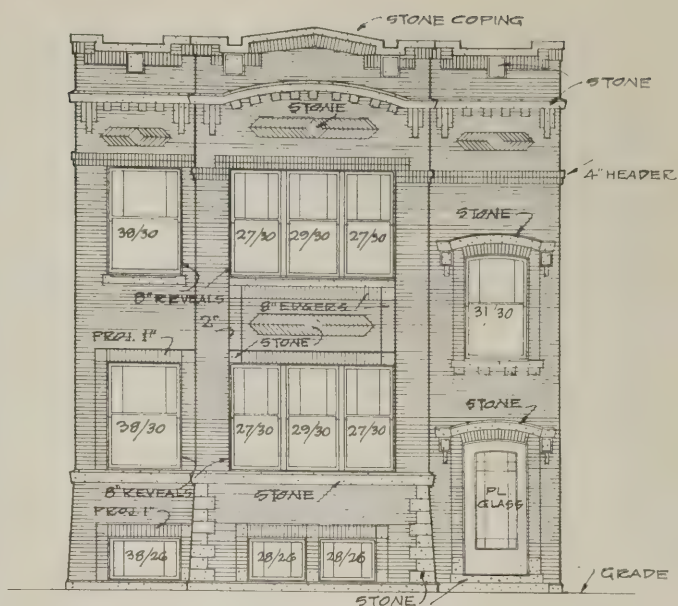


Another Lyons two-flat building

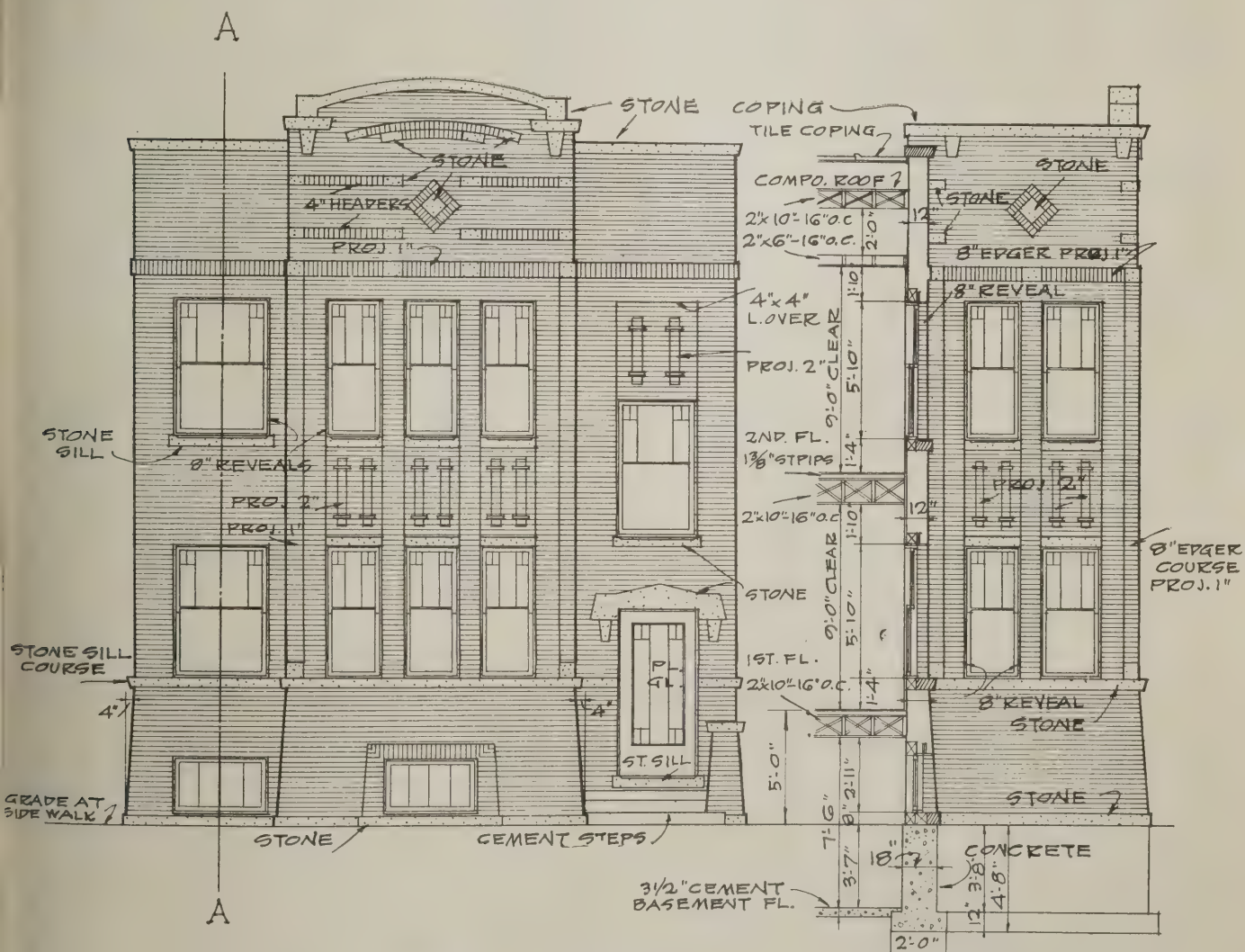
been, and still is, a favorite for a strictly high class city apartment. This apartment has two baths and rents at the present time for about \$150 per month for a single apartment, on a yearly lease.

In 1915 and 1916 Mr. Lyons built houses like these for \$8500 to \$9000. He operated on a large scale and with a well organized construction crew. Lots of that time were bought for about \$2000. Today he has ceased to build these houses on a speculative basis because of changed conditions. He does, however, build a number as a contractor, and the plan shown for the five-room flat is one of those most in demand today. This has provision for an in-a-door bed in the living room of the second floor flat, which is a popular feature giving six-room facilities in a five-room flat. Where the sun parlor is separate, provision is often made for an in-a-door bed in this room, converting it into a sleeping porch by night.

In spite of the sameness of the floor plan the exterior treatment of these 2-flat buildings, when done by a competent archi-

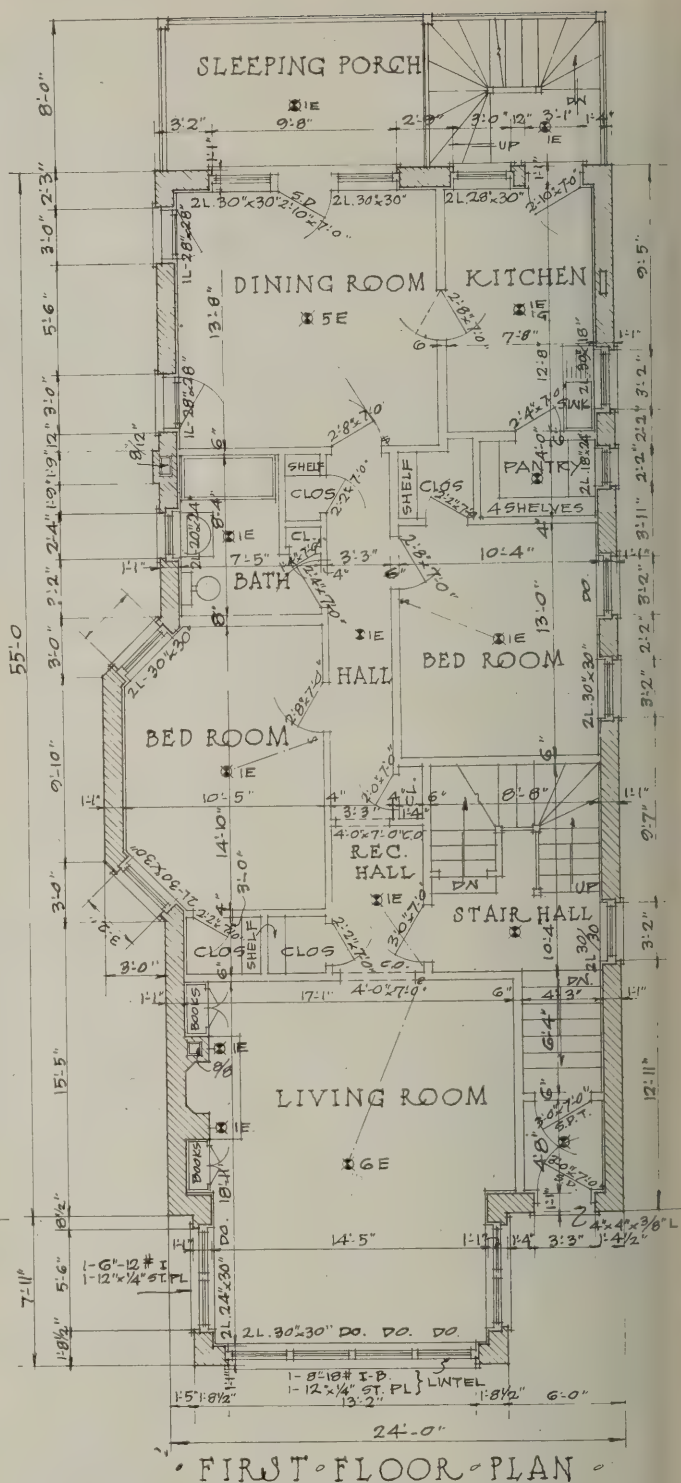


• FRONT • ELEVATION •



• FRONT • ELEVATION • • SECTION A-A •

Typical elevations and sections of two-flat buildings. John J. Lyons, Chicago, builder

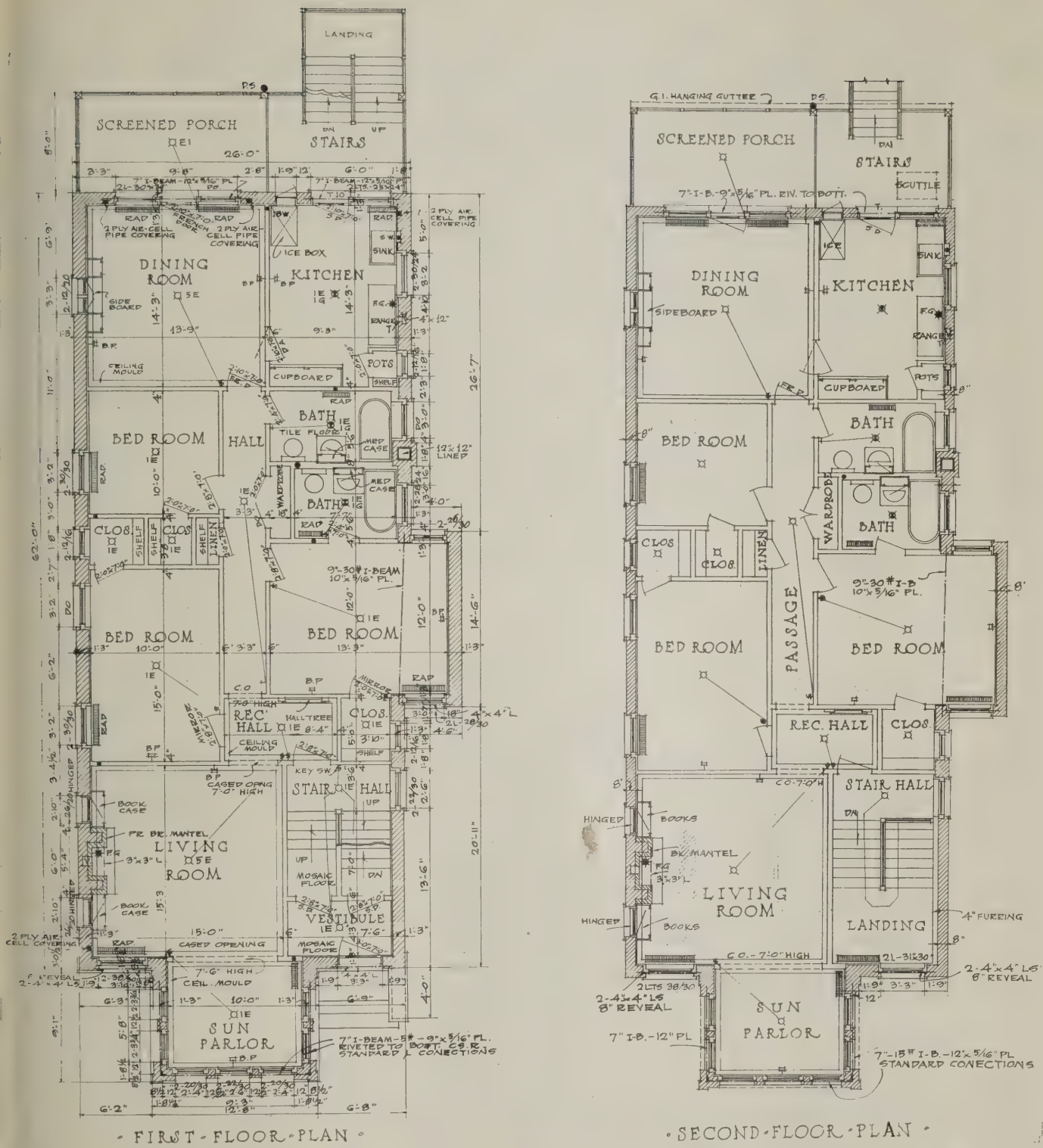


Typical floor plans of five-room two-flat buildings built extensively in Chicago by John J. Lyons

The present selling price of a 2-flat building of the type illustrated, well constructed, would be \$16,000 to \$17,000, according to

War Memorials: The Community Service, Inc., 1 Madison Ave., New York City, has available for free distribution a number of pamphlets which should be of interest to builders in rural communities and industrial centres. The titles as given below are indicative of the type of subject

treated: No. 1, What Sort of War Memorial?; No. 2, A Living Memorial; No. 3, The Planning, Managing and Financing of Memorial Community Houses; No. 4, Existing Community Houses; No. 5, Existing Public Auditoriums; No. 6, Provision for Art, Music and Drama; No. 8, Memorial Features in Community Buildings; No. 9, The Architecture of Memorial Community Houses; No. 10, Architecture of Large Memorial Buildings; No. 12, Food Service in the Community Memorial Buildings.



Typical plans of six-room two-flat buildings built in Chicago by John J. Lyons

Winter Construction in Nova Scotia

THE Dartmouth Developing Company, Ltd., of Nova Scotia, writes us as follows: "We have lately become associated with the Van Guilder Double Wall Company of Rochester, N. Y., and have completed double walls for a permanent build-

ing for the Acadia Sugar Refinery at Woodside, on the shores of Halifax harbor, about two miles from Dartmouth. In view of this concrete construction being done in cold weather, your November, 1921, issue was extremely interesting. In the building we have referred to, a steam pipe was laid parallel with and on the outside of the outer wall at the footing, and every 10 ft. a small opening was made through the

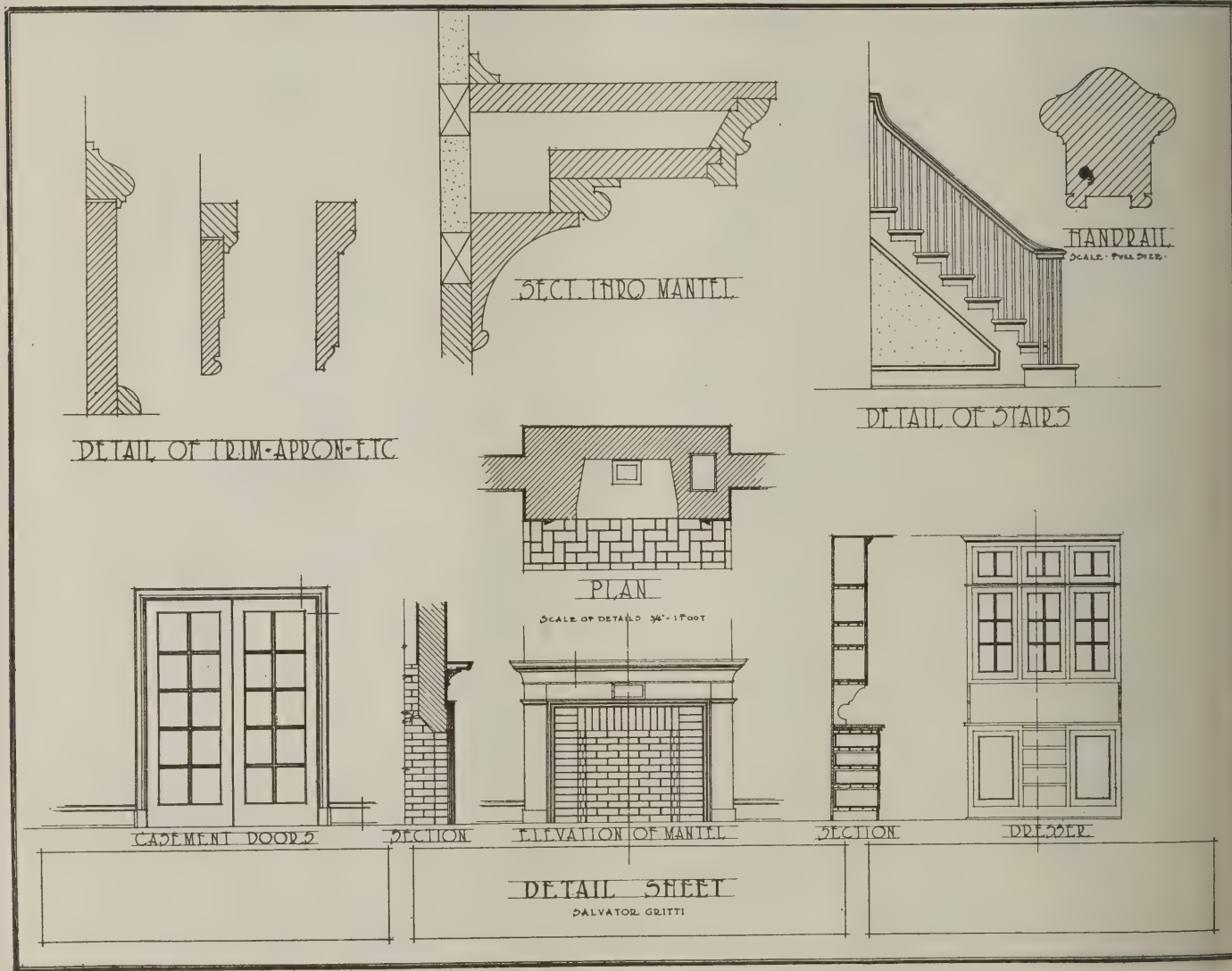
outer wall and an offset pipe with valve was carried into the air space. Live steam, under control, was therefore allowed to rise between the two walls and the concrete work was carried on without any danger by frost. Under our agreement with the Acadia Sugar Refinery, they were to supply the necessary heat, cement, etc., and the above method of keeping out frost came from their engineer."

A Double House for a Narrow Lot

AMONG the plans submitted in a competition instituted by the Operative Builders' Association of Philadelphia, Pa., as a feature of the recent building exhibit in that city, the elevation and plans here shown, were pronounced the most original and practical.

finish a basement floor of concrete so as to leave a smooth, hard wearing surface." The Portland Cement Association answers: "Standard Specifications for Concrete Floors' gives full information on the best way of finishing a basement concrete floor. If you wish a very wear-resistant concrete

for the floor during the early hardening period. Regarding the best method of waterproofing, a cement cistern on the inside to hold water; if a concrete cistern is properly built it will be absolutely watertight. A dense concrete is necessary, and to obtain it a relatively rich mixture should



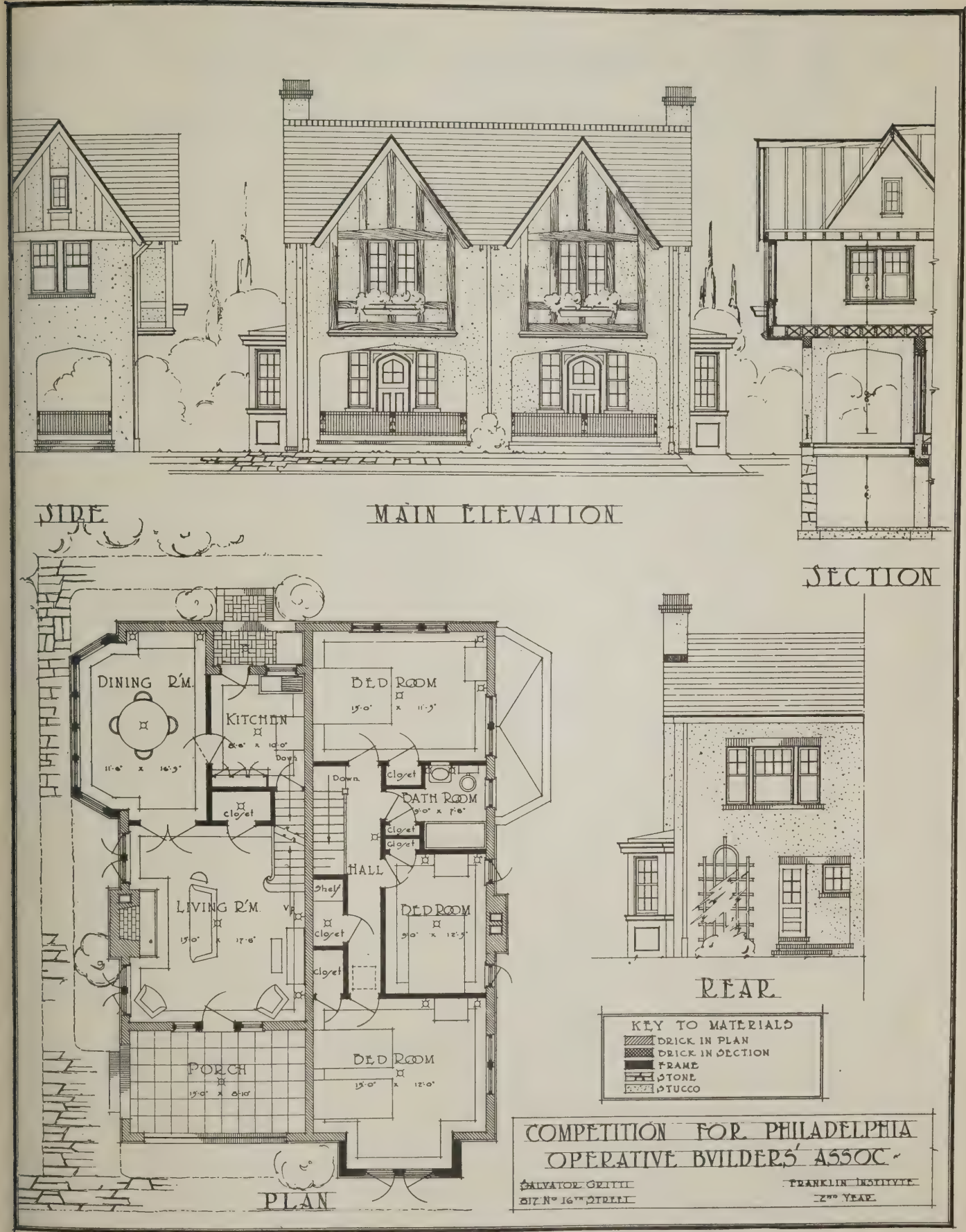
The work is that of a high school boy, a pupil of the Franklin Institute Night School, Salvator Gritti, 18 years old. He evidently lives up to his name.

Concrete Floors and Water-Tight Cisterns

D. R. L., a Canadian subscriber, writes: "I would like to know the best way of waterproofing a cement cistern on the inside to hold water; and the best way to

floor we would suggest the use of what is called No. 1 Aggregate in the second or wearing course of the floor, viz., small pebbles $\frac{1}{4}$ in. or $\frac{3}{8}$ in. in size. If the mortar for this top course is proportioned in the ratio of one part of portland cement to one part of sand to one part of small pebbles, the wear-resistant qualities of the surface are improved. These specifications cover the question of floor construction in some detail. Note particularly the importance of minimizing the amount of mixing water and the importance of proper protection

be used. At least 1:2:3, and better a 1:1½:3; the quantity of mixing water should be minimized, 5½ to 6 gallons per sack of cement usually being sufficient; the concrete should be thoroughly mixed at least a minute and a half in a batch mixer and should be thoroughly spaded or rodded as it is being deposited in the forms, to prevent the formation of any stone pockets. The aggregate should be clean and well graded, and the cistern should be protected from too rapid drying out during the early hardening period."



Design and plans of a double house for a narrow lot, by Salvatore Gritti, Philadelphia, Pa.

An Architect's Contribution to System in House Building

Ernest Flagg, a Prominent New York City Architect, Devises Processes and Methods that May Have a Wide Influence on Future House Building

A BOOK full of suggestion and food for thought, for the architect and builder of residences, is "Small Houses—Their Economic Design and Construction,"* by Ernest Flagg, Architect, New York City. While the work mainly describes a particular type of house developed and built by the author, and is written largely as an argument in favor of this particular type, there is a wealth of material of the utmost interest and inspirational value to everyone who is striving to solve the house-building problem in a modern business-like way.

Module System of Design

A module system of design is used to insure standardization of work and avoid special features. This system of design is very old and very simple. It is the "trestle board" of the ancients. The designs are made on sheets of paper ruled into squares (ordinary commercial cross-section paper), the side of each square representing a fixed unit of measure. Consequently the drawing may be made free hand and the dimensions or area may be read without the use of a scale. (See Fig. 1.)

The module or unit used in Mr. Flagg's designs is 3 ft. 9 in. The reason for this unit he gives as follows: "On working drawings this is divided into five parts of 9 in. each and the sheets ruled accordingly. The reason for adopting that particular unit for these little houses was because multiples of 3 ft. 9 in. give very convenient dimensions, both for the room and story heights and also economical sizes for building materials in the avoidance of waste. Standard lengths of lumber, for instance, are graded at 2-ft. intervals. Beams and other scantling are cut to lengths of 8 ft., 10 ft., 12 ft., 14 ft., and so on. Multiples of 3 ft. 9 in. give lengths of 7 ft. 6 in., 11 ft. 3 in., 15 ft., 18 ft. 9 in., so that by using standard lengths of timber these distances can be spanned and sufficient bearing had on the walls, without cutting, and therefore without waste. Multiples of 3 ft. 9 in. also give very suitable dimensions for rooms of the kind wanted. The module 3 ft. 9 in. is a convenient unit in setting forms for masonry, and divisions of it apply in many

ways. All beams and rafters are spaced on the half module; one-fourth of a module is a suitable width for stair treads of the more important stairs, while one-fifth of a module serves for others. The full module is a suitable width for corridors and also most windows; and permits the use of standard panes of glass without cutting. Two modules, or 7 ft. 6 in., do for most story heights, while three modules, or 11 ft. 3 in., serve for the higher stories."

The following are other brief extracts from Mr. Flagg's book, which will show possibly better than any other kind of a review the nature of the material he offers his readers:

Truth in Construction

"One excellent way to save money in building is to tell the truth; that is to let things show for what they are, and save the cost of making them appear to be what they are not. In many of our most important works the construction has nothing to do with the part that meets the eye, except to hold it in place. Such designs violate the very fundamental laws of art. They are unreasonable, which good art never is. Art without reason is a counterfeit which, however it may impose on the unthinking at the time when made, is sure to be detected and condemned at a later date, as unworthy of admiration."

Proper Planning

"A chief cause of waste in building is due to unskilful planning. One who has not made a careful study of the matter can hardly realize how great a difference there may be in the relative economy of two plans which, to the casual observer, seem much alike. The amount of money lost yearly in the United States through unskilful planning would be staggering if known."

"To arrange the house conveniently it is necessary for the designer to have constantly in mind the proper relationship which should exist between the various departments that go to make up the home. Those divisions ordinarily are: 1st, the public part, if it may be so called—the part to which friends and visitors are admitted—including the entry, living room or rooms, and the dining room; 2nd, the private part, consisting of the sleeping rooms and their

dependencies; 3rd, the service department, including all parts used or occupied by the servants, whether indoors or out, as the kitchen and its dependencies, laundry, yard, etc.; 4th, the means of communication, such as corridors, passages, stairways, and the like; 5th, places for storage of household effects, fuel, trunks and wearing apparel; and 6th, those parts which provide for the outdoor life of the family, as porches, verandas, lawns, gardens, and walks.

"It is in the fourth of these items where the greatest economies can usually be made. Means of communication are, of course, necessary, but if separate are of no value for any other purpose; and if communication could be had without them usefulness would not be impaired.

"It is therefore highly important, where economy is necessary, to reduce the area devoted exclusively to communication to the limit of practicability; not, however, by pinching but by elimination. Corridors cost as much to build and maintain as if the space they occupy were in rooms; indeed they cost more because the percentage of wall surface to floor area is greater. The skill and ingenuity of the planner can nowhere so well be shown as in reducing the length of corridor without loss of convenience; that is indeed his chief problem. Anyone can plan with a liberal use of corridors, but it requires skill and ingenuity to plan conveniently without them."

Economy in Design

"One of the best ways to economize in building is to economize on ugliness. A good-looking house will rent better, sell better, be pleasanter to live in, and altogether worth more than if ugly.

"Nothing can be of greater service in avoiding ugliness than a knowledge of the principles of design. Acquaintance with even a few of them will aid powerfully in that respect. If the chief rules of good design were understood by the masses, as they might be, nothing would do more to promote beauty, improve workmanship, add to the value of manufactures, and in many other ways further the general welfare and prosperity of the country. They are simple, easy to acquire, and should be taught with the alphabet.

"Most of the qualities of good design

*Published by Charles Scribner's Sons, New York City. Noted in National Builder, March, 1922, p. 70.

may be broadly classed under two heads, viz., essential and desirable—the desirable ones being those which reflect the character and personality of the artist, and the essential ones those which are necessary in order that the design may be worthy to be classed at all as a work of art. Among the essential qualities are reason, unity, harmony, clarity and variety. Among the desirable qualities are imagination, interest, refinement, simplicity, dignity and style.”

Dependencies

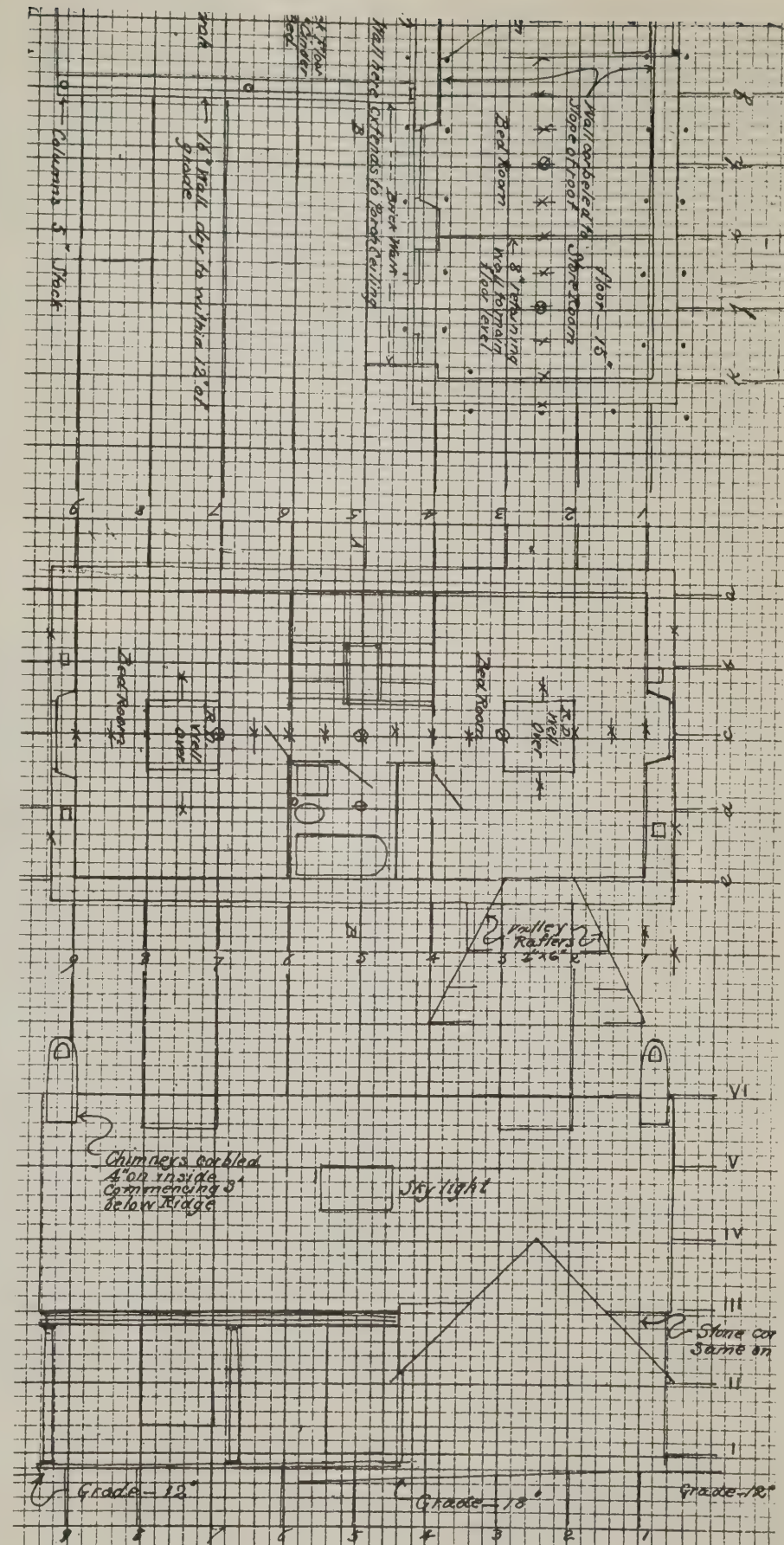
“In designing small houses, if one wishes to obtain the full value of his opportunity, he must make full use of the dependencies in his composition. If there is to be a fence, wall, shed, garage, or other construction connected with the house, it should be utilized to form an integral part of the design and add to its general importance and beauty. This is especially true in designing cheap houses, for here the designer has so little material at his disposal that he cannot afford to dissipate any part of it. One who tries will often be surprised to find how much can be done with very scant materials when all are mobilized and used with care; a bit of wall or a fence, properly placed, may greatly modify the character of the design and give to it a degree of importance out of all proportion to the means employed. A small garage well placed, in combination with a small house may together make up a composition having an air of dignity, which neither possess without the other. Terraces, arbors, trellises, hedges, and trees may all become powerful aids in producing fine effects, and by such means one may often, at little cost, escape altogether from the commonplace.”

Standardization

“The standardization of all parts which go to make up the completed house, so that the different kinds may be interchangeable among themselves, is a very important element of economy in building, and the model system of planning, as already pointed out, is a great help to that end.

“The standardization of parts is a very different thing from the standardization of plans. By standardization of plans is here meant the use of the same design for a number of houses. Standardization makes for speed, convenience, and economy; but standardization of plans also produces monotony. Except under certain conditions the duplication of houses which all look as if they came out of the same mold is a thing to be avoided. Houses made in that way have no individuality and are reduced to the status of the manufactured article, turned out by machinery. No matter how good the design, the continued repetition of it is deadly.

“Standardization of the various parts which enter into the construction of houses, on the other hand, is a different matter; to do that does not lead to monotony, but to



simplicity and repose. Doors, windows, moldings, columns, beams, rafters, stairs, dressers, and all other things that enter into

the composition may be of uniform sizes and patterns, but combined in an infinite variety of ways, and the same is true of

building methods and processes generally.

"When parts are to be standardized, one can well afford to devote more time and care to their design than otherwise. In that case it pays to take great pains to eliminate waste which otherwise would be many times multiplied. When the parts of a house have been properly standardized, every feature will have been so designed and adjusted as to call for the use of stock sizes of materials, without cutting or waste. The sashes, for instance, will be arranged to receive panes of glass of commercial sizes, walls will be spaced to permit the use of standard lengths of lumber, and so on. To do this will result not only in saving materials but time also, which, in these days of high wages is quite as important.

"The standardizing, if properly done, will be applied to every detail of the building no matter how small, and on every one something should be saved. All these little economies, which though they may seem trifling when considered separately, will amount to a great deal in the aggregate. Moreover, this careful study of the parts saves trouble in erection, and in many ways expedites, simplifies and improves the work.

"In standardization the module system of planning is a powerful aid. In the first place, it is a great time saver both in making the plans and in laying out the work. Then the fixed unit which pervades all parts and determines all measurements tends to eliminate those irregularities which constantly creep into plans made in the ordinary way, and for which special provision must be made by changing the sizes of doors, windows, or other features, and making drawings which would otherwise be unnecessary; all of which causes the loss of time and money and involves additional care and trouble. The system is also a great aid in obtaining symmetry and order, which is a mark of careful planning and good workmanship, and which imparts to the completed structure the appearance of having been made by one who understood what he was about."

Distinguishing Characteristics of Mahogany

ONLY true mahogany from tropical America, "African mahogany," and "Philippine mahogany" are commonly sold as mahogany in this country, but at various times over 60 different species of timber have been sold under that name. Although all of these species resemble each other in varying degrees, tropical American mahogany and "African mahogany" possess one important characteristic in common. This is the occurrence of dark amber-colored gum in many of the pores. The gum does not fill the pores, but is recognized as dark specks or streaks in the pores as seen on end or side grain. This gum is barely visible to the naked eye, but is easily seen

through a hand lens with a magnification of 10-15 diameters. In preparing the end grain of the wood for examination, a very sharp knife should be used to make a smooth cut.

Some other woods have similar dark masses of gum in the pores, but none of these are commonly substituted for mahogany. Among them are crabwood and sapeli, species imported from South America in small quantities only, and the Cedrelas (Spanish cedar, etc.), which are rarely sold as mahoganies, and are easily recognized by their odor.

True mahogany has fine, continuous, concentric lines on the cross section usually from $\frac{1}{8}$ to $\frac{1}{2}$ in. apart, which distinguish

it from "African mahogany" in which these lines never occur.

"Philippine mahogany," although not marked by the black masses of gum, is distinguished from true mahogany and other so-called mahoganies by the presence of fine, white, tangential lines $\frac{1}{8}$ in. to several inches apart, readily visible to the naked eye, and showing under a lens a rows of small openings filled with a whit substance.

A more complete key and description of mahogany and so-called mahogany, which describes common species in detail, may be obtained from the Forest Products Laboratory.

Saves \$220 With a Vacuum Cleaner

A CLEVELAND contractor, William H. Farmer, recently saved \$220 when finishing the work on a building for the City Ice Co., because he was ingenious enough to see that his wife's electric vacuum cleaner would do a certain piece of work

to him that the attachment hose of his wife's cleaner would take up all the bits of brick and plaster, the dust and trash which had accumulated in those tanks. He tried it out, and it did the work so well that he finished the cleaning with it. His total cost



Vacuum cleaner saves \$220 on the job

better than it could be done by manual labor. Mr. Farmer put up two delivery plants for the ice company. At the one called the Saranac station, it cost him \$350 to clean out the ice tanks when the building was completed. He started to do the same piece of work in the second station, at Warren and Fisher roads, when it occurred

for the job was \$125, and he figured that at this rate he could well afford to throw away the cleaner, which, of course, was somewhat the worse for wear after this severe test. But when he took it to an electrical dealer he found that all it needed was a new fan and a new bag, price \$5. He is looking for new uses for the cleaner.

Model Homes Solving the Housing Problem in France

By W. P. Mitchell, Paris, France

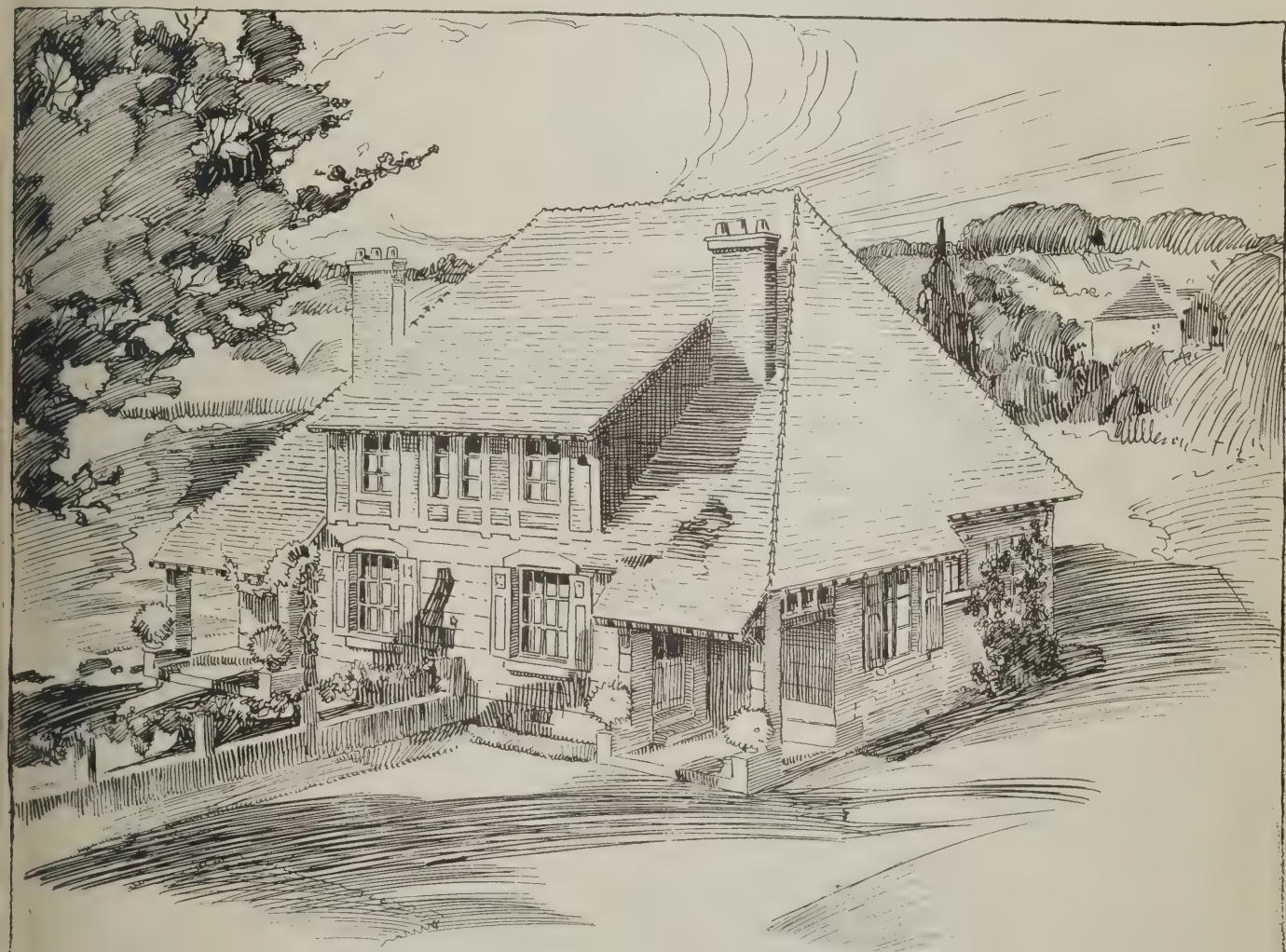
IN considering the reconstruction problem of the liberated regions of northern and eastern France the entire country has become obsessed with a new housing problem, both urban and suburban. The bungalow and the family-to-a-floor idea in the small towns and industrial communities in France is taking what we used to call the Paris flat to the countryside.

payer—but it had already, before the war and since, manifested itself elsewhere.

In England some half million more lodgings—tenements, bungalows and "semi-detached"—are in project for completion in three years' time. In Switzerland, at Zurich, two hundred and fifty million francs have been spent to the same end during the last decade. In Holland three thousand six

hensive plans for a garden city yet conceived.

The signal fact which stands apart from any previous manifestation of home making and home building is that universally the designs have been made for concrete construction entire, or for some modification or adaptation of the idea. Either poured cement, armored cement, hollow brick or



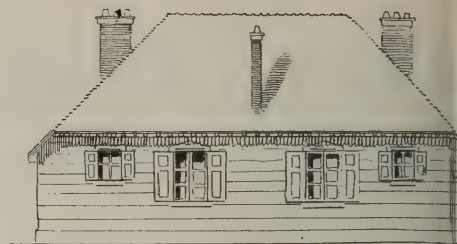
A double house, Tergnier, France

Not alone is the movement, sometimes also allied with the garden city idea, as will be shown later, coming into the foreground in all parts of France, where both city and town dwellers are ever finding it more and more difficult to find or keep a roof over their heads—writing specifically of the rent-

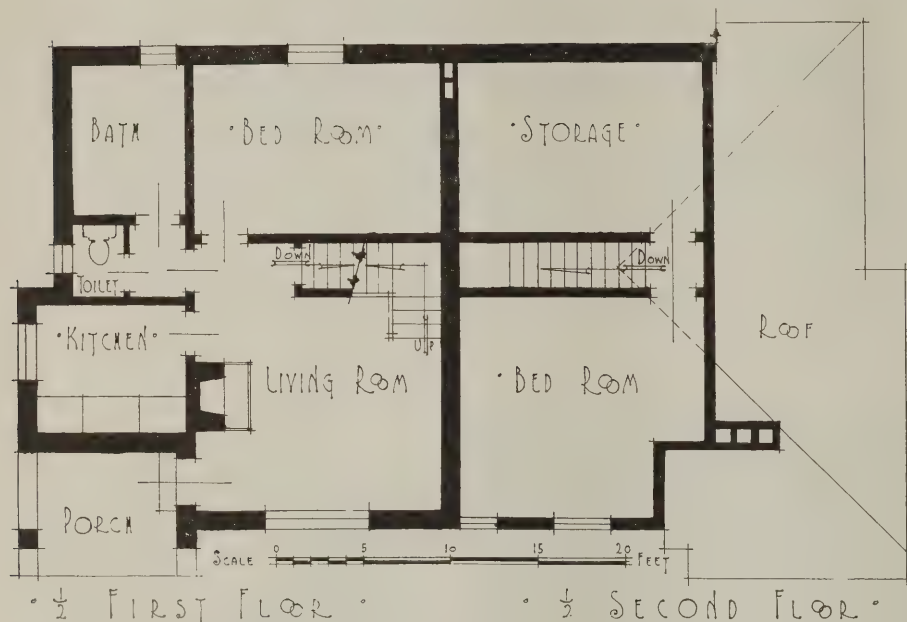
hundred lodgings or apartments are actually under construction. At Cologne in Germany the number in hand is five thousand, to say nothing of the Krupp steel works' scheme at Essen, which comprehends 11,500 individual family lodgings. Kolossal! These are laid out on one of the most compre-

tile stuccoed, and almost invariably the edifice of sky-scraping proportions has been tabooed in favor of the detached or semi-detached bungalow.

It has remained, however, for France, war-ridden and impoverished north France, to come to the highest expression of this



Front, side and rear elevations of double house, Tergnier, France



model home building on an ambitious scale hitherto unknown.

The presiding genius is a supposedly soulless corporation—the Northern Railway Company of France.

Private initiative has done much towards reconstructing northern France; government activities have been much less, have dragged, have been caught in a vast warp and woof of red tape which even today, four years after the armistice, is still so inevitably tangled in certain districts that one despairs of ever seeing it straightened out.

The Compagnie des Chemins de Fer du Nord, to give this general benefactor its Gallic patronymic, by agreement with the French Ministry of Public Works, sought the privilege of proceeding with a housing scheme of its own. Since public transport or the means thereof is one of the basic necessities of the development of all phases of modern life the fact was recognized that the proposition was one of a "general utility," as is the all-embracing French phrase which covers most sorts of expedient legislation here. Permission was granted for the company to act as it would.

On the very morrow of the armistice the company sent out its superintendents and its foremen, its designers, engineers and all the specialized labor it could mobilize for the re-establishment of 2123 kilometers of track-age, round houses, car sheds, stations, cul-

verts and bridges. From the first it was obvious that the vast body of workers must themselves be housed, as also those who were to come after as operators of the line. Over three-quarters of a million dwellings of one kind or another had been destroyed, practically none remained that would give shelter from the cold of winter or the heat of summer while the work of reconstruction was going on. All was to do.

The first houses built—these of summary wood construction with corrugated iron or fibroid roofs—were scattered here and there along the line as exigencies of the occasion

demand. Then came the final application of the general housing scheme in the form of groupments, communities, call them what you will, all of them definitely endowed with a general specific application of the garden city idea, of which they were destined to become elements.

A score of these communities were put under way at virtually the same time; at Aulnoye, a great metallurgical and frontier transit town on the Belgian border; at Lens, the principal coal mining town of northern France, utterly devastated and its mine flooded; at Bethune and at Tergnier. These were the chief, the most important, with Tergnier the most important railroad town in all France. It was here that the company's chief efforts naturally centered.

Tergnier is 131 kilometres from Paris at the junction of an intense traffic north, east, south and west, with its accompanying roundhouses, coaling stations, car-shops, freight yards, repair yards, etc. Its before the war population was something like 10,000 souls. Today three-quarters of the number are already back, largely housed by the initiative of the company, their livelihood entirely made possible by the same beneficent industrial force.

What follows is a rapid resume of first hand observation of one of the most remarkable demonstrations of rapid recovery from the ills of devastating war which I have seen personally, or of which I have had knowledge in a constant residence in France of more than a generation.

Through Monsieur Girard, the general manager of the company, and Monsieur



Octagon group houses for foremen and employees, Tergnier, France



A model house, divided for several families, Tergnier, France

Ackermann, the general track superintendent, I was put in charge of Monsieur Chevril, one of the company's designers,

It is this wide scope in the treatment of the garden city of Tergnier that gives it its peculiarly gratifying aspect as to conve-

in the shape of box cars, speed was the one desirable element. This condition endured during the first construction period as it might be called. The first actual work was begun in July, 1919. The concrete houses were commenced in the month of May, 1920. To date there have been built 1200 separate rooftrees (chimneys, the French call them and count them) and by October, 1921, there was finished 1327 in all, housing more than 6000 company employes of all grades.

The total of like constructions at the sole charge of the company will be 10,815, not counting such structures as properly belong to the railway and the exploitation thereof—stations, freight houses and the like all along the line. The company has sought to give its employes the means of attaining a standard of living thitherto unknown in France among a like class of workers.

Today the ground plan of Tergnier is as a parked group of buildings enclosing also



Sixteen rooms. Divided for four families

for a minute study of certain economic conditions existing, or shortly to exist, in the region. The results of the Phenix-like rebirth of the salamander-like railroad town of Tergnier are now first set forth as a by-product of this little journey to an industrial shrine of activity such as the world has never known under like conditions.

Within the former city limits I did not see a single old house inhabited, or if possible of being inhabited was only made so by utilizing the debris of some gaunt skeleton of a wall. All is new! The railroad company took over a tract of land of an area of 220 acres, on which they have laid out the lines of the city, the new Tergnier. The project is entirely on behalf of housing the company's own workers.

Aside from the operating train crews and laborers and specialists of the locomotive and car shops the company soon found that it was obliged to enlarge the scope of the scheme and provide for company dwellings for its under superintendents, pay clerks, bookkeepers, etc., of a superior sort, both in size and appointments.

nience, color-scheme and general aesthetic presentation in tradition with the French conception since time immemorial.

At first as no houses existed for the company's employes except as makeshifts

a small park of its own large enough for its wants with a cement-bottomed lake, recreation building, tennis courts, stadium with a 700 meter track, a clinic, a pharmacy, maternity hospital, a large play house for



A four-family house



Six-room house, Tergnier

the smaller children, another sheltering a sewing and cooking school. There is water in abundance, with reservoirs and standpipes, in fact all that could be desired and much more than is found in any towns of similar magnitude elsewhere in France. Especially is the bathing establishment to be noted, where for but a few cents swimming pool and showers are available.

Each individual house has its contribu-



French class in designing a reservoir and kiosk

tary plot of ground large enough to furnish quite all the vegetables required by the family, and these plots, be it remarked, are already planted out and producing a crop. All have electricity and water laid on, and in most of them there is a bath room, etc., and an admirably planned system of sewerage.

The company has not confined itself to the construction of any single type of house, but has adopted a variety that gives a unique charm to the little new-born town. Each is so arranged that it has its own separate veranda.

The houses of four rooms with the imposts of upkeep of the community features have cost about 30,000 francs each (say \$6000 at normal exchange rates) and are rented by the company on a basis of 3 per cent return, this time \$180 per annum at normal exchange.

There are co-operative stores where all the necessary items of living may be had at controlled prices based upon normal profits, this plan applying to bakeries, butcher shops and the like.

It is worth noting that here for the first time I have seen a really American labor saving device in common use in the building industry in France. It was a paint sprayer and the workman employing it said that he was satisfied with it and that it did more work than could be accomplished by hand and with less toil. No question here of

spinning out the work so that it might last another day. Reconstruction of France is not a game of that kind.

The government or administration of these properties formed a final problem. Two methods presented themselves. First, for the company to act as landlord and name an administrator. Secondly, the inhabitants to have an opportunity to assist in the management or administration. This latter method was the one adopted. There is a sort of a council composed of three representatives named by the company and a group of workmen, elected by their col-

leagues, who are charged with the upkeep and policing of the town, as well as the organization and control of the fire department.

This council has at its disposition a cash budget constituted by proportionate payments levied on such subsidiary profits as may accrue from the renting of moving picture concessions and the like.

A central organization composed of a representative of each division at Paris treats questions of a general order and outlines specific policies of conduct to be followed.

A Smart Looking Office is a Business Asset

THE accompanying illustration shows the very pleasing little office recently erected by Miller-Nelson, Inc., Baltimore, Md., manufacturers of concrete products and dealers in building materials. As a direct result of putting up this neat little building the company has succeeded in selling its concrete block and other building material for the walls of a number of new homes,

a going concern, but will give him a convenient and pleasant place from which to direct his organization, so attractive that the customers will be drawn to it and will not be repulsed, as prospective purchasers so often are when they behold the mud-covered and moth-eaten offices, still in to prevalent use by local building organizations.



Office of Miller-Nelson, Inc., Baltimore, Md.

and the attractive appearance of the office and yard is a matter of common comment in the vicinity.

The walls of the building up to the eaves are of concrete block and the roof of slate on wood frame with wall panels of stucco and half beaming from eave line to peak. The floors are of reinforced concrete with hardwood surface. Care has been taken to give the building a restful, homey atmosphere. It is surrounded with an attractive planting and several concrete lawn benches and flower boxes.

At a small outlay the materials dealer, contractor or concrete products manufacturer can equip himself with a building which not only shows off his business as

Brick Mortars

J. J. M., Ilmo, Mo., asks for general information on brick mortars. This subject is covered in *Brick—How to Build and Estimate*, published by the Common Brick Manufacturers' Association, 1300 Schofield Building, Cleveland, Ohio (25 cents a copy). We suggest also that J. M. M. obtain a copy of Bulletin J from the National Lumber Association, Washington, D. C. Most of the standard works on construction all have sections on mortars. *The Architect and Builders' Pocket Book*, by Kidder, Nolan, and the *Handbook of Building Construction*, by Hool & Johnson, being among the best.

The Lockport Homes Company

Interesting History and Experience of a Housing Corporation Sponsored by Big Business Men

LOCKPORT, N. Y., began to experience a housing shortage in 1917. The board of commerce took the question in hand and organized a campaign committee and secured subscriptions amounting to \$70,800 to be paid on the capital stock of a housing corporation which was organized in April, 1917, with a capital stock of \$100,000 and given the name of the Lockport Homes Co., Inc. Directors were elected and the serious business of building houses was immediately undertaken.

Two types of houses were selected and

so far as possible, a uniform size of lot was adopted having a frontage of not less than 40 ft. with a depth of not less than 100 ft. Some lots were a little wider and depth sometimes ran to over 200 ft., depending on location. A very few lots were less than 40 ft. front. Experience has proved that this is a very desirable size for the purposes of the Homes company. There seems to be no advantage in having a lot wider, and a depth beyond 150 ft. is usually a burden to the owner, while 100 ft. is sufficient.

All of the first 88 houses constructed were provided with good cellars with cement floors. All improvements were provided in the houses including bath and hot and cold water, electric lights, gas and hot air furnaces. It was the intention of the company to build houses which would be comfortable although small.

Build Both for Rent and for Sale

These houses were offered for sale or rent. They were rented nearly as fast as ready. Rents were fixed at \$20, \$22 and

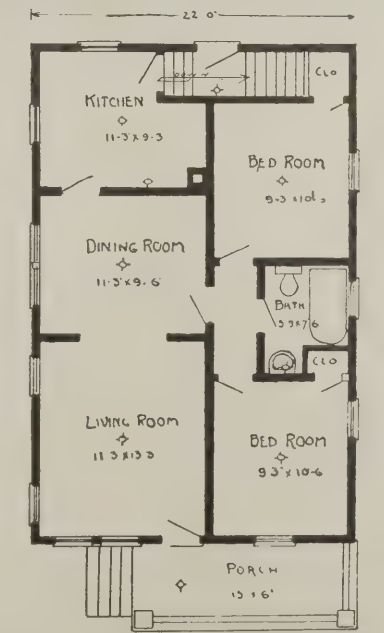


Typical one-story cottages—bungalow type—built by Lockport Homes Co.

contracts were let for the erection of seventy-five. Forty of these houses were of a six-room type, 20x24 ft. Thirty-five were five-room houses, 18x22 ft. Three old houses which were purchased with some vacant lots were remodeled and sold. Later in the summer a separate contract for ten five-room houses 18x22 ft. was entered into, making a total of 88 dwellings in the first year's program.

Operations were commenced on May 17, 1917, and a few houses were ready for occupancy early in the fall, and the whole 85 houses were under cover and work proceeded during the winter, the houses being all finished the following spring.

Land was purchased in three general locations of the city. One group in the eastern part, one group in the southern part and one group in the western part. It was thought best to purchase land on streets already opened, and where possible, having improvements such as sewer, water, gas, electricity and sidewalks. In some cases these improvements had to be added. In



Typical plan of one-story cottages

\$25 and were later raised to \$23, \$25 and \$28. A few houses were sold in 1918, and sales continued until all of the houses were disposed of before June 1st, 1920. Sale prices were fixed at \$2,650, \$2,850, \$2,950 and \$3,150. They were sold on a monthly payment plan. A cash payment of \$200 and \$300 was accepted the balance payable at the rate of \$20, \$22 or \$25 per month. This included interest and principal. First mortgages at 5 per cent were placed on the 85 houses with the Farmers and Mechanics Savings Bank for \$1,100 on the five-room houses and \$1,300 on the six-room houses. When the houses were sold this mortgage was assumed by the purchaser who gave the Homes company a second mortgage for the difference between the cash payment and the first mortgage, at 6 per cent. The interest on the first and second mortgages is deducted twice a year from monthly payments and the balance of the payments made, applied to the reduction of the principal of the second mortgage. It was found more satisfactory to the pur-

chasers to deed them the property and take back a second mortgage than to make sales on land contracts. It is easier for the purchaser to make a re-sale, which has occurred in several instances at a considerable advance over the original price paid, and the Homes company has sufficient control over the property, until the second mortgage is paid, through the monthly payment plan. The second mortgage may be taken up at any time by payment of the balance and interest due.

The balance sheet of the corporation De-

creased to \$600,000. The number of directors was increased from seven to twelve and in February, 1920, the Lockport Homes Co., was ready to again undertake the task of providing more houses for Lockport.

Conditions were entirely different from what they were when the Homes company first began operations. Material costs and wages had soared to fabulous prices. It was found that such houses as were built in 1917 would cost more than double to replace. The directors realized that it would be impossible to make a success of

kitchen on the first floor with two bedrooms and bath on the second floor. Cellars were provided in only five. No heating plants were installed, it being intended that the tenant would heat with a stove.

The directors being unable to make satisfactory contracts for the construction of these houses at a fixed price and being unwilling to undertake this work, a cost-plus 10 per cent basis it was decided that all work would be done under the immediate direction of officers of the Homes company and all material purchased direct in the



Row of one-story cottages built in 1920 and 1921 by Lockport Homes Co.



Row of one-story cottages built in 1921 by Lockport Homes Co.

cember 31, 1919, showed a net profit for the year, and after deducting the losses of previous years left a net surplus of \$12,859.92. Out of this was declared a dividend of 10 per cent to stockholders of record December 31, 1919.

Conditions Changed Radically In 1919 and 1920

Late in 1919 it began to appear that the housing shortage in Lockport was more serious than ever and that Lockport must either provide homes for the increasing population or industry could not expand. The board of commerce again took the matter in hand and a goal of \$500,000 was set. After a strenuous campaign this amount was over-subscribed by more than four hundred citizens and business enterprises of Lockport. The capital stock of the Lockport Homes Co., Inc., was in-

creased to \$600,000. The number of directors was increased from seven to twelve and in February, 1920, the Lockport Homes Co., was ready to again undertake the task of providing more houses for Lockport. Conditions were entirely different from what they were when the Homes company first began operations. Material costs and wages had soared to fabulous prices. It was found that such houses as were built in 1917 would cost more than double to replace. The directors realized that it would be impossible to make a success of

Build Cheaper Houses

It was also decided to build four five-family houses in the industrial section.

These houses are of the row type, two rooms deep, having a living room and

open market except in such instances as would be possible to make suitable subcon tracts.

The manufacturers called the attention of the directors to the lack of accommodations for single men and urged that some provision be made for them. To supply this demand an old hotel was purchased and thoroughly renovated and remodeled as a men's hotel. This building being located in the business section, the first floor was arranged for stores and rented for that purpose. On the second and third floors, 39 rooms provide suitable and comfortable living quarters for single men.

No attempt has been made by the Homes company to provide homes for families who can afford to pay \$5,000 to \$10,000 for a house, or \$50 or more per month rental. Other builders and real estate operators in the city have in a measure supplied this de-

mand. It has been the desire and intention of the directors to provide medium priced homes for folks with moderate means who were unable to make a cash payment of \$1,000 or more on the purchase of a home, or who were unable to pay more than \$35 per month rent. It is intended that all houses built by the Homes company shall be sold and the capital used to erect more houses as the demand requires and as finances permit. Every effort has been made to conduct the business of the corporation on as economical a basis as pos-

sible, and it is expected that any surplus earnings will be promptly returned to the stockholders.

shown substantial losses during the past year and it is not surprising that this corporation should fail to show a profit. The actual losses sustained have been proportionately small. All real estate is carried at book value, no losses having been charged unless a sale has been made at less than cost. It will be noted that the cash income has exceeded the operating expense in spite of the fact that the majority of the property owned failed to return an income during the year.

In December, 1920, the five-family houses

from other cities. Work on the cottages was gradually resumed and at present (December 31, 1921), 35 have been completed. Thirty-three are occupied and four new tenants are waiting for new houses to be finished. Work cannot proceed as rapidly as it should for lack of funds. There is still a balance owing on unpaid stock subscriptions amounting to \$142,669.13.

Must Provide for Renters

In every community there are many families who will always be renters. They do not desire to purchase or they may not be able to make the necessary cash payment or their employment may be of such a nature (often they are experts temporarily employed) that it would not be desirable for them to own a home. They are useful, necessary and productive citizens needed by their employers and an adequate housing program should make the necessary provision for them. The five-family houses were constructed for a portion of this class who desired houses at a low rental. The state of industry has been such for the past year that no new factory workers have been required and these houses were not needed. With the resumption of work in manufacturing plants on full time, these houses will supply some of the necessary accommodations.

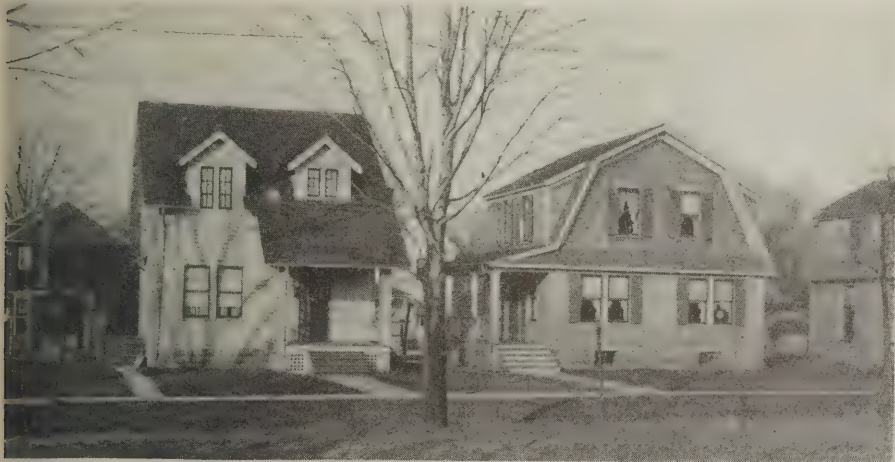
The men's hotel was completed and ready for business in November, 1920. The factories shutting down and laying off the single men first, most of them drifted away and the need of living quarters for them disappeared. After struggling along into the summer, the hotel was finally closed. It has recently been renovated and reopened under new and competent management and indications are that in the near future it will be doing capacity business. It is expected that the income this year will at least exceed the carrying charges.

Resale of Houses

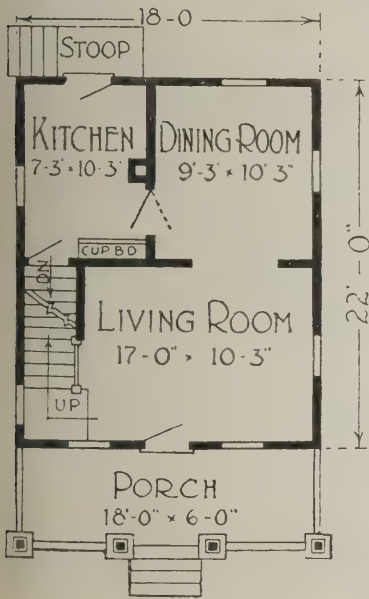
No losses have yet come to the Homes company by reason of re-sale of any of the first 88 houses constructed prior to 1919. It has become necessary to foreclose a few of the second mortgages taken on these sales and in only one instance was the Homes company obliged to bid in a house and this place was sold a short time later at a price which covered the costs. In every other instance the purchaser sold the house with a profit. Several voluntary resales have been made and in no instance has the purchaser taken a loss.

Experience justifies the practice of deeding the property to the purchaser when making his cash payment and taking back a first or second mortgage, payable in monthly installments rather than the method of selling on land contracts.

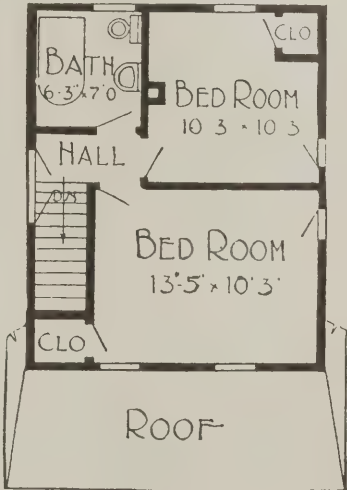
In May, 1921, a subsidiary corporation known as the Lockport Securities Corporation was organized with the unanimous approval of the stockholders present at a spe-



Typical five-room house of the Lockport Homes Co.



First floor.



Second floor.

Typical floor plans of five-room house

Losses in 1921

The foregoing describes the origin and history of the company based on its 1920 report. What follows is from the 1921 report and brings the record of its operations to the first of the present year:

The majority of business enterprises have

were practically completed and 20 of the 50 cottages were ready for occupancy. Industry being at a standstill, the immediate need of more houses had temporarily passed and all construction work was discontinued for a period of several months.

Early in the spring came a demand for houses and tenants began moving in. Some came from other houses less desirable, others were beginning housekeeping, and a large percentage have come to Lockport

cial meeting. This corporation was formed for the purpose of enlarging the activities of the Homes company and enabling the Homes company to carry out certain contracts and arrangements necessary and desirable to the successful completion of its program.

The tide has turned and every sign points to the fact that the low point in business has passed. Recovery will be slow and no right minded person expects or desires the conditions of 1920 to be repeated. The movement of our population is ever toward the city. Mechanical trades are becoming more specialized and skilled building trade workers proportionately fewer. House demands ever require better houses, more comforts, more conveniences, more luxuries, always advancing the cost. What the future of the building industry will be is more uncertain than in many other lines. Building costs were advancing steadily for many years prior to 1914 and are now nearly double what they were then. It is very doubtful if they will ever return to the level of that year. In the meantime folks must be provided with homes at a cost or at a rental which they can afford to pay. The time is very near when some provision must be made to provide additional homes for Lockport as the few now under construction in the city will not begin to supply the demand.

Financial Statement

Following is a financial statement of the operations of the company for the year ending December 31, 1921:

INCOME			
Real estate sales	\$45,650.00		
Less cost of property sold	45,511.99	\$	138.01
Rentals			8,615.93
Interest on: Mortgages	6,101.19		
Investments	130.23		
Notes receivable	1,401.23		
Unpaid stock installments	44.70		7,677.35
GROSS PROFIT		\$	16,431.29
EXPENSE			
Maintenance:			
Watchman's salary	\$ 357.00		
Repairs	942.43		
Water	63.38		
Miscellaneous	23.53	\$	1,386.34
Selling:			
Advertising	489.60		
Commissions	100.00		589.60
Administrative:			
Salaries	5,003.25		
Rent of office	189.00		
Printing, stationery and supplies	510.89		
Postage	114.68		
Telephone and telegraph	70.26		
Professional services	801.80		
Miscellaneous	377.79		7,067.67
Capital:			
Insurance	768.27		
Taxes	1,915.32		
Bond premiums	72.50		
Interest	2,067.04		
Uncollectible accounts	255.85		
Organization expense	279.75		5,358.73
		\$	14,402.34
Depreciation			5,877.83
Total expense			20,280.17
NET LOSS FOR PERIOD		\$	3,848.88

Present Problem a Hard Nut to Crack

Writing under date of April 7, 1922, L. B. McDannell, general manager of the com-

pany, continues the history of the company as follows:

"Our most recent operations were confined to one-story houses for the principal reason that we thought we could build something of this type and keep the cost within reach of the people who would live in them. As stated in our reports, we have made no attempt to build high-class houses or expensive houses although we find that we succeeded in getting a very good class of tenants.

"This is probably due to the shortage of houses. We are still short of houses in

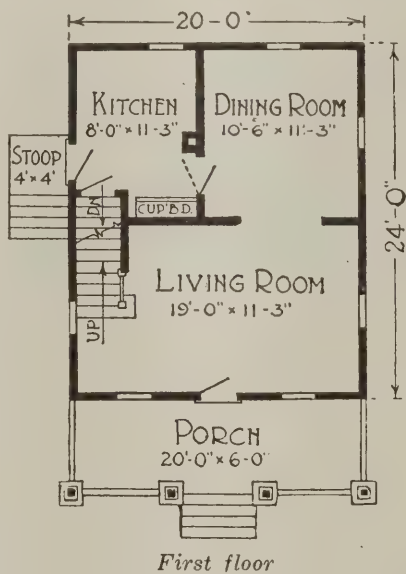
practically impossible for the industrial worker to live in a house built at present costs and pay \$30 to \$35 per month rent and it is impossible to build a fair house of reasonable size including proper improvements and conveniences on an investment of much less than \$3,000 to \$3,500.

"If building costs are too high and if they are coming down in the near future, what inducement is there for capital to invest with a certain prospect of this investment being scaled down from 10 to 20 per cent in the near future?

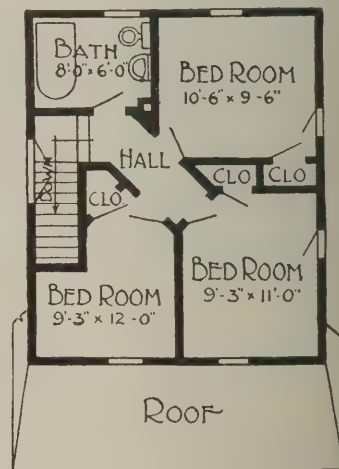
"It is not a question of the individual



Typical six-room house of the Lockport Homes Co.



First floor



Second floor.

Typical floor plans of six-room house

Lockport and present indications are that we will be for some time to come. There are a few new houses being erected in the city outside of our operations, but there are lots of people who would like to build who still feel that building costs are too high and it would seem that they are higher than they should be in comparison with other things, particularly wages in the industrial lines—with common labor rates in factories at \$20 to \$25 per week. It is

building his home at present prices and absorbing the loss himself with the idea that it is worth that much to have a home of his own; for the majority of the people do not own their homes and someone must build a home which can be rented to them.

"On the other hand, if building costs are not too high, then wages in industrial lines are too low. It is a big problem and if you can do anything to help work it out you will have accomplished a great deal."

Correct Design and Proportioning in House Planning

By Charles A. King, State Normal School, Plymouth, N. H.

Some Fundamental Principles Applied to Ordinary Design for the Builder

IN STUDYING DESIGN and in attaining facility in applying it, general form should first be considered; a perfect square is not so pleasing to the eye as an oblong, for the reason that the mind and eye dislike sameness, and both crave variety; a perfect circle or segment of a circle is not as pleasing as an elliptical form for the same reason. An oblong mirror is a better shape than a square one and an elliptical frame is better than a round one. An oblong or elliptical table is not only better than a square one from an aesthetic standpoint, but usually it may be better placed in a room. A bookcase or china closet which is just as wide as high is not so pleasing to the eye as if it were higher than wide, or wider than high. A study of proportions as found in the best examples of architecture will demonstrate that the proportion most pleasing to the eye is about eight to thirteen.

To the designer, vertical lines suggest strength and horizontal lines repose; oblique lines bring to the mind action and unrest, while curved lines are ever the lines of beauty and grace. Buildings and furniture in which horizontal lines predominate have an appearance of squareness and reposeful strength; the architecture of the Greeks and Egyptians, in which the arch is unknown, has become the basis of much the finest architecture of recent years; the recent adaptation of Pueblo architecture in the far West, mission furniture and many of the designs of the craftsman furniture owe their popularity to the strength and repose which vertical and horizontal lines impart. Prominent oblique leading lines are to be avoided where it is structurally possible, as they destroy repose and the appearance of stability, and unless their structural purpose is evident they are an element in the design as discordant to the trained eye as is the discord of two instruments playing out of tune to the trained ear.

Curved lines unify and make harmonious the different members of a design, soften abrupt changes of direction and give beauty to a design which otherwise would have nothing but strength and repose to recommend it. Designs of the old masters of furniture making have come into their own after a century of retirement in attics and shed chambers; reproductions and adapta-

tions of these designs are now recognized as containing the essential combinations of form without the sacrifice of utility which makes them the most desirable furniture for every room in the house. The tasteful proportions and simple combinations of lines and details are so pleasing to one of cultured taste that the Louis XV furniture with its exaggerated curves and over ornamentation seems little short of atrocious. Compared with the work of the old masters, mission furniture with its massive proportions and straight lines seems so severe as to be tiresome after living with it for so long that it has become shabby, as it lacks the structural features and variety of form and detail to make it permanently interesting.

The carpenter who can draw a set of plans is not so rare today as a generation ago, but while the value of such skill cannot be depreciated, we cannot assume that the carpenter draftsman understands and applies the laws of design by which the architect designs his buildings, and which ancient architects applied farther back than history records human achievement. The actual builders of the great works of ancient times are unknown, but the names of the architects of many of them will last as long as history.

Importance of Individuality

Much of the difference between a building designed by a trained architect and one by a builder architect is due to the proportioning of the different parts of the building and to the details. Usually the architect designs the latter with little consideration to the stock patterns of the dealers; this is especially annoying to the ordinary builder, for he cannot see why stock designs will not answer the purpose quite as well, but the difference in these details is largely responsible for the difference between the commonplace building designed by a builder, and the one with individuality designed by an architect. This explains why within the area of the trade of one or two planing mills there is a tiresome sameness in the appearance of buildings, a lack of that individuality which characterizes a neighborhood in which the buildings were built from the plans of different architects.

If the latter buildings were trimmed with the ordinary stock details they would lose much of their individuality even though no two of them would have been made of similar outline or arrangement. The reason for this sameness is that the carpenters dealing with these mills have a very narrow choice of designs, often allowing the mill man to make his own selection, who in most cases will be governed by the design which may be turned out at the greatest profit, hence the frequent repetition of a few designs.

Of course there are commercial advantages in using stock patterns, but specially designed details add so much to the distinction and attractiveness of a house that they affect its value. The majority of people do not realize that they unconsciously consider such things, but the house with seemingly insignificant points of difference from others will be preferred, yet generally the purchaser cannot analyze the reasons for the preference, or attributes it to something else.

Laws of Design and Proportion

The laws governing all design have been taken from natural forms and their laws of growth; these were conventionalized and adapted to spaces and purposes, hence any design which cannot be traced back to some natural form or law of growth is not considered good design; geometrical forms, interlacings and all surface designs are subject to the same laws.

Aside from the sun and moon, the cross section of a snake, a tree or plant stem or similar round form there are no perfect circles in nature; even the earth is not a perfect sphere. Hence the use of compasses in drawing a curve rarely results in the most pleasing design, for usually curves

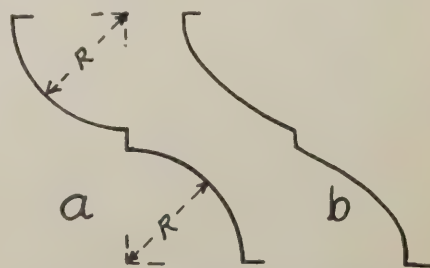


Fig. 1—Circular arcs vs. elliptical curves

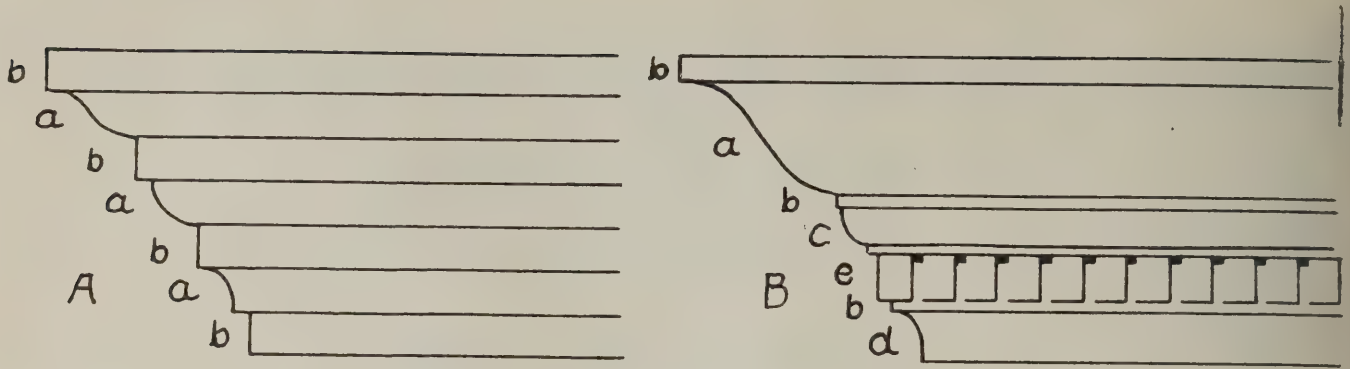


Fig. 2—Molding details

should be elliptical for the reason that there is variety in such a curve, though the Greek bead is a segment of a circle. Each inch of a circle or segment of a circle is just like every other inch, while an inch from an elliptical curve will be different from every other inch, and will thus have the variety which pleases. Variety is an essential factor in design as in nature which abhors

sameness, for there were never found two leaves, two animals or two human beings exactly alike in every particular.

The study of the best works of ancient and medieval times upon which have been based the entire structure of modern architecture and decorative art will reveal very few true circles; practically every curve was drawn freehand, or based upon a conic section, unless for structural reasons a circle or a segment of a circle was necessary; exceptions to this will be found in Roman arches, moldings and decorations, and in Gothic arches, tracery and moldings.

A bed mold may be drawn with compasses as at a Fig. 1, but it is not as interesting as the molding at *b*, which may be used for every purpose of the bed mold, would not cost appreciably more to make or put up, and would be a much better form.

Another element entering into the consideration of all details is illustrated in these moldings, that of proportion, for after a molding is in place it is judged by the play of light and shade upon its surface. The relation existing between the curved surfaces *a* and fillets *b* of Fig. 2 *A* is not interesting as there is no difference in size; Fig. 2 *B* is an improvement, as the spaces between the curved lines and fillets are not of the same magnitude, and the ogee *a*, the fillets *b*, and the ovolo *c*, the dentils *e* and the cavetto at *d* give a pleasing variety and make an attractive cornice.

The use of large details upon a small piece of work is poor taste; the same is true regarding the use of small details upon large work or in places where they will be so distant from the eye that they will not be effective. In all design the proportion of the molding to the whole is an important factor, and the proportion of the members of a molding to its width is equally important.

Moldings

Moldings may be divided into two types, the Greek and Roman, shown in Fig. 3, though the latter is but a degenerate offspring of the former. The contour of Greek moldings is based upon conic sections and may be drawn by geometric processes, but usually are drawn freehand. Their subtle curves give an air of refinement and distinction impossible if curves based upon the

circle are used; by comparing Greek and Roman designs this will be realized.

Greek architecture has been immortalized because of its beauty, which largely depends upon moldings of beautiful contour. The Greek moldings shown in Fig. 3 have been reproduced times without number upon the best class of custom work, while the Roman

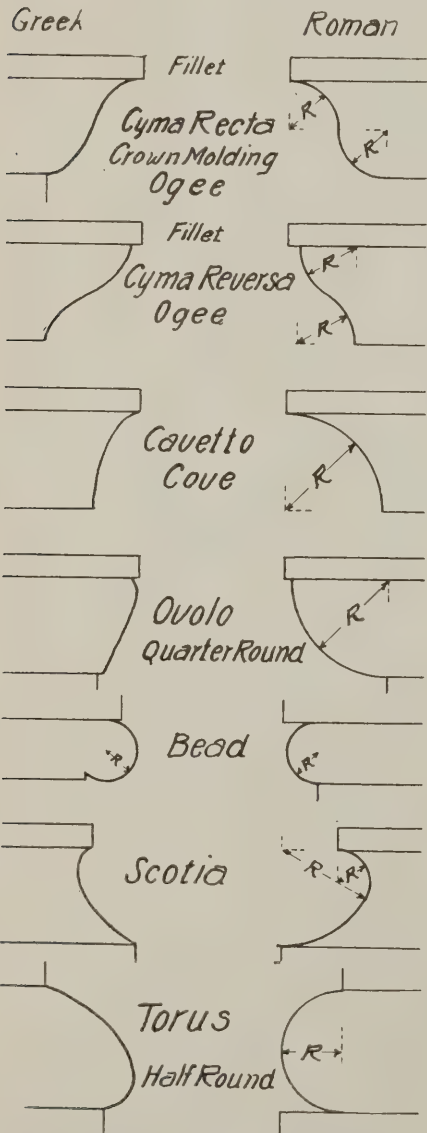


Fig. 3—Greek and Roman moldings compared

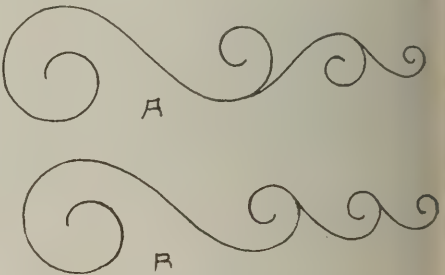


Fig. 4—Right and wrong scrolls

type has been relegated to stock patterns which may be found upon the ordinary class of work.

It will be noted that Roman moldings are based upon curves and combinations of

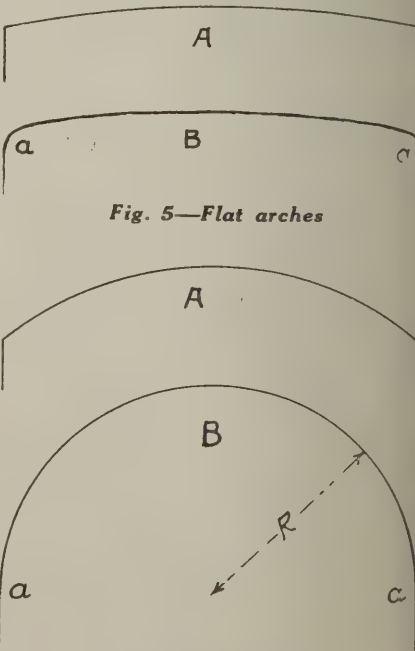


Fig. 5—Flat arches

Fig. 6—Flat arches

curves which can be drawn with the compasses. The intersection of two curves is always upon a tangent, and if a fillet is placed between two curves their contours should be tangent excepting that they are moved apart the width of the fillet as in the bed mold Fig. 1. Roman designs are

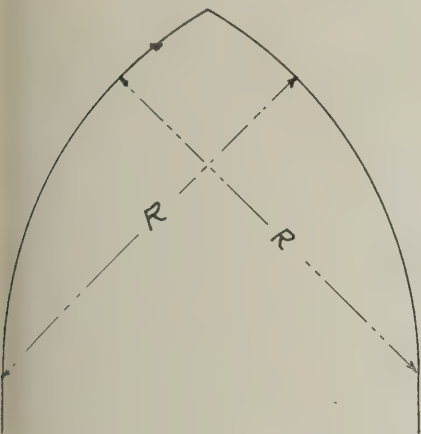


Fig. 7—Gothic arch

common-place, and while for purposes of utility they are quite as efficient as the more elegant Greek designs, they lack the "class" of the latter. All moldings are of the above forms or built up from combinations and adaptations of them.

tangential connection, but instead start backward from the main stem. This is never seen in nature, and is not pleasing to the eye, hence is poor design. The principles of radiating lines and tangential contacts are applied in designing arches, porch brackets or any detail involving the joining of curves or of curves and straight lines.

Arches

Often the flat arch, Fig. 5 A, is used in brick masonry, because without specially molded brick it is not practicable to lay a correct arch as at B, in which the spring of the arch at a is tangent with the architrave. The defect is more obvious in an arch of larger rise as at Fig. 6 A, when compared with the circular or Roman arch at B, which is a semicircle, and therefore springs from its support a at a tangent.

The Gothic or pointed arch, Fig. 7, has distinctive character, and the suggestion of loftiness is the reason for its popularity in church architecture. Again we find nature is the source of inspiration, for tradition says that the Gothic arch resulted from the attempt to reproduce in imperishable material the upreaching character of the tall beech trees bordering the aisles of the forest. This was the nearest human approach to conditions which inspire the reverence so often felt in the presence of the most beautiful works of the Almighty.

relation to the detail as a whole.

Porch Brackets

The purpose and design of porch brackets are a common application of radiating and tangential lines, and their form causes them to add to or detract from the distinction of the house to a far greater degree than would seem possible for such an insignificant detail. Of the designs of Fig. 8, (1), (2), (3), (4), (5) are undesirable; No. 1, because it extends upon the post and plate equal distances, and the curves above and below the center are the same, both of which are defects because they do not permit the variety possible. A comparison with No. 6 will suggest a method by which the defects could have been remedied. No. 2 consists simply of meaningless curves with no break to the monotony; compare with No. 7. No. 3 is a slight improvement upon No. 2, but the curves are weak and ugly; the break at a would have been improved by a fillet instead of the two curves joining as they do; compare with No. 8. A comparison of No. 4 and No. 9 will show the lack of variety and weakness of the former. While Nos. 1, 2, 3, 4 and 5 are memory reproductions of porch brackets actually used, the latter includes about all that is bad in design, yet it is little worse than many so-called embellishments. Note that the shafts of (6), (7), (8), (9) and (10) are easy curves, the

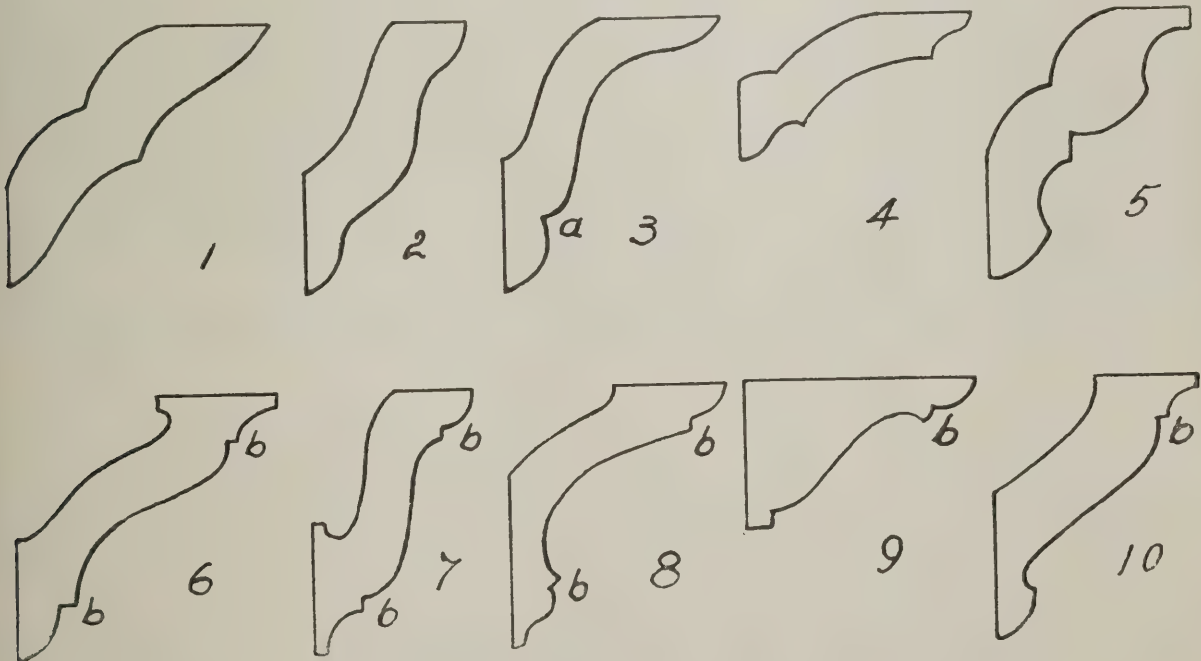


Fig. 8—Poor and good porch bracket details

Many designs are based upon the scroll which is a conventional representation of the running vine and applies the law of tangentiality; this is illustrated by Fig. 4 A, in which it will be seen that the continuation of the design is always forward from the main stem, while at B is shown a degenerate and incorrect form of scroll in which the stems of the continued design do not have

A careful study of the finest examples of architecture will show that both structural and decorative details are based upon radiating lines and graceful tangents; each line grows naturally from its source and can be traced back to the foundation of the building. It will also be found that while all details are true in regard to their relation to the whole, each member is in its true

ends of which form an offset tangent with the top and bottom of the brackets at b, or spring from a fillet as in No. 9, or an ovolo in No. 10.

Stick to Natural Laws

In all good design of similar details the embellishment is concentrated at the ends; columns for instance have plain shafts, ex-

cepting for flutes, the base forming the connecting link between the column and its support, while the capital embellishes its top and receives the entablature which rests upon it.

Sometimes workmen are perplexed in placing balusters and other turnings as to which end should go up. In about every case the heavy part should be at the bottom, which gives to the eye an impression of stability. It is one of the fundamental laws of design that the weight should be at the

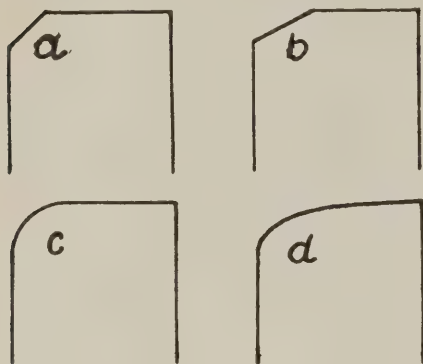


Fig. 9—Bookcase beils

bottom or point of support, as it is also a law of nature. The heavier part of a pendant should be placed at the top where it is supported.

Any decoration which interferes with the utility of the article decorated is poor design; for example, a projecting carving or boss upon a chair back which is uncomfortable for a person to lean against is poor design, no matter how well the carving may have been executed. In such a case the chair has not been carved, the carving has been stuck on, hence it cannot be that construction has been decorated.

Even in so simple a design as the corners of a bookcase, shown in Fig. 9, cutting the corner an equal distance each way as at *a* is not so good design as *b*, in which the cut is greater upon the top than on the edge; the use of the quarter circle as at *c* is less interesting than the elliptical curve at *d*. In many cases no more important differences separate the commonplace from the distinctive design, for these slight variations make for both simplicity and variety.

The builder of today has to please a public which is far more critical regarding the aesthetic side of its homes and furnishings than the public of a generation ago, and the workman who has little or no conception of the laws regarding true form, and has no facility in creating it will find it increasingly difficult to maintain his professional standing in competition with those whose ambition has urged them to learn something of design. It is true that the architect is supposed to furnish details for all such embellishments, but the builder who knows enough of design to execute the detail properly will be able to do it more

economically and to the greater satisfaction of all concerned.

If the builder will keep a sketch book in which to jot down memoranda of an at-

tractive detail, he will soon have a wealth of motives which cannot but be of value to him in designing anything occasion may require.

Building Ordinances That Injure

THE interest of the building industry is directed to the citations of Mr. T. F. Laist, representative of the National Lumber Manufacturers Association, in an address to the Buffalo, N. Y., Retail Lumber Dealers Association, on April 12:

"Lumber must not only suffer for its own short-comings, but restrictions against lumber are created for the purpose of furthering other ends, for example, I can point out a number of cities where it has been the custom to extend fire limits by small areas or a block at a time to include such territories for no other reason than to prevent the construction of a building deemed objectionable by other owners or occupants of the block. Thus it happens that where one of the residents desired to erect a barn or garage at the end of his lot which others wanted to prevent, his neighbors instead of making a fight against that particular building, petitioned the council to extend the fire limits, hoping thereby to prevent the construction of the objectionable building by ruling out the cheaper type of construction. Such ordinances are enacted very frequently without publicity. In such cases the lumbermen took no aggressive stand but permitted the ordinance to go on record, thus preventing frame construction in areas of considerable size in which every building in existence at that time was of frame. It can readily be seen that if the local dealers, as a class, were a little more active in safe-guarding their interests, such unjust and unreasonable restrictions could not successfully be made the subject of ordinances. Not only is the lumber trade affected, but every lot owner in the block has suffered by being in the future compelled to erect a more expensive type of structure than he had contemplated when his lot was purchased. I can point out instances where this has worked a real hardship on the individual and has deprived him of securing a home in the anticipated time.

"In another city a building ordinance was framed to require fireproof construction in apartment houses for no other reason than to prevent the erection of this class of investment. The ordinance ruled out wooden-joint construction, thus making it unprofitable to erect an apartment.

"The opponents of the apartment house therefore gained a point at the expense of lumber, although they had no objection to the material in itself. This is indicated from the fact that the frame house is permitted in almost the entire city."

"When we know that such things happen, is it not evident that local lumber dealers must keep a watchful eye on their 'law making bodies.' This can best be done by appointing a vigilance committee to guard their interests. By so doing they will accomplish not only a public service but prevent inroads into their own business which may in time become serious. Particularly at this time, it is very important that building construction be kept down to the lowest cost compatible with good practice and this, as every one knows, can only be done by using the maximum amount of lumber. It is evidently to the interest of the building industry and to builders and contractors particularly that the principles on which ordinances are based shall be both reasonable and protective. That ordinances discriminating against any kind of material shall be applied in blanket fashion in order to prevent the construction of a type of building strikes directly if insidiously at every interest and every material."

The Labor Situation

THE long drawn out building-trades labor controversy in Cleveland, Ohio, was recently settled on the basis of the 1921 wage scale. In St. Louis, Mo., seven of the unions have at last agreed to accept wage reductions of from 15 to 25 per cent, after holding out since the beginning of the year. It is estimated this agreement will release \$20,000,000 in prospective work. In New York City the building trades are still getting the top wages of war-time conditions. In Chicago the battle between the unions and the citizens' committee to enforce the Landis award continues, with apparent gains toward open-shop in those trades which have refused to recognize the award. It is estimated that at least 5000 non-union workers from other cities have been drawn to Chicago by the present building boom.

Wages of bricklayers in March ranged from 90c. per hr. in Atlanta and Boston to \$1.37½ in Denver, Colo.; carpenters were obtained for as low as 70c in Atlanta and in New York City got \$1.25. The wages of hoisting engineers varied from 80c in Minneapolis to \$1.37½ in St. Louis. Negro hod carriers in Atlanta got 30c. In Los Angeles, Calif., they got \$1.12½. Common labor ranged from 20c. in various Southern cities to 75c. in New York City.

A Popular Church Building

C. W. Bulger and Son, Dallas, Texas, Architects, Have Devised a Small Church Type Now Built All Over the Country

SMALL church building specialists is the reputation of C. W. Bulger and Son, architects, Dallas, Tex. This reputation has been largely achieved by the country-wide popularity of an original design, noted more for its general utility, economy, simplicity of construction and adaptability to

Economy of a Square Structure with Special Roof

"As a specific illustration of the points of economy which are outstanding in this typical plan, we first refer to the square shape of the building. Many have not taken the trouble to note that a square building

entire walls. Above, a deck is formed, also strapped together at the corners. The portion of the roof over the deck to the apex is formed on the deck, and the entire construction sheathed solid. The ceiling is hung from the deck construction by means of rods with turn buckles for adjustment.



A small church design—C. W. Bulger & Son, architects

present-day church needs than for its adherence to traditional church architecture. Clarence C. Bulger, the junior member of the firm, describes the accompanying design for a church now building at Mexia, Tex. (total cost \$60,000), as follows:

"Beginning with the design we have thrown away traditions as to architectural style and have permitted the design to be the natural outgrowth of our utility plan. In the development of both plan and design we have taken advantage of every opportunity for economy without sacrificing durability, and to a certain extent, beauty. For our effect in the latter particular, we depend more upon the general proportions of the building as a whole than upon extensive detail. For convenience we may call the design 'Pyramid style with Spanish atmosphere.'

has the minimum lineal feet of the outside walls. As an illustration, assume a building 50x200 ft. as compared with one 100x100 ft. Each contains 10,000 sq. ft. of floor space, but the square building has 100 lin. ft. less outside wall. When an average height of 30 to 40 ft. is considered, the difference in cost would be considerably in favor of the square plan.

"A second feature of the economy in this plan consists of the division of the roof space into four small units—three gable wings and a central roof or dome. These spans are not so great but that they can be handled without trusses. The center dome is handled by what we choose to call a 'unit truss' construction. This consists of binding the four corners with steel straps to offset the thrust of the hip rafters, forming a continued beam of wood around the

In connection with this construction it should be noted that the length of the hip rafter is materially reduced by inset at all four corners of the auditorium with supporting posts extending from the hip rafter support to the basement. (This construction is outlined by F. E. Kidder in part two of his book entitled 'Building Construction and Superintendence,' page 100. By the use of certain improvements and additions to this fundamental idea we are enabled to span much larger areas than Mr. Kidder recommends.)

"A third point of economy consists in the use of brick veneer construction on frame. We believe that this construction is more substantial for church buildings and even more durable than solid brick or tile. The absence of partitions in a church building together with the sinewy nature of lumber

makes the frame wall more adaptable for church buildings from the point of view of wind resistance. The fact that the frame with the protection of the pressed brick on the outside is a dryer wall than a solid brick wall would tend to lengthen the durability of the floor joists and timbers usually used in connection with solid brick. Of course if fireproof construction is consistently used, there would be no question about the preference in favor of solid brick.

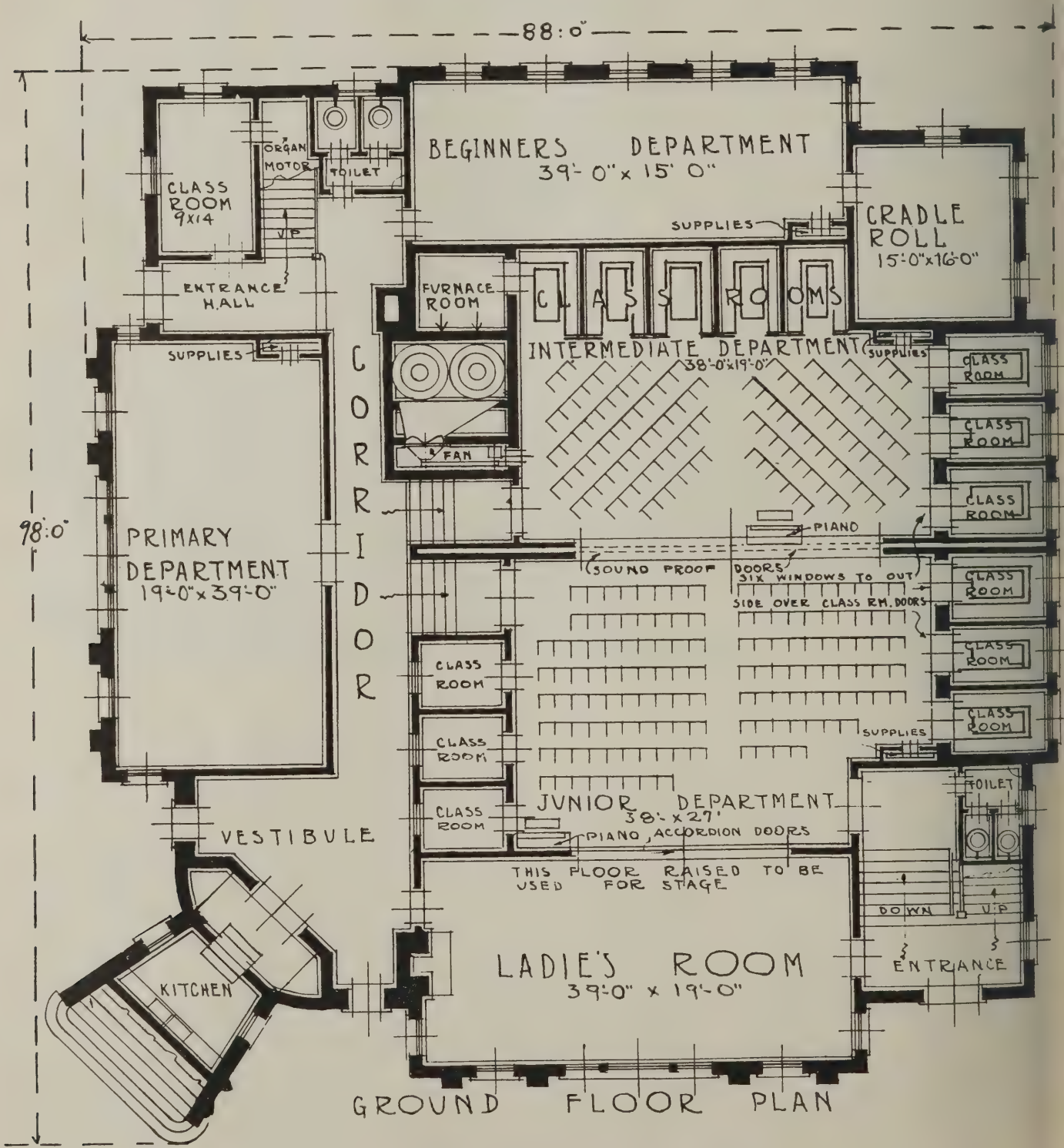
Other Economy Features

"Other points of economy consist in the

use of pier construction for foundation with reinforced-concrete girder between; the elimination of the elaborate cornices and the substitution of cast or natural stone or terra cotta simple combination coping, cornices, frieze and achitrave; and referring to the plan itself, the efficiency of the arrangement whereby various rooms can be used or combined for various purposes.

"It may be fitting to offer some explanation as to the plan itself. During the last 10 years church planning in general has undergone revolutionary changes. The modern church is becoming more and more

a center of religious and social education as well as a center of worship. This development has resulted in the promulgation of a number of projects costing in excess of a million dollars, and has made it necessary to completely change the architectural style and general treatment for smaller churches in order to provide for these additional features in an economical and practical way. To illustrate the demand for this type of building, our firm alone during the last 10 years has designed and had erected more than 100 buildings of this type in more than 20 states."



One important factor not mentioned by Mr. Bulger is that a church building of his type may be erected without difficulty by the ordinary small city and country town contractor. It is not necessary to go to big national contracting firms. This is a very important factor in the economy of erection.

General Data

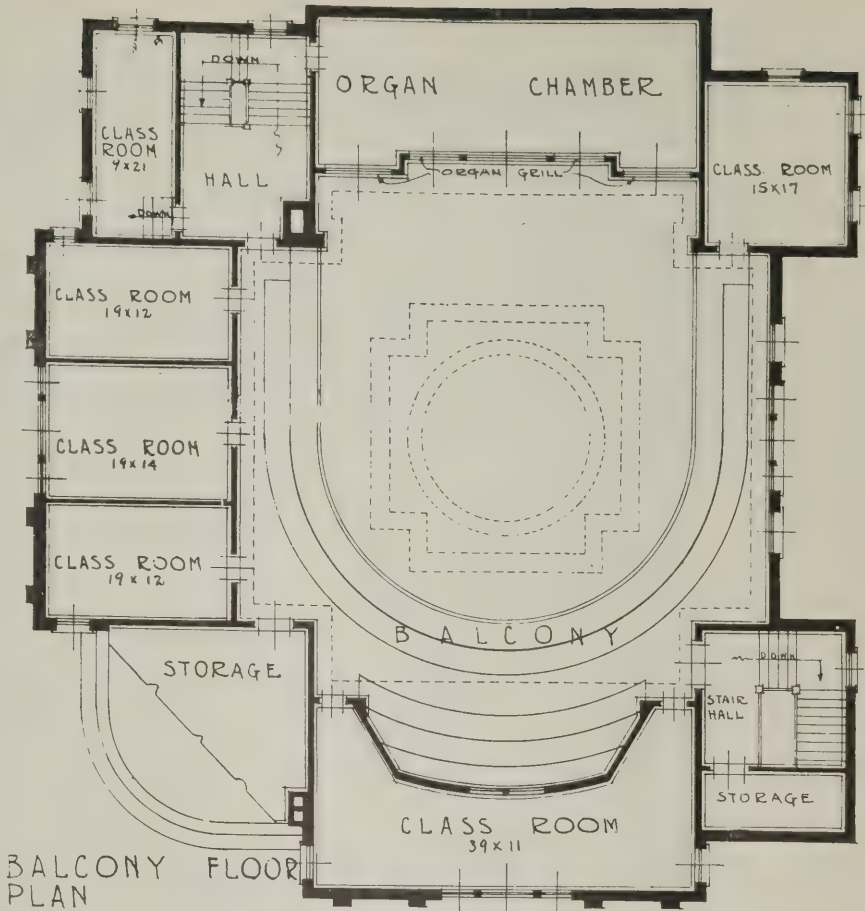
Seating capacity—	
Auditorium	360
Choir	40
Small assembly	125
Senior department	125
Balcony	240
Total	590

Cubic Contents

Total, cu. ft.....	334,000
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Sunday School Data

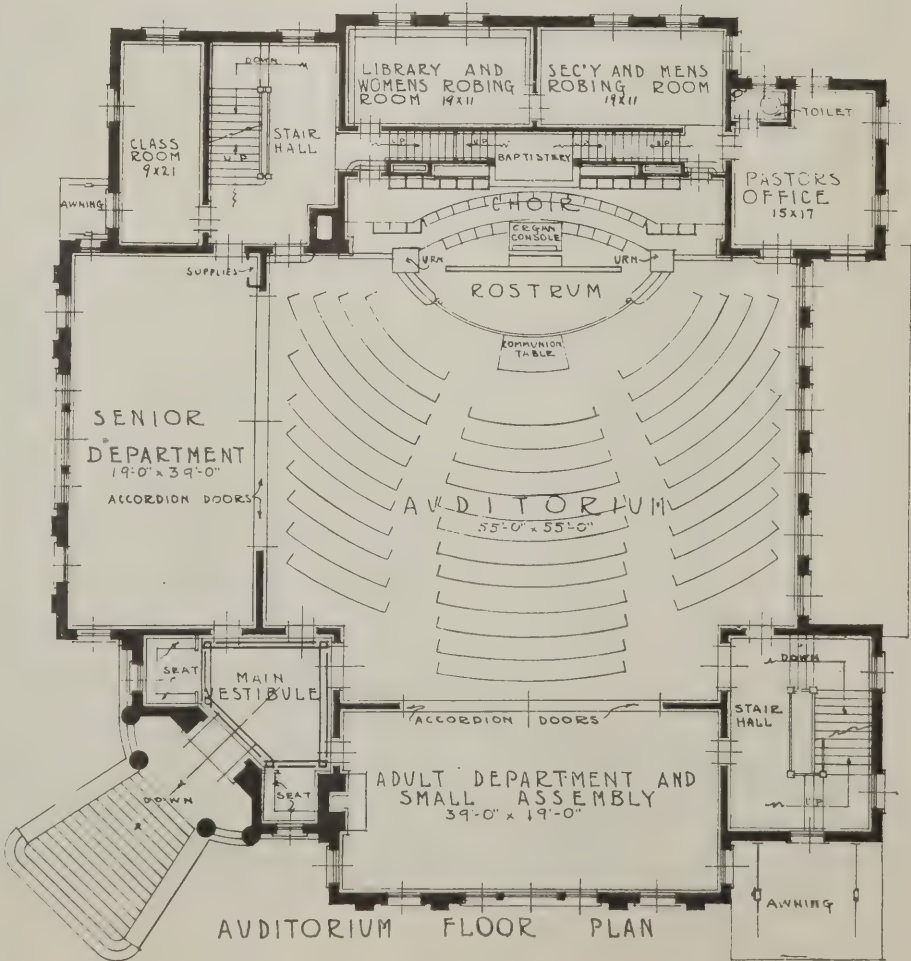
Department.	Sq. Ft.	Pupils.
Cradle roll	255	20
Beginners	585	42
Primary	741	53
Junior	943	135
Intermediate	703	100
Senior	741	120
Officers and teachers.....	60	
Special classes	100	
Totals	4709	750



The Yellow Stain on Hardwood

A TROUBLESOME defect often found in hardwood lumber is that recognized yellow stain. It is usually distinguished by a pale yellow color, occurs generally in streaks and is detected most easily when the wood is surfaced, although at times it is present without any discoloration of the wood. Its first symptom may be a moldy appearance of the wood. Yellow stain has been observed by the Forest Products Laboratory in hickory and maple tool handles, birch veneer and in oak airplane propellers and wheel spokes. It is classified in the *Pencillium divaricatum* group of fungi, and resembles one of the fungi which damage wood pulp.

The only damage that yellow stain is positively known to do is to mar the appearance of the finished product, since it usually penetrates the wood so deeply that it cannot be surfaced off. It is probable, however, that the fungus actually weakens the wood, and the use of yellow-stained lumber for airplane construction or similar purposes where strength is important is to be discouraged until more is known about the action of the fungus on wood structure. Lumber can be protected from attack of yellow-stain fungus by seasoning the stock without delay after it is cut, storing it in a dry place, or treating it with preservatives.



Popularizing Home Building in Houston, Texas

Rotogravure Section of Sunday "Chronicle" Produces 300 Inquiries
a Week from Prospective Home Buyers

THE lumber yards and building-supply dealers of Houston, Tex., are profiting by an unusual scheme of co-operative advertising. Unfortunately professional builders, contractors and architects have not yet been able to co-operate, nor has a way been shown whereby they may directly profit from the present scheme. However, it is not unlikely that a way will be found to unite all the parties interested in house building for their common good.

The enterprising Houston *Chronicle* prints the only rotogravure-pictorial Sunday supplement in the Southwest. The extraordinary interest in home building and home ownership led the publishers to devote a page of this picture supplement every Sunday to pictures and floor plans of houses. A typical page is reproduced herewith.

These pages of course have much news value, but are nevertheless paid for as advertising propaganda by a group of lumber and building-supply dealers and manufacturers. The charge per page is \$500, divided into units of \$12.50 each. A lumber dealer, for example, pays at the rate of two units or \$25 per page. The Houston Real Estate Board pays \$100, and various other interests in proportion.

The photographs and floor plans of houses are purchased by the newspaper from one or more of the various agencies which make a business of supplying such material. The same plan agency works with the local lumber dealer and will supply at a nominal price complete working plans of any of the houses illustrated. Any one of the advertisers is therefore equipped to sell complete any house illustrated.

Each page carries a coupon to be filled out by the interested reader. About 300 of these are sent in every week, filled out with the names and addresses of live prospects. These are turned over to the list of advertisers, who (in the case of lumber and material dealers) in turn generally pass them on to the favored building contractors to follow up. The Real Estate Board parcels the list out according to geographical districts so that prospects are followed up only by a few real estate dealers.

These pages almost invariably show attractive houses and often very pretty interiors. There is little doubt that this feature of the Sunday paper has done much

to stimulate home building in Houston and therefore all building interests have profited in some degree from it. This feature has been copyrighted by the *Chronicle* and it is the intention to supply this same service to other newspapers.

The publishers of the *Chronicle* are now working on a plan to interest the building contractor and the speculative builder. When the editor visited Houston in February there was some doubt in the minds of representative builders and contractors whether they were in any way beneficiaries from this publicity. But to an outsider it would seem that the interest thus created and fostered in home ownership was a dis-

tinct advantage to the whole building industry and that a way must eventually be found to benefit the professional builder as well as the material man.

This feature of the *Chronicle* includes a "Home Building Bureau" where there is an opportunity to be of considerable service to the public and advertiser alike. This bureau has an exhibit of plans and some sample building materials and answers various queries from prospective home purchasers.

Robert H. Cornell, assistant publisher of the *Chronicle*, started this feature of the paper as a result of one of the city's "Building Shows."

Moving a 250-Ton Building With Motor Truck

CURTIS BROTHERS, Inc., Portland, Ore., and Seattle, Wash., make a specialty of "raising and moving buildings, boats, machinery and other heavy bodies." The view herewith shows how a recent job

was accomplished. Roy Curtis, manager writes:

"This building is two stories high and measures 40x80 ft., weighing approximately 250 tons. In loading the building



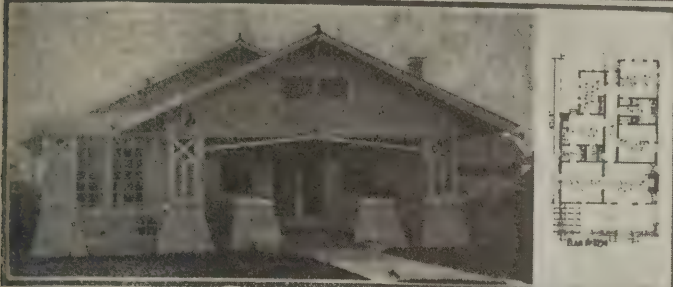
The motor truck "walked off" with it

BUILD AND OWN YOUR OWN HOME

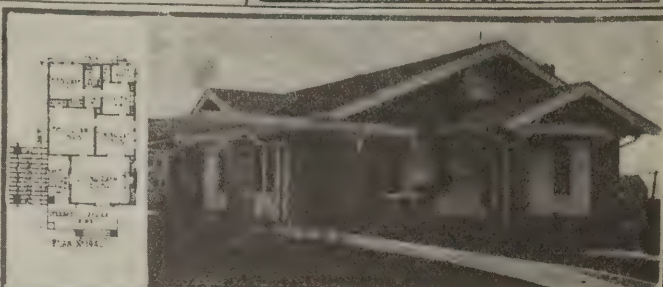
Get Service Here

HOUSTON CHRONICLE HOME BUILDING BUREAU

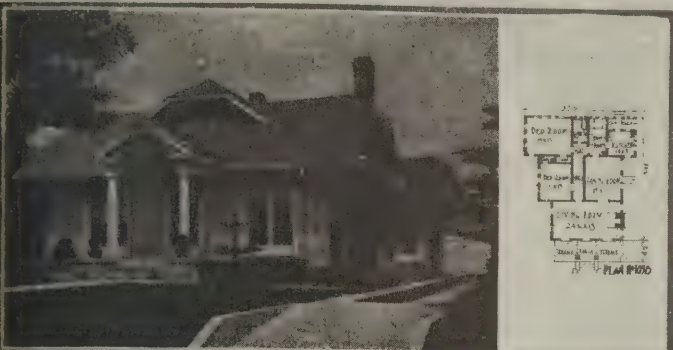
If you are interested in building a home (or in remodeling), now or in the future, you will be the gainer, without obligation of any nature, in clipping the enclosed coupon and mailing to The Houston Chronicle's Building Department Building, and secure information of help to you. CLIP THE COUPON and SEND IT IN NOW before you forget!



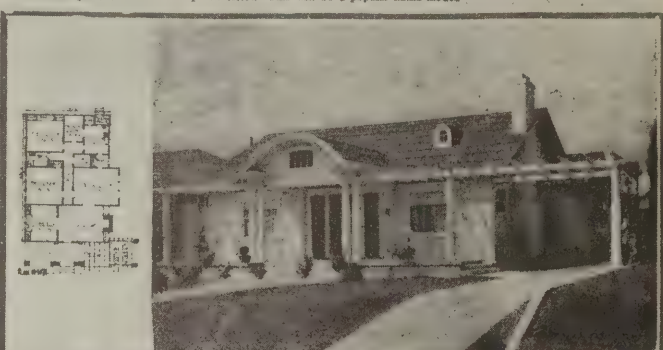
PLAN 1020—A newer bungalow model would be hard to imagine; note the large kitchen, with delightful little exclusive breakfast room. The combination glassed bedroom and sun parlor at the rear of the house also commends this plan.



PLAN 1042—Here's another modern bungalow cottage with the port cochere effect, with built-in book case, commodious closets and spacious terraced and porch effect. This will be a popular home model.



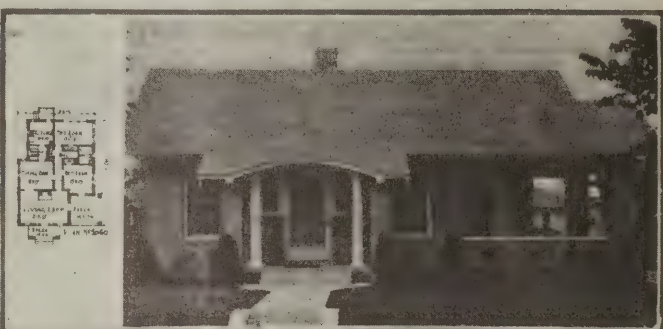
PLAN 1036—Where one may have a semi-terraced effect lawn, this simple one-story home reflects the utmost refinement and delightful exclusiveness, spacious gallery effect, two bedrooms and large living room, makes 1036 a pleasing plan.



PLAN 1074—Combination library and living room of 24 feet made possible in this pleasing roomy bungalow. Two bedrooms and a breakfast room further commended the model.



PLAN 1028—Sure to be a popular inexpensive home model for the proverbial 50-400 lot. It would be hard to imagine a "bomies" effect than offered in this model. Rooms are standardized with built-in features.



PLAN 1009—We show herewith the first of our brick veneer models in an extremely refined small home plan. It is said of brick veneer, like a good tire, judged on the "mileage" basis pays for itself in accumulated years.



SAVE THESE PAGES—Each month prizes will be given in a contest to determine the most popular of the various styles of residence cottages and bungalows shown on these pages. To the first person sending in the serial plan number of the generally accepted first choice of homes (consensus of opinion) will be awarded the prize of \$10 in gold.

Save the building plan pages of January 1, 8, 15, 22 and 29 and before February 4 send in your selection of best adapted home plan, addressed to Building Department, Home Building Bureau, The Chronicle, Houston, Texas.

Remarkable interest has been shown since the installation of the Home Building Bureau in new interior built-in effects for homes.

Show herewith is delightful book case and tile mantel effect in spacious living room shown; the smallest possible portion of anyone's home can be converted into a breakfast room as shown by enclosed model with built-in buffet and combination chest of drawers.

Courtesy Gulf Coast Lumbermen.

"A man who in the struggle of life has no home to retire to is without life's best reward and best defense."—J. G. Holland.



Among Those Co-Operating In The Chronicle's Home Building Bureau Service Are The Following Firms:

Lynch Davidson & Co. (Realtor) 3628 Canal St. Preston 135 or 6254.	Jones Lumber Company Wale and McKinney Aves. Preston 84 or 817. 2401 Texas Ave. Preston 1266 or 737.	Farrar Lumber Company Preston 1266 or 737.	South Texas Lumber Co. (Yard) 2401 McKinney Ave. Preston 1190 or Capital 1190.	W. T. Carter Lumber and Building Company Liberty and Henry Sts. Preston 4163 or 2737.
Temple Lumber Company 2800 Texas Ave. Preston 3052 or 2051.	Fields-Lutman Lumber Company 6108 Burroughs Bldg. Wayside 1437 or 1438.	Houston Title Guaranty Co. Winger Stewart, President. Lamberman Bank Bldg.	Hardin Lumber Company 2700 Texas Ave. Capital 2786, 2781.	R. W. Wier Lumber Company (Wholesale) First National Bank Bldg. Preston 1533 or 1140.
H. D. Taylor Lumber Company 517 Preston Ave. Preston 10.	Silverberg Lumber Company Washington Ave. and Boulevard. Taylor 17.	Purdy-Guinan Lumber Co. 220 Yale Bldg. Heights. Phone Taylor 400.	Stowers Furniture Company Phanish Bldg. and Walker Ave. E. F. Walker, Mgr.	Houston Real Estate Board W. B. Allen, Henry J. Beeling, W. C. Brennan, Geo. T. Brown, A. A. Bush, A. B. Crockett, E. P. Zachary & Co., J. W. Edwards, Hedden F. Ellis, Florida Roberts & Co., A. B. Foreman & Co., Herman H. Gehrke, Gulf State Realty Co., G. T. Selby, Houston Land Corporation, Lee Realty and Investment Co., Guardian Trust Co., H. C. Meyer & Co., M. D. Harris & Son, Glenn Nichols Land Co., New Realty Co., W. A. Smith & Co., C. B. Stewart & Co., W. A. Taylor, J. W. Tabor & Son, L. T. Thomas & Co., John Van De Mark, J. E. Webster & Co., Houston Title Guaranty Co., Harcourt Title Guaranty Co.
Spencer-Sauer Lumber Company 2828 McKinney Ave. Preston 1254 or 1255.	Boykin Lumber Company Carter Building. Preston 1909 or 1104.	Pittsburgh Plate Glass Company 101 131 Crawford St. Preston 1301.	Gibraltar Savings and Building Co. Chronicle Building. Phone Preston 2208.	
	Central Lumber Company 2122 Congress. Preston 1731.	C. Bender & Sons 617 North San Jacinto St. Preston 645.	Houston Building and Loan Ass'n First National Bank Bldg. Preston 6381.	

we used ten 12x12's 40 ft. long for cross timbers and four 12x14's 40 ft. long for running timbers, using eight sets of shoes and rollers, four on each side. There was no shoring done in connection with the moving.

"The building was moved approximately

800 ft. and turned completely around, after which the building was raised 10 ft. and another story built under it. This work was completed in six days with only six men.

"We used our 3½-ton Mack truck with a special pulling winch which derives its

power from the truck's engine, which we find to be very efficient for hoisting heavy machinery as well as moving buildings."

The moving was done with so much ease that it was occupied during the whole process. It was said that not a drop of ink was spilled.

House Construction for Heating Economy

The Suggestions from Collective Experiences of Heating and Ventilating Engineers are Here Collated in Condensed Form for the Consideration of Progressive Builders

IT sometimes seems that there is more competition among builders to see which can build the cheapest rather than which can build the best. However there is every reason to believe that the next few years will see a great change in building standards. It is beginning to be realized that one of the fundamental reasons why money for houses is hard to obtain is because ordinary present-day construction is so flimsy that interest rates and commissions must take account of the great risk of rapid deterioration in such construction.

Too much attention has been paid to getting a low first cost rather than a low ultimate cost. The ultimate cost of a building depends on the length of its life, its cost of upkeep and the cost of its operation. For even the most humble home has its cost of operation, including such items as the money spent for heating, lighting and the like. If a house is so located and constructed that the kitchen and other rooms most used are naturally dark or poorly lighted the annual expense for artificial lighting, over and above what it would be for a well constructed kitchen, is an appreciable factor of cost, which in 25, 30 or 50 years at even 4 per cent compound interest would amount to a tidy sum.

Heating an Important Factor

At the annual meeting of the American Society of Heating and Ventilating Engineers in New York City in January several papers were read and much discussion took place concerning the heat losses in buildings of various construction. As the price of coal mounts higher and higher and as its quality deteriorates more and more, this matter of building a house, or apartment, or any other kind of a building so that it can be heated efficiently and economically will receive constantly greater attention.

Air Leakage Through Walls and Roofs

Discussing the subject of the "Effect of Wind Velocity on Radiation Losses and In-

terleakage,"* Stewart A. Jellett said: "There is one side of this subject I do not think has been touched on, and that is the character of the wall itself. The infiltration varies tremendously with the character of the wall and the different classes of material used for its construction. We found a few years back, when concrete roof construction came into use, that our calculations as to the heat losses were all at sea, and that the losses were very much greater than we had figured before. After a series of experiments we found it necessary to increase radiation on the top floor of a building if the roof was concrete and the same thing was true of a terra cotta building. I know of one building built with terra cotta walls in which some water pipes were put in the air space back of the inner furring. They frequently froze, although the building inside was comfortably warm 2 or 3 ft. away from the wall, but with a low temperature outside and a northwest wind, the temperature 3 in. away from the wall was 58 deg. F. and 3 ft. from the wall was 72 deg., showing that terra cotta is porous.

Water Leakage Through Walls

"Any calculation of infiltration will not amount to much unless we figure the character of the wall itself and know in advance how the building is going to be built. We have the same question in Atlantic City, not so much for air leakage as for water leakage. At the present time we are engineers for a building there. After very considerable thought, the owners decided that in addition to the inner 4 in. furring and air space, they were going to have 13 in. walls all the way up their 14-story building, because on the wall of one of the newer hotels a northeast storm drove the moisture through an 8-in. wall carefully laid, and the paper molded. The owners of this new hotel

have decided to have a 13-in. brick wall and a 4-in. terra cotta furring with air space. It costs a good many thousand dollars to do it, but they say the damage to the other buildings has been continual and they figure that their heat losses are greater through the walls than they are at the windows, also that the leakage is not around the windows but through the walls.

"If that is true of rain driven with high wind velocities it is also true of air itself. It is going to penetrate a porous material such as terra cotta very much sooner than it will a solid brick wall, or it will penetrate a light brick wall sooner than a heavier one.

"We ought to know in making up data the factor of safety which applied to a 13-in. brick wall, a 17-in. brick wall and both with a terra cotta furring. I think all these things ought to be considered if a table is to be prepared."

Making Masonry Walls Tight

Samuel R. Lewis: "Not enough stress is being laid on the quality of the masonry. Masonry walls, as a rule, are good filters. When our ancestors built a cistern they were quite likely to build a brick wall around the pump well to serve as a filter. I call to mind an experience with a long outside wall, something like the wall of this room. Canvas was pasted against it on the inside and it was painted so that it was fairly air-tight. A gale of wind one day blew the canvas from the wall by the leakage-pressure through the wall.

"The masonry walls in buildings must be considered as a means merely to hold something up as supports, not enclosures. I have built some houses in which a diaphragm of paper with cemented joints was provided between the floors over the plastered ceiling as a furring against all outside walls. Flexible air-tight paper joints were also made between the floor and ceiling diaphragms and the walls so as to al-

*March "Journal of the American Society of Heating and Ventilating Engineers," New York City.

ow for drying out the joists. Similar joints were made between the window and door frames and the furring. The results were remarkable and well worth the trouble both in comfort and in fuel saving.

"In building a supporting wall, steps must be taken to make it air-tight, as the wall in itself is usually a sieve. Too often we install a larger heating plant than is necessary, which burns more fuel forever after, when we would better have fixed up the building so that a large heating plant would be unnecessary."

Heat Losses in Frame Houses

On "Heating the Average Home Economically," a discussion reported in the January journal of the society, P. J. Dougherty said: "In a survey made during the war it was discovered that practically as much coal was required to heat a house in Texas as one of the same size in Minnesota, in spite of the great difference in the average winter temperatures. In the old states houses are better built and thus require a relatively smaller amount of fuel to keep them warm, as compared with the less solidly constructed houses in the Southern States.

"Heavy building paper and shingles placed over the siding of a poorly constructed frame building will materially reduce coal bills besides reducing painting bills. Metal weather strips on all outside doors and windows are very essential for economical heating. The leakage around three average-sized windows in a room is frequently equal in area to a pipe 8 in. in diameter.

Chimney Heights

"A strong draft, properly controlled, is the best fuel economizer on the market. Faulty chimneys are responsible for more heating troubles than any other condition. A highly efficient heater will prove a failure on a poor draft. A chimney less than 10 ft. high is erratic and uncertain in its action, and usually gives trouble in rainy or snowy weather. A tile 12x12 in. is the best size for the average house. No tile less than 8x12 in. should be used. A 4-in. light brick partition should separate all tile-lined flues in a chimney. All heater flues should be subjected to a smoke test and made tight before the house is turned over to the owner. Leaky flues are the most frequent cause of draft troubles. No other connection should be made to the water flue but that of the heater.

Unfair Competition and Peddling Bids

"The heating contractor is responsible for the proper capacity and proper construction of the heating plant and the type of heater used. Unfair competition and peddling bids on the part of the owner sometimes force a heating contractor to install a heating plant considerably below the capacity required. When properly operated and controlled a plant that is above the capacity required is far more economical

and satisfactory than one that is below the capacity required.

Have Heater Plenty Large Enough

"Most of the heating boilers installed in the average home are too small to meet the practical operating conditions demanded of them. The average man who attends his own heater is away from home about 10 hours during the day. If he uses hard coal, his heater, if of the proper size, should keep his home warm from the time he leaves in the morning until 10 hours afterward when he returns at night without his family being compelled to put coal on or shake the fire during the day.

"It is the general practice to install boilers in homes rated with hard coal on only an 8-hour firing basis instead of on the 10 or 12-hour rating basis as the actual conditions require. Furnaces as a rule are rated on a 10-hour firing basis.

"The ratings placed on boilers tested according to the Boiler Testing Code of the society apply only to standard testing conditions such as ample draft, intelligent firing, good quality of coal, clean boiler properly, cemented and mounted, etc. A boiler properly rated at say 800 ft., when tested under standard operating conditions, may not be able to develop say 500 ft. rating if the draft is weak, the firing inefficient, the coal of poor quality, the heating surface covered with soot, the sections and door

frames leaking air or if there is short circuiting of the gases due to faulty cementing, etc. Because of those prevailing handicaps placed on most heaters, in which the actual operating conditions are far below standard testing conditions, good practice demands that small boilers be installed from 50 to 100 per cent greater in capacity than the amount of radiating surface installed. Good engineering practice demands that proper factors of safety be used to meet the varying conditions met in actual operation.

"The short circuiting of the hot gases through a boiler and the leakage of air between the sections into the flue travel because of improper cementing of the spaces between the sections is a frequent cause of heating trouble. We all know that air leaks through cracks in a cigar's wrapper ruin a cigar. Air leaks because of faulty cementing also ruin the economical operation of a boiler. Regular boiler cement should be used; asbestos is porous and should never be used.

"It is important that the boiler be the proper type to suit the conditions. If the draft conditions look unfavorable, install one size larger firepot with fewer intermediate sections having a short fire travel. If the draft is strong, give preference to a long fire travel. A heating plant that is improperly designed and poorly constructed is bound to be wasteful in fuel."

Penetration of Wood Preservatives

THE effectiveness of any wood preservation treatment is measured very largely by the depth to which the preservative penetrates. This can be determined by the following tests, which are used by the Forest Products Laboratory:

The presence of creosote oil is indicated by the dark discoloration, and the degree of penetration may readily be determined by taking a sample at a point free from checks and other imperfections and at a considerable distance from the end. This may be done either with an ordinary 1/2-in. bit, or with an increment borer, which brings out a core of wood that shows in cross section the depth of penetration and is easily examined. The observation should be made at once, because the oil spreads rapidly over the cut surface. In order to prevent infection, the hole in the treated piece should be tightly closed with a creosoted plug.

As zinc chloride is colorless, the depth of penetration of this preservative must be ascertained by chemical means. After cutting the stick in two or getting a sample with the increment borer, the freshly-cut surface is dipped for not to exceed 10 sec. in a 1 per cent solution of potassium ferrocyanide, and the excess solution is removed by blotting paper. The sample is then dipped into a 1 per cent solution of ura-

nium acetate, and dried. The treated portions will be whiter than the natural wood, and those untreated will have a dark red or a maroon color. This method does not give very sharp contrasts on wood which is reddish in color, like red oak, but otherwise is very satisfactory and affords a permanent record.

Another method (developed by Galen Wood) consists in spraying over the freshly-cut surface a mixture of equal parts of a 1 per cent potassium ferricyanide solution, a 1 per cent potassium iodide solution, and a 5 per cent solution of soluble starch. This colors the treated portion a very dark blue, but does not affect the untreated wood. Although the color fades in time, it may be brought back by spraying again.

Sodium fluoride is colorless, and no satisfactory method of showing its presence in wood has been devised.

Mercuric chloride is also colorless, but dipping the wood in a solution of hydrogen sulphide turns the treated area black.

As individual pieces may show an abnormally high or low degree of penetration, a sufficient number of tests should be made to obtain a fair average. Samples should be taken at a considerable distance from the ends of the stick in order that they will not be affected by the heavy longitudinal penetration from the ends.

Insuring Safety and Economy in Building

Safety and Economy in Building Insured by the Services of Qualified Engineers will Tend to Keep Building Contracts Within the Field of the Local Builder

NATIONAL BUILDER can render its readers no greater service than to drive home to every architect, building contractor and professional builder the fact that many ordinary types of building—apartment houses, theaters, lodge buildings, etc.—often require a structural engineer's service to render their construction safe and economical. A few hundred dollars spent for such engineering service and advice will often save thousands in damages and reconstruction costs as well as save the man responsible for the construction untold mental distress should a failure occur.

It is the owner of course who must pay for such service; but the architect and contractor are the ones who should recommend it; and they should remember that to do so is no reflection on themselves. It is simply paying a legitimate fee to one who makes a business of assuming the responsibility for the safety and economy of an engineering design.

What Constitutes Engineering Service?

"Simply making framing plans and stress diagrams and selecting steel sections from a manufacturer's hand book is but a small part of structural engineering," says T. L. Condron, consulting structural engineer, in a paper before the Western Society of Engineers at Chicago on March 13, 1922. He continues: "Every building, or other structure called upon to carry loads for which computations and stresses are necessary, is a structural engineering problem. Where long span roofs or floors are to be supported over the heads of, or under the feet of crowds of human beings, the problem involved calls for engineering knowledge and experience of a high order.

"Too often, only the exterior and interior appearance and the convenience of a building receive serious consideration, while it is assumed that the hidden frame work will be properly and adequately designed or proportioned by the architect, regardless of whether he has been trained as a structural engineer or not, or whether he has or has not retained a competent structural engineer. Not infrequently, and quite properly, the leading qualification of the architect selected, is his skill as an artist and his ability to conceive and produce attractive and pleasing drawings or sketches for the visible exterior and interior parts of the building, while he may have no qualifica-

tions either to make or to pass upon the structural design of the building. In such cases as the ones under consideration, and in scores of similar cases, the engineering is left to be done by one or more of the contractors, 'subject to the approval of the architect,' who, as a rule, is not qualified by training or experience for the responsibility he thus assumes.

"It requires painstaking study of the structural problem presented by the architect's drawing for an engineer to determine, first, what will be the actual loads to be carried and, second, how to design the frame work so as to carry these loads with safety and economy.

"A competent structural engineer realizes that not only must he determine the actual loads to be carried on his structure and so proportion the structure as to carry these loads safely and economically, but he must also take into account the effects of temperature changes and vibrations from interior or exterior causes and provide strength in his structure to resist the uncertain loads and stresses due to temperature, vibration, wind and numerous other contributing causes in order that his structure may be safe under all conditions."

Cause of Knickerbocker Theater Failure

Discussing the Knickerbocker moving-picture theater failure (NATIONAL BUILDER, March, 1922, page 34), of which Mr. Condron made a thorough investigation, he said: "There seems to be but one conclusion possible from the study of the facts regarding the building and that is, either 'the designer' of the steel work was incompetent to detail steel work, or he disregarded all recognized safe practice in designing the details for this work." (The designing in this case was done by the structural steel manufacturer.)

What Lessons Do These Failures Teach?

"What should the engineering profession do to avoid the dangers of such disasters? Should the mantle of charity be thrown over these and other equally dangerous practices, involving the utter neglect of consideration being given to the engineering problems of buildings? Or should such examples of neglect, accompanied by actual failure, be given wide publicity and their actual causes explained?

"So long as the danger is not recognized, builders will continue to trust implicitly to

the presumed skill and ability of men incompetent to design important structures. The burden must rest upon those who pay the bills. They seldom appreciate that engineering services are needed in building work and that competent engineers should be retained. They are lulled into peaceful contentment by the statement made to them that the 'construction details are to be made by the contractor subject to the architect's approval,' consequently they are led to believe that there is no need to go to the expense of engaging structural, heating, ventilating and electrical engineers. Frequently, where professional engineering advice and direction are not retained for the preparation of plans and specifications, these important factors are worse than neglected and left to be designed by dealers in materials 'free of charge,' like 'tea store premiums.'"

The Architect's and Building Contractor's Opportunity

There is another phase to this matter not brought out by Mr. Condron, but which has a vital influence on the work and future of the average architect and building contractor both in the cities and in the smaller towns. Much important and profitable work that a local architect could design and a local builder could construct now goes to big city architectural firms and big national organizations of engineering contractors for no other reason than that these outside organizations employ competent engineers. Building owners have confidence in them for that reason. The local man may be just as good an architect for the purpose and the local contractor just as reliable a builder, but unfortunately neither one has acquired the practice of employing a structural engineer to help them solve their problems and insure their work against failure.

There are numerous independent, competent consulting engineers throughout the country who make a business of accepting architects' and contractors' problems, analyzing them, and solving them. For such services they get fair fees based on the time spent or on the value of the job; and there is no reason in the world why the small-town architect and contractor cannot benefit as much or more from engineering service than their big city competitors. They must come to it eventually or continue to lose much local work.

Sanitation, Heating and Lighting of Suburban and Country Houses

By Edward E. Ashley, Starrett and Van Vleck, New York City

No. 6—Plumbing Installations

WE HAVE, in previous sections of this series of articles, covered the disposal of the waste from the residence. We will now continue from the disposal plant or public sewer into the house and to the several plumbing fixtures.

The extent to which a person should go in an investment of plumbing depends entirely on the individual. Of course, it is

system from outside of the house to the public sewer or disposal plant.

House Drain—The horizontal drain inside of the house to which the vertical lines connect.

Soil Line—Any vertical line to which a water closet is connected.

Waste Line—Any vertical line receiving

The local regulations should be followed in all localities where these exist, but where building in rural districts it would seem desirable to adhere to a simple, sanitary installation, arranging the house sewer so that the main soil line forms a direct vent through roof from the soil line, omitting a house trap and extending the piping to all fixtures by an end vent or circulating system, by which system there is very little possibility of stopping up the vents. The vents, although fewer, are of larger size, providing a continuous and positive circulation of air through the plumbing system at a much lower installation cost.

All plumbing fixtures should be provided with traps. Where the branch waste pipe to which the fixture connects is over three feet from the vertical stack, the trap of the fixture should be of a non-syphoning type.

The trap forms a seal and acts as an interception between the sewer system and the room, preventing the sewer gas from entering the room.

When fixtures remain long unused the water in the trap seal will evaporate from the heat and dryness of the room, allowing the sewer air to enter room.

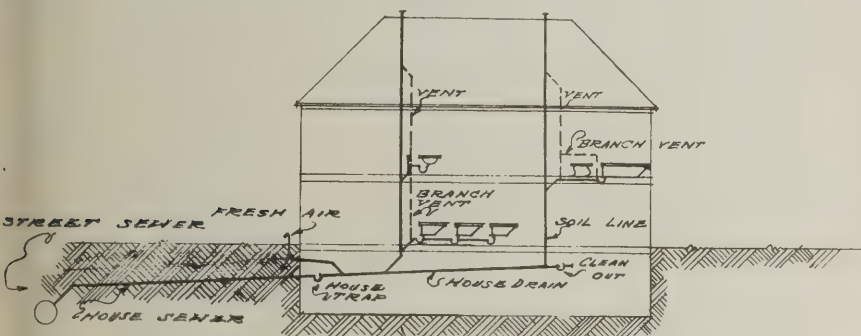


Fig. 33

hardly to be conceived that a person building a house would neglect to consider the comforts of his family to such an extent as to fail to provide at least one complete bathroom, a kitchen sink and laundry tubs, expanding from this to lavatories in the

waste from any fixture other than a water closet.

Vent Line—Any piping provided for ventilation of the plumbing system to prevent "syphonage" back pressure, etc.

The type of plumbing system to be in-

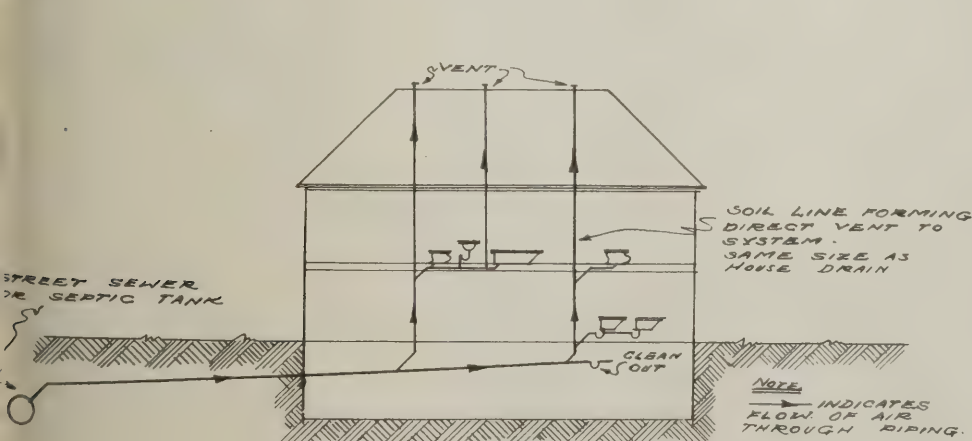


Fig. 34

individual rooms or to separate baths, pantries, sinks, etc.

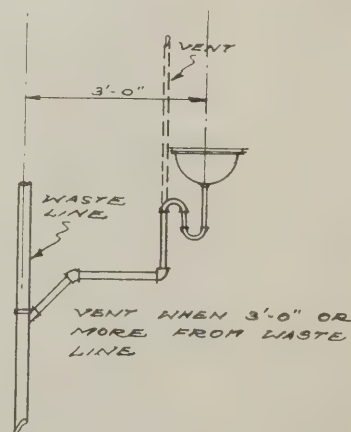
For the convenience of the reader, we define the terms used from time to time in this section thus:

House Sewer—That part of the drainage

system installed, especially in or near cities, generally is governed by local rules and ordinances which must be followed. In rural districts no such rules exist and the local plumber generally puts in the very simplest system he can devise.

Piping—Soil, Waste, Vent and Drain Lines

All inside house drains, soil, waste and vent lines should be what is known as *extra heavy* cast-iron hub and spigot pipe, with joints caulked with oakum and lead, either



coated with asphaltum or not. The fittings should be of corresponding weight, long turn pattern except when space conditions make this impracticable.

There has and probably always will be

the branches or ends of runs for similar purpose.

The piping for soil, waste and vent should have a uniform grade of at least $\frac{1}{4}$ in. to the foot and care should be taken

through they should be provided with sheet copper or lead flashing to make the joint watertight. If a soil or vent run through a low roof near windows, the pipe should be extended to a location where the foul air would not reach the window.

A method often employed by the writer for country houses is to carry the soil and vent lines into the attic and there consolidate them into one main vent and build the vent into the chimney.

Size of Piping

In proportioning the size of piping for a plumbing system the following size connections should be provided for the various fixtures:

Water closet, 4 in. waste connection, 2 in. vent.

Slop sink, 3 in. waste connection, 2 in. vent.

Kitchen sink, 2 in. waste connection, $1\frac{1}{2}$ in. vent.

Shower bath, 2 in. waste connection, $1\frac{1}{2}$ in. vent.

Bath tub, $1\frac{1}{2}$ in. waste connection, $1\frac{1}{2}$ in. vent.

Single lavatory, $1\frac{1}{4}$ in. waste connection, $1\frac{1}{2}$ in. vent.

Laundry tubs, 2 in. waste connection, $1\frac{1}{2}$ in. vent.

The main house drain and soil line should be not less than 4 in. in diameter. If the

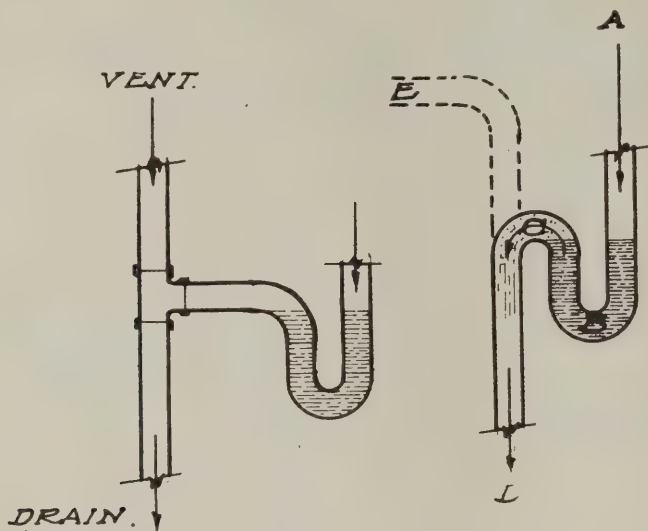


Fig. 35

Fig. 36

recommendations made urging the use of standard weight soil pipe; a saving can be effected by its use, but in the long run the difference in first cost is so trivial as to hardly warrant it.

Unless extreme economy must be exercised there seems to be no question as to the desirability to use extra heavy cast-iron pipe and fittings for all soil, waste and vents over 2 in. in diameter and galvanized steel pipe for all smaller sizes.

to properly support this piping and to keep all joints air tight.

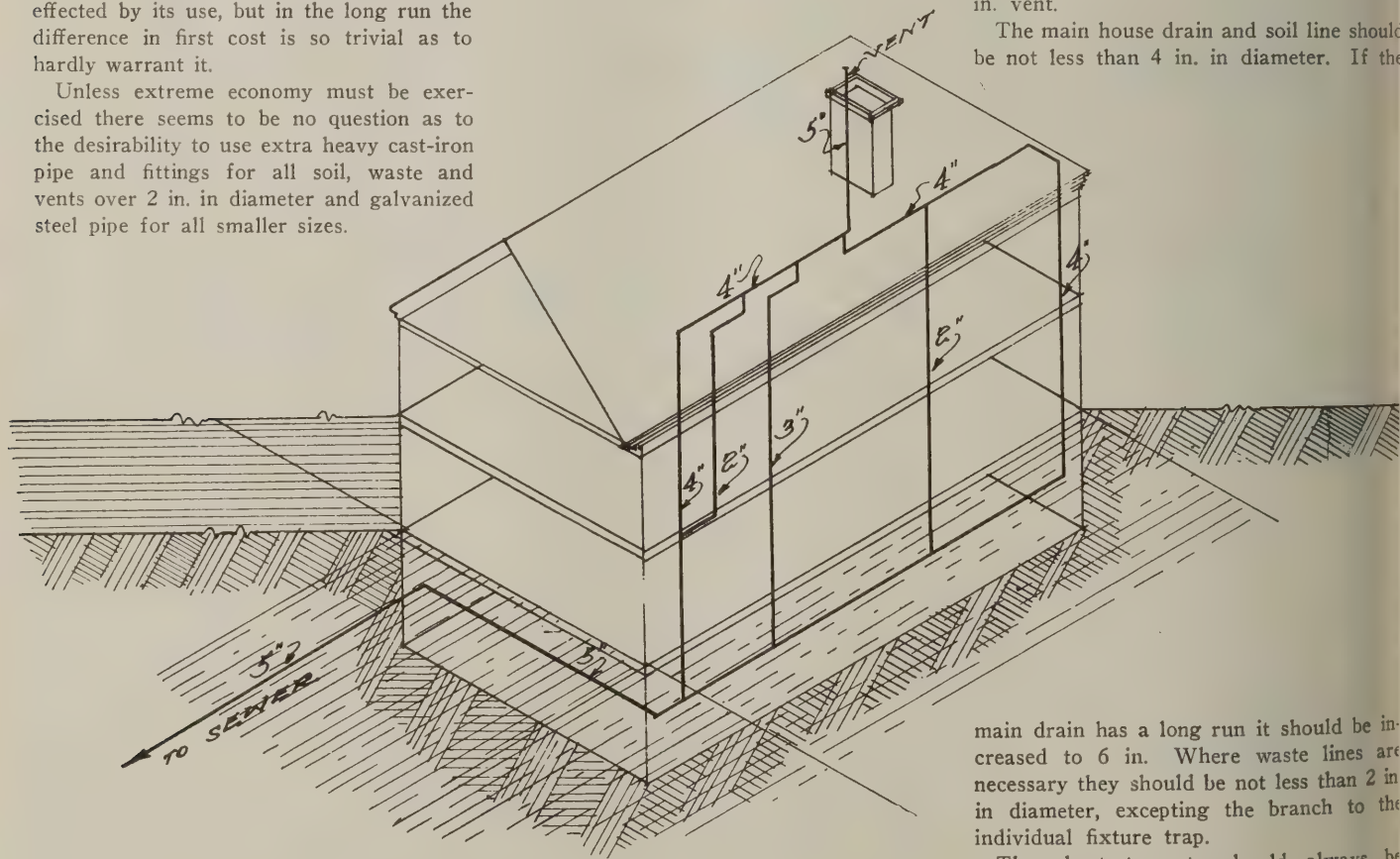


Fig. 37

Installation Notes

In an installation with long, horizontal runs, cleanouts should be provided, arranged so that the piping may be roamed out. Cleanouts should also be provided at

The waste from a refrigerator should not be connected to a drainage system, but should discharge into an open sink.

The soil and vent lines should be carried up and through the roof; where they pass

main drain has a long run it should be increased to 6 in. Where waste lines are necessary they should be not less than 2 in. in diameter, excepting the branch to the individual fixture trap.

The shortest route should always be taken for installing all drainage piping and only deviated from when conditions in the building will not permit the short route. Ample pitch should always be given to all piping, running in a horizontal plane, never less than $\frac{1}{8}$ in. to the foot. The piping should be supported so as to prevent sag-

ging and to keep it in alignment. It is always desirable to provide a drain for the refrigerator. This drain should discharge into a sink in the cellar or in the side of a water-supplied floor drain. It should never connect direct to a drainage system.

ing of special designs, as this makes repairing very expensive. Generally, there is some local supply house with a show room in which various fixtures are set up and selections can readily be made from them.

In making selection of fixtures it is im-

portant that the pottery or enameled ware should be non-staining and free from crazing discolorations or imperfections.

Probably there is no one line of material for use in home building to which so many improvements and changes have been made that make for the convenience and health as do plumbing fixtures.

In looking back it is quite probable that the reader can recall the hopper closet, the tin lined bath-tub and the round porcelain wash bowl set in a marble slab, all sheathed in wood with lead waste and water pipes and polished brass stops.

Many readers probably remember the low boxed in black kitchen sinks which caused so many back aches. Twenty or 25 years ago such fixtures were looked upon as modern. Strides have been made since then to serve and make the surroundings pleasant, with the result that American plumbing fixtures are well designed and the most sanitary in the world.

What should a modern bath room look like and be today? First of all, it should have sanitary floor (tile cork linoleum or compressed cork) with tiled or enameled walls with sanitary cove base and cap mould.

The selection of the flooring should combine sanitation with comfort, the cork or cork linoleum combining both of these.

(To be continued)

Radio a Lightning Risk

NEWMAN T. MILLER, Indiana state fire marshal, calls attention to the fact that one of the worst causes of fires is bad wiring and that wiring and fuses in radio installation should be closely watched. Outfits not in use should always be turned off.



Fig. 38

The vent lines should be of same size as the waste branch, excepting only in the case of water-closets, slop sinks and shower-floor drains, where the vent lines may be reduced in size to 2 in. in diameter. The local plumbing regulations, however, must govern these sizes in all cases.

The vent lines should always be installed with care to prevent clogging by rust or from waste water backing into them, and the base connection of a vent should be so arranged that the lowest fixture connection will discharge into it, thereby keeping it flushed out at all times, permitting a free circulation of air through the plumbing system.

Plumbing Fixtures

The actual selection of plumbing fixtures is one of individual taste, although in this selection care should be exercised to see that the fixtures selected are rugged, with substantial brass work and of standard manufacture that they will be easy of repair and simple to keep clean, minimizing the extent of exposed brass or nickel plated trimmings. They should be provided with ample size waste connections. Avoid buy-



Fig. 39

The Cash Books and Journals

By G. W. Hafner, Industrial Engineer

No. 5, Continued—Illustrating Petty Cash Vouchers and Summary of Cash Receipts Record and Cash Disbursements Record

THE forms of voucher checks shown serve the purpose of a combination remittance statement and check, and are made up in three copies:

- 1—Copy for trade creditor. (Fig. 18.)
- 2—Copy to be filed numerically in bank binder. (Fig. 18A.)
- 3—Copy to be attached to purchase invoice or invoices, and filed alphabetically by shipper's name. (Fig. 18B.)

The body of the voucher should contain a brief synopsis only of the account being paid. If a single invoice is being paid, it is necessary to state only the date, invoice, number and amount. If more than one are covered they should be listed separately, and the total extended. If any deductions are made, these should be shown and the net amount to be paid brought down. This should all be done directly from the purchase invoices themselves. In this way, attention is immediately called to any notations concerning errors, corrections, claims, discounts, etc.

The net amount to be paid having been determined, as shown in the body of the voucher, the check portion is filled in and signed by the proper authority. The original copy is then mailed to the shipper, the second copy is filed in numerical order in the bank binder, and the third copy is attached to the copy of the invoice or invoices paid, and filed alphabetically by vendor's name.

By this method all statements, invoices, memoranda and the like, covering the entire account with any one and all shippers, are kept together in such shape as to serve all the purposes of purchase ledger accounts.

The bank binder copies are used for entry in the Cash Disbursements Record, and for noting, in the "Paid by Check No." column of the Purchase Analysis, the number of the check given in payment of each account.

An exact list of all unpaid bills is readily obtained at any time by listing and adding the open items in the "Purchase Analysis"; that is, those items opposite which no entry appears in the column headed "Paid by Check No." The total of these open items proves the balance of the accounts payable account in the General Ledger.

The voucher check outlay described above will not be suitable in those cases where a small office is maintained, and where the proprietor or manager finds it advisable to write his own checks by hand. In this case,

an alternative method is offered in Figs. 19 and 19B. This provides a means of listing the invoices to be paid on the stub, as well as on the reverse side of the check itself, and will be found much more satisfactory than ordinary stock checks.

FIGURE 18

N^o. 469

NAME OF FIRM
ADDRESS

TENDERS THE ATTACHED CHECK IN FULL
PAYMENT OF THE ATTACHED STATEMENT

DETACH CHECK BEFORE DEPOSITING

TO
FIRST NATIONAL BANK
EVERYWHERE, U.S.A.
1-74

NAME OF FIRM
CHICAGO, ILLS., _____ 19____

PAY _____ DOLLARS

TO THE
ORDER
OF

NAME OF FIRM
TREASURER

HAFNER METHOD

FIGURE 18A

N^o. 469

NAME OF FIRM
ADDRESS

CHICAGO, ILLS., _____ 19____

PAY _____ DOLLARS

TO THE
ORDER
OF

MEMO OF ENTRY

THIS COPY FOR
BANK BINDER

HAFNER METHOD

THE Bureau of Standards announce that government investigators have succeeded in harnessing ordinary home electric light current for the operation of radio receivers, supplanting all battery power. The electric light current by reduction of voltage is used to light and operate the vacuum tubes only.

Questions, Answers, Kinks and Discussions

Edited by V. L. Sherman

Herein is a Department of Mutual Help for the Exchange of Experiences and Ideas. It is Not Only Well Worth Your While to Give Your Experiences for What You Get Back from Others, but National Builder Pays You for Doing So in Good Hard Cash

A Handy Slide Rod

S. F. B., New London, Ohio, sends the sketch of a slide rod (Fig. 1) which, he says, is "one of the handiest tools I use. It is used for any length from 6 to 12 ft. in setting base lengths. It can be set very

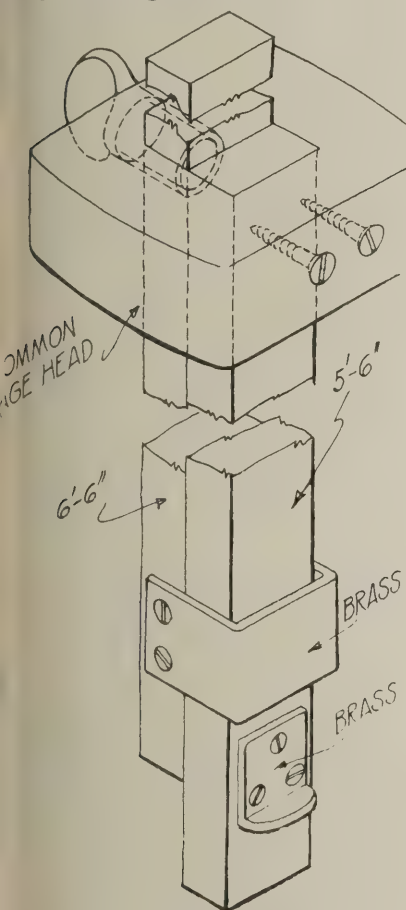


Fig. 1—Slide rod

setting stud lengths or openings and for quickly and accurately. I also have one that runs out 20 ft. for long stuff. The rod is iron and the rods are $\frac{3}{4} \times 1\frac{1}{2}$."

Concrete Drain Plugs

E. O., Missoula, Mont., sends this kink: contract for a concrete siphon culvert,

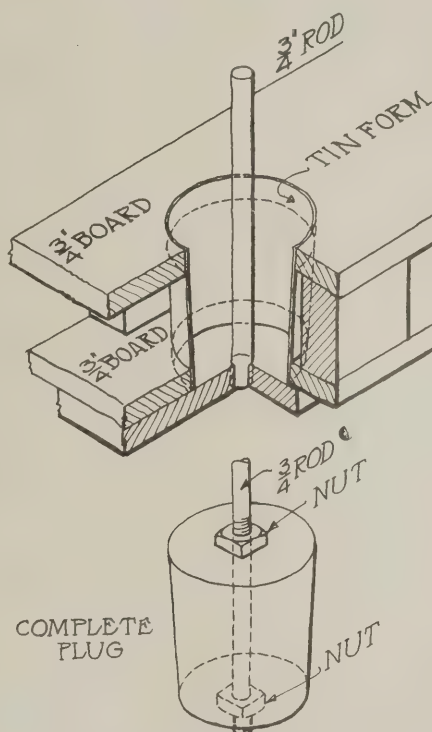


Fig. 2—Concrete plug

the construction of which I was in charge of, called for cast iron plugs in the bottom of the culvert so that the water would drain out and not freeze and crack the concrete. Before the job was finished we discovered that there were not enough plugs to complete the work. They had to be put in at once, so there was no time to get more, and I didn't know just what to do. I tried making plugs out of wood, but they would swell up and could not be removed. Then I tried concrete. The plugs were 4 in. long, with a diameter at the top of 5 in. tapering to 4 in. at the bottom, and with a $\frac{3}{4}$ in. hole through the center to receive the rod by means of which the plug was to be removed. I made a form of two $\frac{3}{4}$ in. boards 10x14, with blocks between them to hold the boards the proper distance apart. (See Fig. 2.) In one board I made a circular hole 4 in. in diameter and in the other, with the same center, I made a circular hole

5 in. in diameter. A piece of lightweight tin fitted into these holes like a shallow funnel and made the sides of the form. A board was nailed over the outside of the 4-in. hole, and a small hole bored in it so that the $\frac{3}{4}$ -in. iron rod thrust through it came through the center of the form. I coated the tin and rod with a little cup grease to prevent the concrete's adhering, arranged some small wire for reinforcing and poured in the concrete. After 24 hours I removed the iron rod, took the plug carefully out of the form and placed it on a board, covering it with wet sacks to keep it from drying out too fast and cracking. After a week the plug was ready for use. The rod was thrust through the hole and both nuts tightened moderately. (See Fig. 2.) The plugs were then dipped three or four times into hot tar, which gave them an elastic surface. These plugs have been in use for three years, and are as good today as the cast iron ones."

A Door Lock Mortise Gauge

S. E. T., Alamogordo, N. M., sends

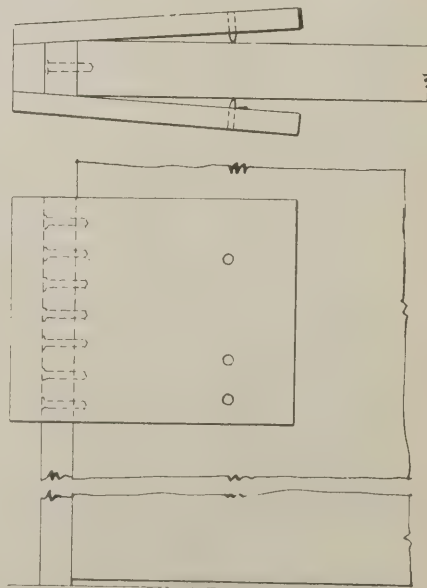


Fig. 3—Lock mortise gauge

sketches of a kink which, he says, he has been using for some time and finds quite a time-saver when there are a number of locks of the same type and size to put on, and he adds, "the majority of medium-priced locks work to the same scribe." The staff (see Fig. 3) should be of a length equal to the distance from the floor to the point at which the lock is to be placed, and the number of points as many as required for the size bit used in mortising. When properly made, this gauge will mark every hole to be bored for a lock, with a couple of blows, and it works as well on the 100th door as on the first."

Fixing Up the Old Saw

F. B., Bridgeport, Pa., writes: "Once in a while a saw gets kinked or buckled so that it is no longer satisfactory to use. I had one such, of a very good make, and as good saws cost money and are like faithful pets, I decided to have it straightened and put in condition. I took it to one saw-filer and jack-of-all-trades, but it was soon evident that he knew little or nothing of peening saws. Then I decided to send it to the maker. I did so, and was surprised to learn that they take care of such troubles regularly in their repair department. They straightened, filed and set my old saw at a nominal cost, and I now have a saw as good as new. This is not an ad for the saw manufacturers, but a story of my experience for the benefit of the craft. Don't throw away the old saw, even though the teeth have been much abused. Get the name of the maker from the saw-blade or the handle screws and write him your troubles. Dollars are hard enough to get now. Let's economize and boost."

A Lock Splice for Long Buildings

F. P. M., Cape Elizabeth, Me., sends sketches and directions of a kink which he

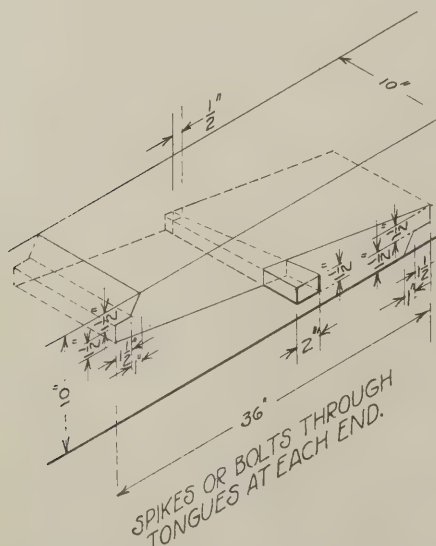


Fig. 4—Lock splice for long buildings

has been using for some time and finds of great value, and of which he says: "I have a lock splice that has proved of great value to me in making up tie beams and sills for long buildings. I have used it on timbers for 6x6 in. to 16x20 in. hard pine and have never had a joint start. It is easy to put together and draw up to a joint and very easy to work. Last year I had two sticks of 8x10 in. spruce, 24 ft. long. I put them together with this splice and placed the ends on work benches. Then I had a number of men sit on it to bear it to the ground, but it did not start the splice. My father, who was in the building business, used this splice in building some large sugar houses in Cuba 48 years ago. A few years ago I was down in Cuba and saw one of the mills, and none of the tie beams in the roof had started in the least."

While this splice is not new to many readers, it is such a good one that we show it for all.

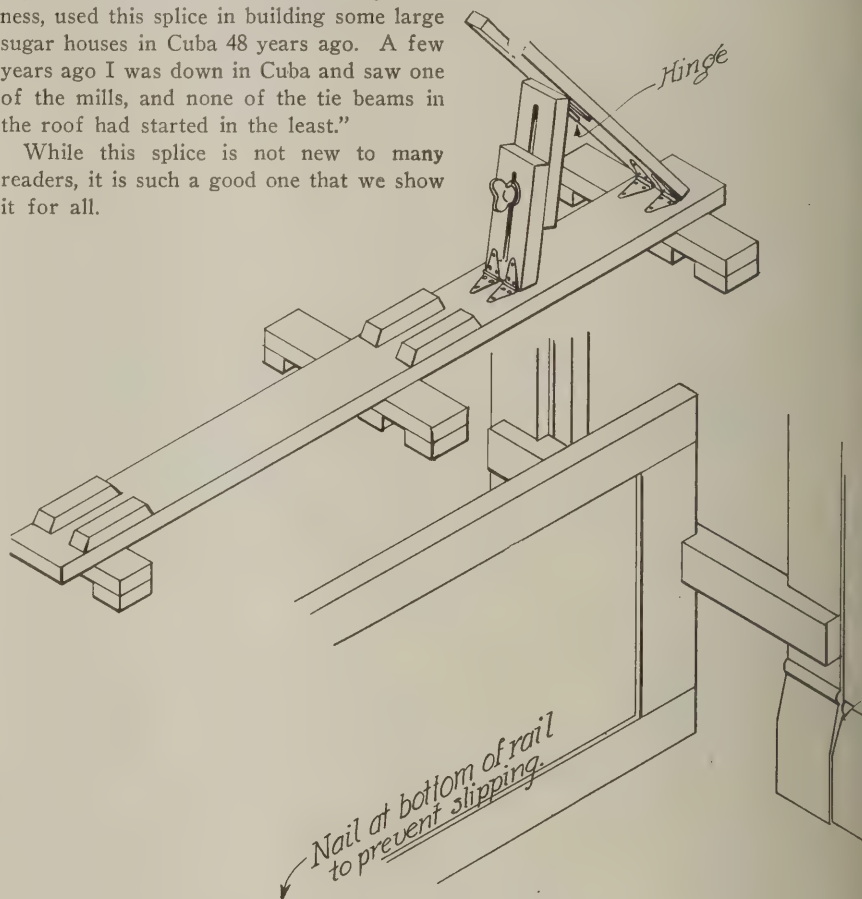


Fig. 5—Two door vises

From North Dakota

Even if a little out of the ordinary we wish to submit the letter of S. J. M. of Glen Ullin, N. D.:

In a country town everyone has his work cut out for him. The boys generally begin by filling the wood box, gradually working their way up to a man's job. There is very little choice in vocations, and should the young fellow later grow discontented and leave for the city he is at least well acquainted with a full day's work.

Of late years there has been a good deal of vocational guidance, a great idea in the original, but now an excuse for side-stepping real work.

We wish to say that this young man needs no vocational guidance; that undoubtedly he will be an asset to his community, and

a credit and capital builder. We believe there are many like him in the Dakotas and regret that the large cities with their thousands of young fellows are not nearer that country.

"I would not be without NATIONAL BUILDER for anything," he writes. "It has helped me very much in an educational way especially the Questions and Answers Department. Although I am only twenty years old I have built about a dozen houses and a lot of farm buildings. I plan almost all the buildings that I make, and in one barn I made a special gable brace, a sketch of which I will send in to you. During the

winter months I make quite a bit of cabinetry work. I am taking a correspondence course in contracting and building which has helped me very much. When that is completed I expect to take up a correspondence course in architecture."

Two Door Vises

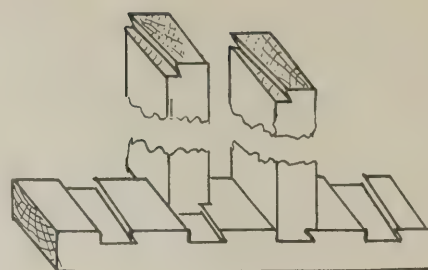
S. J. M., the enterprising young carpenter of Glen Ullin, N. D., whose letter is noted under the heading, "From North Dakota," sends the sketches shown in Fig. 5 and says: "I have used both types of door vises illustrated in the sketches for some years and have found both of them very satisfactory. The smaller one is a vise which may be used on jobs where there are only one or two doors or windows to fit, or on a job where there are some doors the

ave to be planed or refitted. The larger ne is very convenient, for usually when it mes to the job of hanging the doors there ore or less rubbish lying around on the oor, particularly plaster, which will mar e edge of the door if one isn't very care- l when using the saw horse or where the oor rests directly on the floor while being aned. You will note by the sketch that ith this device the door rests on a bench, d unless the mechanic is very careless d throws nails or other objects down on e bench there is not much danger of the oor or window being damaged during the aning. I usually make these vises out of rap lumber, and they are good for several bs."

Standardized, Mortised and Tenoned House Frames

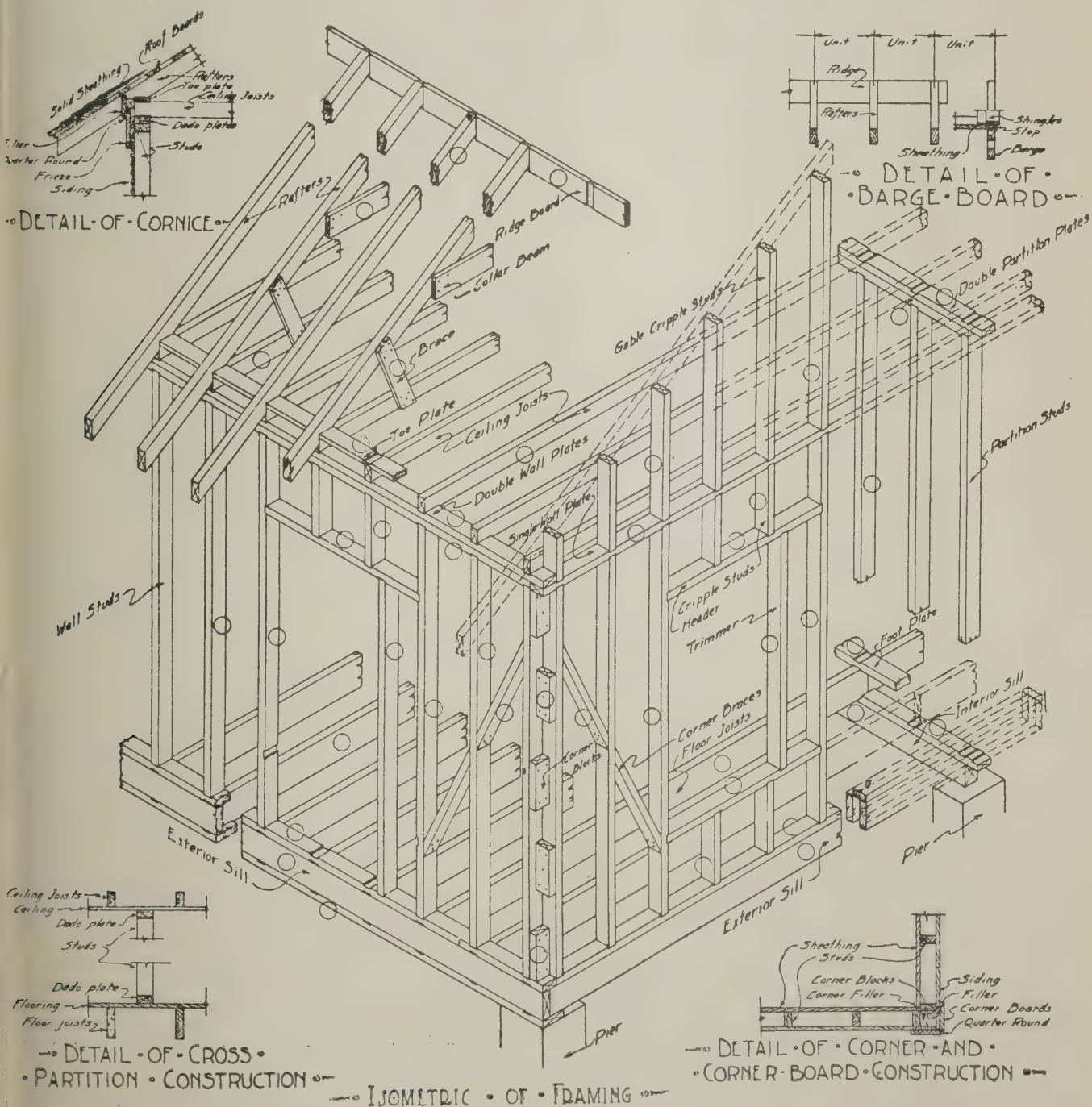
A TEXAS lumber man has gone the ready-cut house manufacturer one better. He not only cuts the lumber to proper lengths and sizes for framing any house, but mortises and tenons the frame to fit together like the old-time practice.

The tradename "Enterlock" has been copyrighted to cover this system of construction, which the manufacturer describes as follows: "Reference to the drawing will show that Enterlock is a simple refinement of lumber manufacture. It is a practical, machine-made application of the hand-made



"Enterlocking" lumber

mortise and tenon methods of the old time master builders who built for strength. High cost of labor and lack of skilled mechanics make it too costly to do such high class work by hand.



"We have overcome the difficulty and are producing by special machinery at the saw mills a standardized, mortised and tenoned, cut-to-length lumber for any size or shape of house. Enterlock is a ready-to-use, finished lumber with all the defects cut out, waste cut out, saving freight, labor and nails and giving a stronger building for less money than in the case of common

lumber.

"We can furnish the sills, joists, plates, studd, ceiling joist rafters and ridgeboards accurately mortised and tenoned to 'Enterlock' and self centering. Flooring, siding, ceiling, wall sheeting and roof sheeting are cut to our standardized multiple lengths in any grade of lumber."

The manufacturer has "standardized"

construction only in the sense that he has reduced the number of sizes (cross-section) of lumber to be used in any house to about 12. Plans of houses are not standardized, and he will cut lumber and prepare it for framing according to his method for any house plan submitted. The manufacture of "Enterlock" lumber is the E. A. Laughlin Lumber Co., Port Arthur, Tex.

Announcements and Publications

Contractors and Builders Accessories, Bulletin No. 100-R, issued by the Empire Tank Works, East Rochester, N. Y., illustrates and describes steel mortar boxes, mortar boards, veneer ties, tanks of various types, and a great variety of accessories in which superior contrivance and economy is shown.

Efflorescence Proofing, Waterproofing and Dampproofing—Properties of the products manufactured by the Arvon Company, Heed Building, Philadelphia, Pa., are described in leaflets issued by that concern, with specifications for special treatments.

Samples and Literature Wanted—T. M. Bryan, Architect, Gainesville, Fla., announces that he has opened a branch office at Magnolia Avenue, Eustis, Fla., with Ray Littlefield in charge and requests samples and literature to be sent to the new branch.

Fundamentals of Economical Plumbing, being suggestions made in June, 1921, to Secretary Hoover's National Building Code Committee in the Interest of the Betterment of the Housing Situation, has been issued in magazine reprint form by the author, Wm. Paul Gerhard, C. E. & Dr. Eng., consulting sanitary engineer, 17 West 42nd street, New York City. Also, by the same author, a monograph on "Sanitation and Sewage Disposal for Farmsteads and Country Estates." Price 30 cents each.

"Hollow Tile Construction," by J. J. Cosgrove, 202 pp.; 6¾x4½; \$2.50. U. P. C. Book Co., Inc., 243 West 39th St., New York City. So far most of the literature available on hollow tile construction has been that issued by the various manufacturers of the product. In this book, the author has aimed to accumulate, unify and simplify such information as will be a guide to practical construction. There is included information, with illustrations, on the several types of block; the various methods of construction; building details, rules and data to assist the estimator in calculating cost; and the last chapter gives photographic reproductions and sketch plans of fifteen typical hollow tile houses.

"Details of Cabinet Construction" is another of the Woodworker Series published by J. B. Lippincott Company, Washington

Square, Philadelphia, Pa.; 202 pp.; 5x7½. Illustrated. Indexed; \$1.50 a copy. The Foreword in this edition explains the purpose of the book so clearly that we quote it verbatim: "Books on general cabinet construction, however excellent when examples similar to those illustrated are being made, do not always help the worker who is engaged on a piece of work different in character. On the other hand, an instructive volume on the setting out and making of joints, whilst essential to every woodworker, necessarily deals with joints alone and cannot pretend to encroach on the general constructive work. Here the author's aim has been to deal specifically with the separate and distinct detail parts which go to make up pieces of ordinary furniture, and to treat each detail in a way that will guide the reader through its construction in any style and in any size. . . . The details, moreover, cover large furniture as well as small, ornamental as well as plain, and the directions—it is hoped—will thus be of service alike to the advanced craftsman and to the comparatively inexperienced reader."

"Edwards' Lightning Wage Calculator" is well described by its title. It consists of eight sets of tables, compiled carefully and checked and rechecked by expert mathematicians, covering almost every possible phase of wage rates. It was originally intended to give merely the calculations worked on an hourly basis from 10 cents to \$1, so as to help the building contractor in figuring up his payroll, but as the work went on and the possibilities of its breadth of application became apparent it was extended for use in all lines of work, no matter what basis of payment is used. Table II is believed to be absolutely original with the author and not to be found anywhere outside of this book. The groups of tables are as follows: I. Hourly Wages—1 to 60 hours from 10 cents to \$1.50. II. Rates Per Hour on Weekly Basis—36 to 60 hour week from \$50 to \$103. III. Daily Wages on Hourly Basis for Eight Hours. IV. Daily Wages on Hourly Basis for Nine Hours. V. Daily Wages on Hourly Basis for Ten Hours. VI. Weekly Wages on Six-Day Basis. VII. Weekly Wages on Seven-Day Basis. VIII. Rates Per Day on a Monthly Basis. The book is published by the U. P. C. Book Co., Inc., 243 West 39th Street, New York City, and retails at \$2 a copy.

"Land Drainage for Farmers, Land owners and Students in General Agriculture," by W. L. Powers and T. A. B. Teeter; viii+270 pp.; 5¾x8½; 106 figures cloth; \$2.75. Published by John Wiley & Sons, Inc., 432 Fourth Avenue, New York City. This book is intended, first, as a text book for students of general agriculture or agricultural engineering; second, as a reference book for practical farmers; third, as an aid to owners of wet, overflowed, marsh, swamp or alkaline land who desire to improve their holdings. In drainage is considered as a means of reclaiming additional areas and of making wet lands more productive. The information presented in this book has been gathered by the authors in the Corn Belt State and in the West, where their work has led them. The contents are grouped under four main heads, Field Drainage, District Drainage, Special Drainage Problems, and Drainage Surveying. Review questions and general references are included at the end of each chapter, while the Appendix offers a series of laboratory problems for the student. In addition to the 106 figures and photographs there are more than 20 tables shown.

"Homes of Moderate Size," 160 pp. 9x12; 300 figures. This substantial and well-bound volume contains a collection of photos and sketch plans of modern suburban and country houses selected from the work of Kenneth W. Danzell. Most of the houses illustrated have been built in and around Maplewood, N. J. The colonial type predominates, though a number of English and Spanish styles are shown. The houses range in size from six to nine rooms and are of convenient and often unique arrangement. Glassed-in sunrooms are almost universal; and many designs show the garage as a part of the house plan. Photographs of the exterior are given, many of them full page, and some interior photographs appear. Sketch plans accompany each design, with a brief, clear description of the arrangement of the rooms, the interior finish, the general scheme of decoration, and in some cases the important features of the house site. The book is conservative, substantial, and offers valuable suggestions to the designer of homes. The U. P. C. Book Company, Inc., are the publishers, and the price is \$4 a copy.



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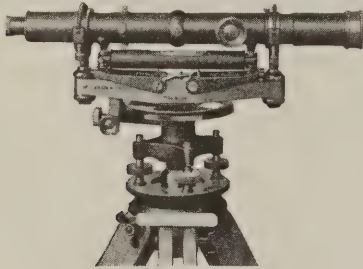
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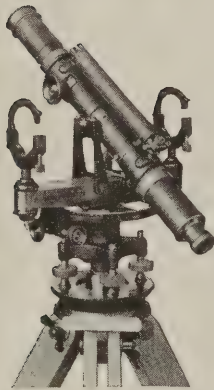
New Devices, Methods and Improvements in the Building Industry

A New Convertible Level and Transit

A NEW level combining two instruments in one and convertible from a level to a transit without the use of detachable parts, has been introduced by the Warren-



As a level



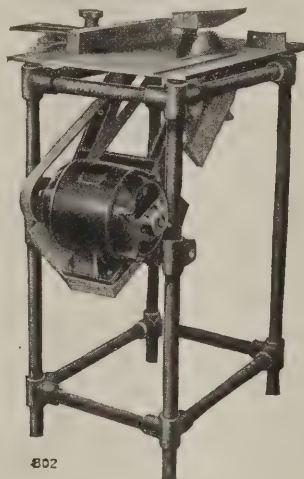
Change to a transit

Knight Co., 136 N. Twelfth street, Philadelphia, Pa. The numerous points of improvement specified in the description of this development are indicated in the illustrations herewith. A complete and fully illustrated description will be furnished by the company on request.

A Small Saw-Table

A LIGHT weight, strong, small saw-table, with tubular steel legs cast into corner fittings, making an inseparable rigid frame with steel top attached is now on the market. The frame supports the swinging arm of the saw mandrel. It is interchangeable for belt or motor drive without extra parts except the wood base for motor. The saw may be raised or lowered and held in any position by a positive clamp; a handle is provided for raising or lowering the arm. A slot is planed in the table for a cut-off gauge supplied with each machine and which can be set at any angle, right or left, for miter work. A ripping gauge is provided

opening $8\frac{1}{2}$ in. from the saw, held in any position by a quick-acting clamp, and adjustable for alignment with saw and quickly removable for cut-off work. A safety guard and splitter and guard are provided. The saw is guarded both above and below the table. The machine can be moved by two men and carried from floor to floor on repair work or new jobs. Table

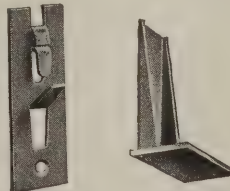


802

is 18 to 24 in.; height from floor 36 in. Net weight with countershaft, 170 lbs. Recommended motor drive half h.p. Description is quoted from the announcement of the American Saw Mill Machinery Co., Hackettstown, N. J.

"Tape Hook" on Spring Sash Balance

IMPROVEMENTS in spring sash balances have been placed on the market by the Pullman Manufacturing Company, Rochester, N. Y., offering economies in

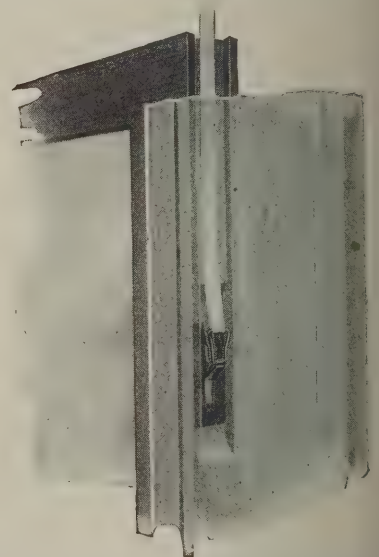


The spring may be controlled by an ordinary nail in the exposed slot in the revolving drum, or by using the special wedge in the tape slot

time, material, and labor. These consist among other features in complete housing of all moving parts, nothing being left to rub on the woodwork and the danger of squeezing the balance in a tight mortise



The tape hook has an angle projection, which placed in the sash engages the loop of the tape and a sharp pressure on the tape causes the loop to bend into place on the hook (Fig. 2).



Disengagement of the hook is obtained by slowly lowering the tape until it leaves the hook. (See Fig. 3)

is eliminated. The weight of the sash is not estimated but by actual weighing, and a table of units of sash balances indicates the type to use. The face plates are standardized and designed for convenience in cutting mortises. The tape hook improvement illustrated shows how the tapes may be readily connected and disconnected. The new sash balance is adaptable to side or head installations.

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NATIONAL BUILDER

Volume 65

CHICAGO, JUNE, 1922

Number 6

The Situation

THE American Construction Council is one of the developments in the construction industry during the past month. A group of men representing most of the national organizations of contractors, building supply dealers, and professional associations met in Cleveland, Ohio, April 28 and 29 and started a new national organization designed to be so comprehensive that it will include every interest in the construction industry.

The ten various factors comprising the construction industry are recognized as follows: (1) architects; (2) engineers; (3) general contractors; (4) sub-contractors; (5) construction labor; (6) material and equipment manufacturers; (7) material and equipment dealers; (8) financial, bond, insurance and real estate organizations; (9) public utility construction departments; (10) representatives of federal, state, county and municipal bureaus or departments concerned with construction.

The objects of the new organization are given thus: "(1) To consider subjects affecting the general welfare of the construction industry and the service which it should render to the public; (2) to establish the standards and principles which should govern the construction industry; (3) to provide a medium for co-operative action among the several groups in the construction industry."

It is said that Franklin D. Roosevelt, former assistant secretary of the United States Navy Department, has accepted the chairmanship of this new American Engineering Council, and that "he will be to the construction industry what Judge Landis is to baseball."

It is not altogether clear that the construction industry needs a dictator or will profit much from one. The service it should render the public is to build honestly and efficiently; the standards and principles that should govern the industry are not any different than those that should govern any industry, business or individual—the fundamental principle is "Honesty is the best policy"; and there is only one standard of integrity. That the new organization will provide a medium of co-operative action among the several groups is to be hoped for; but that it will be doubtful.

April a Record Month

The interesting thing about the building situation in April was the quite appreciable increase in commercial building over the previous month. Residential building still leads all other kinds—being nearly double the value of its nearest competitor, public works and utilities. However, the increase in commercial building is significant because it shows the acceptance of present prices and conditions by business men as fairly stable. The value of construction work started during the month of April amounted to nearly a third of a billion dollars (\$317,700,000), breaking all previous monthly records, according to the F. W. Dodge Co. The work in prospect was a half a billion more.

The biggest increases were in the northeastern states. Later returns for this district, for the month of May, show that there are recent signs of a let-up, caused, it is claimed, by a tendency on the part of building material producers and dealers to increase prices in proportion to the rising demand.

Most economists contend that while the prices of building materials are down about as low as they will go for some time, there is not very much excuse for increasing prices again, except in the case of a few commodities like steel which were reduced in 1921 below the average of all other commodities. Wages in the steel industry, too, were cut to the bone, and now the prospect, with lessening unemployment, is that they will be raised to somewhere near wages in other industries. The fact remains, however, that the coal strike continues unsettled and manufacturers of building material must face a possibility of a coal shortage and subsequent high prices of fuel, as well as a car shortage and trouble in shipping their output, as the season advances. These are factors which may justify a sane business man in adding a margin of safety to his present prices.

In the New York metropolitan district, where the building activity seems to be swinging from residential to commercial building, the last few weeks have seen considerable increase in the prices of cement

and brick—the two big fuel-consuming industries. Common brick are now quoted at around \$20 and cement at \$2.10 net (to dealers).

Orders for lumber in nearly all sections now equal or exceed current production; consequently prices in a number of instances show a tendency to advance, particularly in the Northwest. Production for the first 18 weeks of this year, for the country as a whole, was about one-third more than for the same period in 1921.

Rents and building costs are still high, as compared with food and other necessities and the average family income. Nevertheless the automobile industry showed considerable revival in April. Evidently there is plenty of money available to a large middle class. It is difficult to see how rents can decline with present building costs maintained, and not see a quick end to present speculative housing construction. It is said rents in Chicago are receding.

The labor situation is clearing in most of the large cities with little prospect of further radical wage reductions in the building trades. In Chicago the three alleged leaders of the outlawed building trades are under indictment for bombings and the murder of two policemen. While the Landis award forms the basis of building wages for most of the building done in the city, it is said to serve now merely as a minimum basis and that builders are resorting to bonuses and other forms of inducement to attract and keep good workmen. From many sources comes reports of a nationwide shortage of skilled building mechanics. Carpenters in St. Louis were recently awarded \$1.10 per hour.

Builders must keep alive to ever-changing conditions. A recent dispatch from Baltimore quotes a real estate operator as saying: "Apartment house rentals have declined from 15 to 20 per cent in the last six or seven months, but we have a greater demand for small dwellings than supply.

"We haven't enough two-story houses to supply the demand. These houses used to rent for \$25 to \$30. Now they rent for \$40, \$50 and even \$60, and are readily rented at these prices. They are taken almost as soon as they are vacant or completed."

City Planning Pays Profits

The McNaghtens, Father and Sons, of Hutchinson, Kansas, Prove That Landscaping Real Estate Developments Adds Prestige and Profit to Their Reputation as Home Builders

"THE policy of our firm," said John C. McNaghten, Sr., treasurer and manager of the Suburban Investment Co., Hutchinson, Kans., "is based on the conviction that its business will increase in proportion to its usefulness to the community, and that all efforts and money spent in making Hutchinson a better town to live in will be well spent and will react to the benefit of the company."

inson and had a vision of its future. As far as we can learn, their only visible asset was a second-hand bicycle. They rented a little office room in the building where Jones' shoe store is now located and started a real estate business." From such a beginning has grown a business that deals in most every form of real estate work with a total capitalization and surplus of \$400,000. The work is divided among three sepa-

The entire organization of companies each supplementing and co-operating the other, forms one of the most practical systems of town development in this country. Each has its particular place in the ground planning, building, financing, insuring and disposition of real estate properties.

These three companies require an office force of 30 people. Each department is headed by a man who is a specialist in the



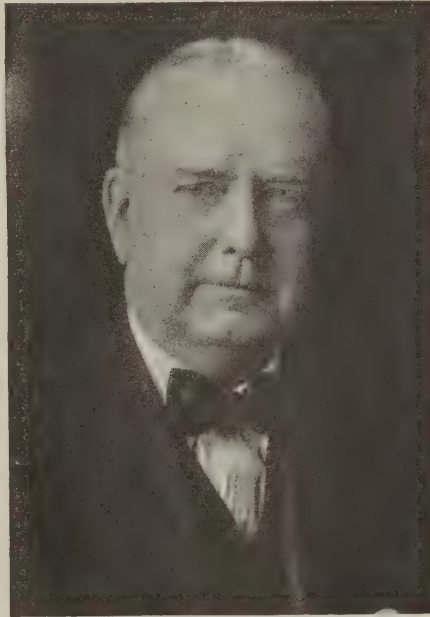
Edw. W. McNaghten

The man who spoke these words was for several years a prominent builder on the west coast—Seattle and Portland. He specialized in bungalows and small homes. With his progressive western ideas and methods, with his two sons, he has perhaps done more to put Hutchinson on the map, literally, than any other agency in that live Kansas city.

Liberal Policy Pays

That the policy outlined by Mr. McNaghten pays dividends is best evidenced by a short resume of the development of the organization.

In 1908, Ed W. McNaghten and Charles McNaghten started an insurance agency in Hutchinson. A business associate describes the start as follows: "Fourteen years ago this spring two boys, in their early 20's, came to Hutchinson. They started in business here because they believed in Hutch-

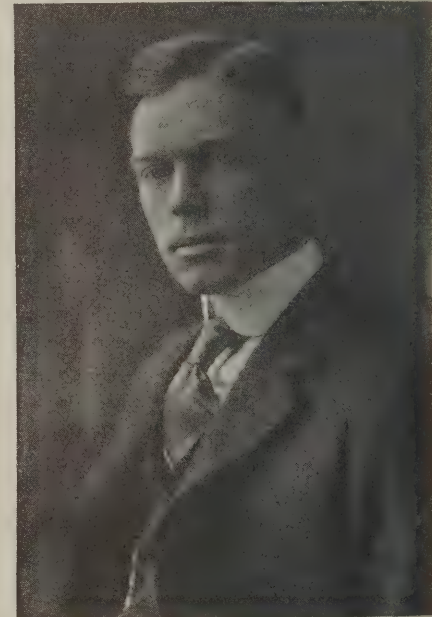


John C. McNaghten, Sr.

rate corporations, one of which is the McNaghten Investment Co., the original company, with a capital and surplus of \$125,000. This concern does a general brokerage real estate business, which amounted last year to over a million dollars in sales. Also subdivisions, suburban development, insurance, landscape and nursery departments are handled by this company.

The McNaghten Loan Co., with a capital and surplus of \$95,000, handles real estate loans of all kinds, represents the building and loan association and housing plan of the Metropolitan Life Insurance Co.

The Suburban Investment Co., with a capital of \$75,000, handles the building and architectural departments. It has built many homes and business buildings, averaging about a half a million dollars in construction per year. John C. McNaghten, Sr., is treasurer and manager of this company.



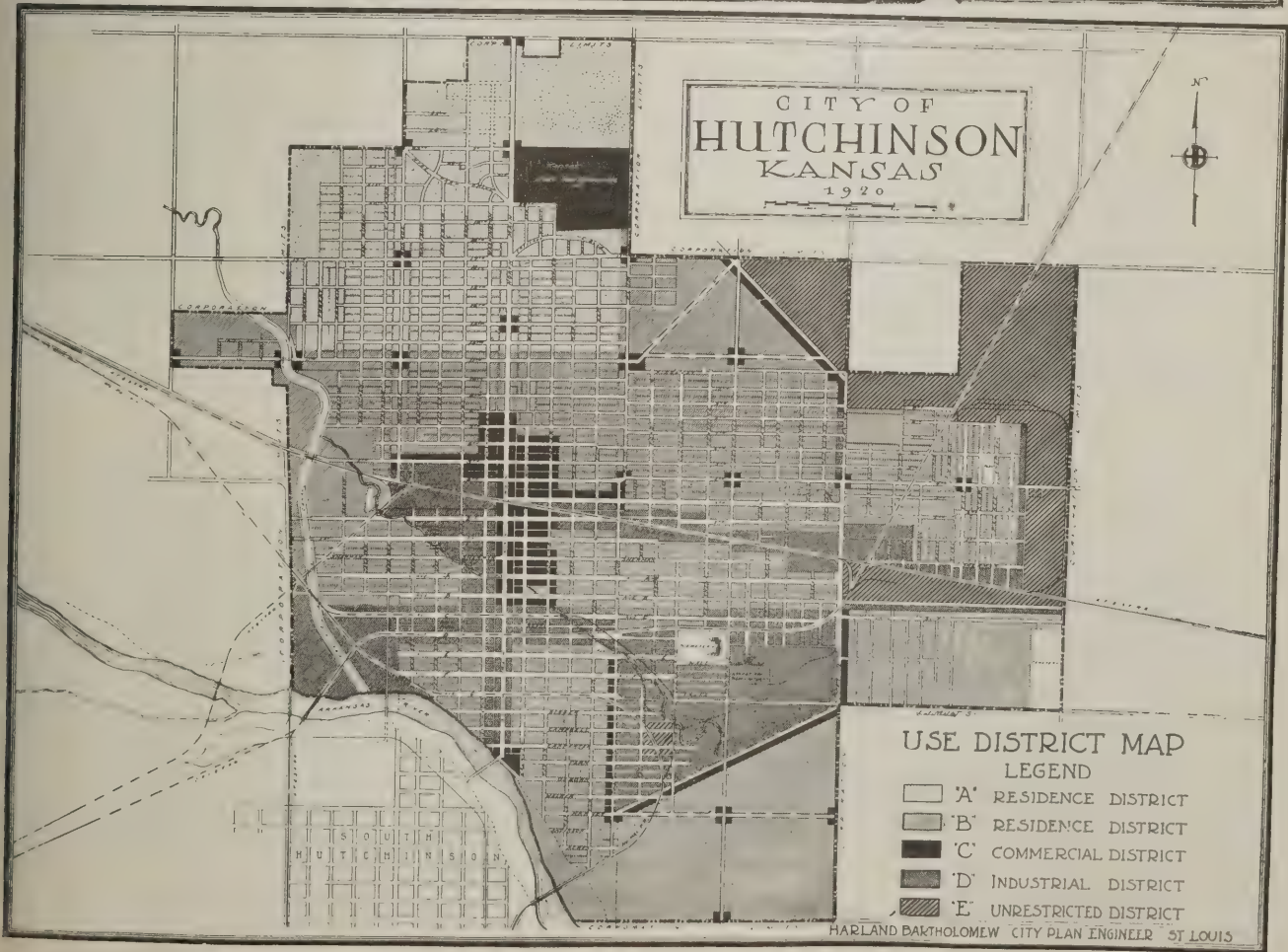
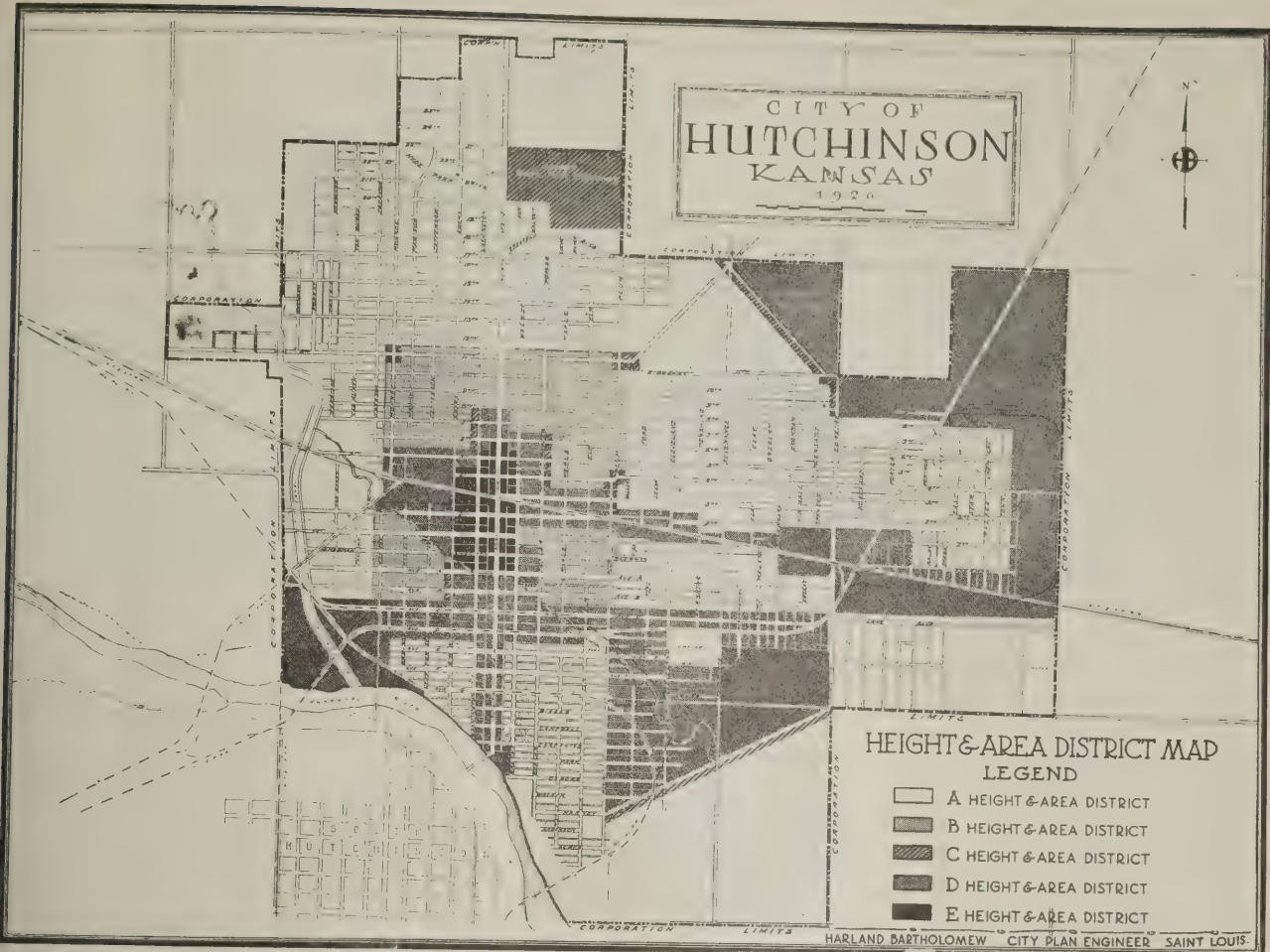
J. C. McNaghten, Jr.

line of work. This concern has developed very largely in recent years and has not decreased its force even during the past rather dull business year.

Hutchinson Has Basic City Plan

All progressive builders and realtor agree that a comprehensive city plan and zoning ordinances are essential to stable real estate values. It is one of the live topics of the day. Experts say these things can not be accomplished except through the co-operation of all interested in building. In Hutchinson, led by such progressive men as the McNaghtens, this co-operation is an accomplished fact.

Harland Bartholomew, city-plan engineer of St. Louis, Mo., made the basic city plan for Hutchinson in 1920. The city is still small one, as American cities go, and few changes of importance were made in its present street layout. The main streets are





Hollow-tile bungalow. Designed by John C. McNaghten, Sr., Hutchinson, Kan.

very broad and the city gives evidence of having been laid out systematically before any building was done. The city plan therefore dealt chiefly with beautifying the future city with parks and boulevards and well-planned additions.

The most important work of the city planner, from the builders' point of view, was the establishment of zoning areas for structures of various kinds. These zone maps are shown herewith, because they have of course a very important bearing on the character of real estate developments, such as the McNaghtens have undertaken.

The city ordinance adopting the zoning plan was passed December 7, 1921, and describes the characters of buildings in the residence zones as follows:

In the "A" Residence District no building or premises shall be used and no building shall be hereafter erected or altered unless otherwise provided in this ordinance, except for one or more of the following uses:

1. One Family Dwellings.
2. Churches and Temples.
3. Schools and Colleges.
4. Libraries.
5. Nurseries and Greenhouses.
6. Farming and Truck Gardening.
7. Accessory buildings incidental to the above uses and usually located on the same lot (not involving the conduct of a retail business) including one private garage, private stable or community garage when located not less than 50 ft. from the front lot line or in a fireproof compartment as a part of the main building, and including also home occupations engaged in by the occupants of a dwelling not involving the conduct of a retail business on the premises, and including the office of a physician.

In the "B" Residence District no building or premises shall be used and no building shall be hereafter erected or altered unless otherwise provided in this ordinance, except for one or more of the following uses:

1. Any use permitted in the "A" Residence District.
2. Tenement Houses.
3. Hotels.
4. Private Clubs and Fraternity Houses.

5. Boarding and Lodging Houses.
6. Institutions of an educational, philanthropic or eleemosynary nature.
7. Accessory buildings incidental to the above and usually located on the same lot, not involving the conduct of a retail business.

Working plans of this hollow-tile bungalow incorporating unusual special features are shown in the detachable insert in this issue.

Building Heights and Yard Dimensions

The following extracts from the ordinance relating to the height of residences and the necessary yard and court areas are valuable to all builders and developers in showing what are the conclusions regarding proper requirements, for a small city, in the opinion of a recognized national expert:

In the "A" Height and Area District the height of buildings, the minimum dimensions of yards and courts, the maximum percentage of lot occupancy and the maximum numbers of families per acre shall be as follows:

Height: No building hereafter erected shall exceed 35 ft. or 2½ stories.

Rear Yard: There shall be a rear yard having a depth of not less than 15 per cent of the depth of the lot, provided such rear yard shall not be less than 15 ft. and need not exceed 25 ft. in depth.

Side Yard: There shall be a side yard on each side of the lot of not less than 4 ft. in width, provided, however, that on a lot having a width of 25 ft. or less at the time of the adoption of this ordinance the width of a side yard shall not be less than 3 ft. A side yard shall in no case be less than 1 in. in width for each foot of building length.

Outer Court: An outer court shall be not less than 5 ft. nor less than 2½ in. wide for each foot of height of such court, nor less than 2½ in. wide



Front and side view of hollow-tile bungalow



Front view of hollow-tile bungalow

pancy and the maximum of families per acre shall be as follows:

Height: No building hereafter erected shall exceed 45 ft. or three stories.

Rear Yard: There shall be a rear yard having a depth of not less than 15 per cent of the depth of the lot, provided such rear yard shall not be less than 15 ft. and need not exceed 20 ft. in depth.

Side Yard: There shall be a side yard on each side of the lot of not less than 4 ft. in width, provided, however, that on a lot having a width of 25 ft. or less at the time of the adoption of this ordinance the width of a side yard shall not be less than 3 ft. A side yard shall in no case be less than 1 in. in width for each foot of building length.

Outer Court: An outer court shall be not less than 5 ft. nor less than $2\frac{1}{2}$ in. wide for each foot of height of such court, nor less than $2\frac{1}{2}$ in. wide for each foot of length of such court from the closed end.

Inner Court: An inner court shall have a width of not less than 6 ft., nor less than $2\frac{1}{2}$ in. wide for each foot of height of such court, nor shall its area be less than twice the square of its required least dimension.

Setback: There shall be a setback of not less than 20 ft. Where a new building is erected near existing buildings which have setbacks greater than 20 ft., the new building shall set back a distance equal to the average setback of the buildings within 100 ft. on either side.

Lot Occupancy: No building with its accessory buildings shall occupy in excess of 60 per cent of an interior lot, nor in excess of 70 per cent of a corner lot. No dwelling shall hereafter be erected or altered to accommodate nor make provision for more than 18 families on any acre of land, nor make provision for more than a proportional number of families on any fractional part of an acre of land. The maximum number of families which may hereafter be housed on any plot of ground

for each foot of length of such court from the closed end.

Inner Court: An inner court shall have a width of not less than 6 ft. nor less than $2\frac{1}{2}$ in. wide for each foot of height of such court, nor shall its area be less than twice the square of its required least dimension.

Setback: There shall be a setback of not less than 20 ft. Where a new building is erected near existing buildings which have setbacks greater than 20 ft., the new building shall set back a distance equal to the average setback of the buildings within 100 ft. on either side.

Lot Occupancy: No building with its accessory buildings shall occupy in excess of 40 per cent of

an interior lot, nor in excess of 50 per cent of a corner lot. No dwelling shall hereafter be erected or altered to accommodate nor make provision for more than ten families on any acre of land, nor make provision for more than a proportional number of families on any fractional part of an acre of land. The maximum number of families which may hereafter be housed on any plot of ground shall not exceed the integral number obtained by multiplying the acreage of such plot, exclusive of the area within street lines, by ten.

Section 11:—"B" Height and Area District

In the "B" Height and Area District the height of buildings, the minimum dimensions of yards and courts, the maximum percentage of lot occu-



Typical residences built by the Suburban Investment Company in the Farmington Park section, Hutchinson, Kan.



Farmington Park Development, Hutchinson, Kan.

shall not exceed the integral number obtained by multiplying the acreage of such plot, exclusive of the area within street lines, by eighteen.

City Builders Are Forward Looking

"The whole city plan of Hutchinson is built upon the concept of a larger and

more populous urban community," says L. D. Tilden, the engineer in direct charge of the city plan under Mr. Bartholomew. "The street system, street car lines, pleasure grounds, railroad facilities, industrial and residential zones are planned primarily

as a guide by which the building of this larger community may be directed. Hutchinson is not yet large enough to be oppressed by the errors and mistakes of the past. It is the city's good fortune to be anticipating rather than correcting. The



Elevations of a bungalow of the "aeroplane" type. See floor plans on next page

merit of this particular scheme which has just been drawn up for the city is in its far-sighted comprehension. If the men who are called upon from time to time to direct its execution will constantly follow the principles enunciated in the Hutchinson plan and keep the vision of the larger city in mind, the people of Hutchinson and their numerous wheat-growing neighbors will profit greatly. The state of Kansas, incidentally through having granted authority to cities to make plans for a better future growth, will also benefit. Hutchinson's pioneer work in this field should inspire the preparation of many city plans. No city is too small to profit by forethought."

The McNaghtens have been consistent believers in and boosters of the city plan. They find that it removes the gambling element from their business and insures the



satisfaction of their customers. The officers of the companies continuously study the city planning and development and make all their buildings and additions conform to the city plan. The use of the city plan and zoning maps is a valuable guide to their judgment in the development of various new tracts.

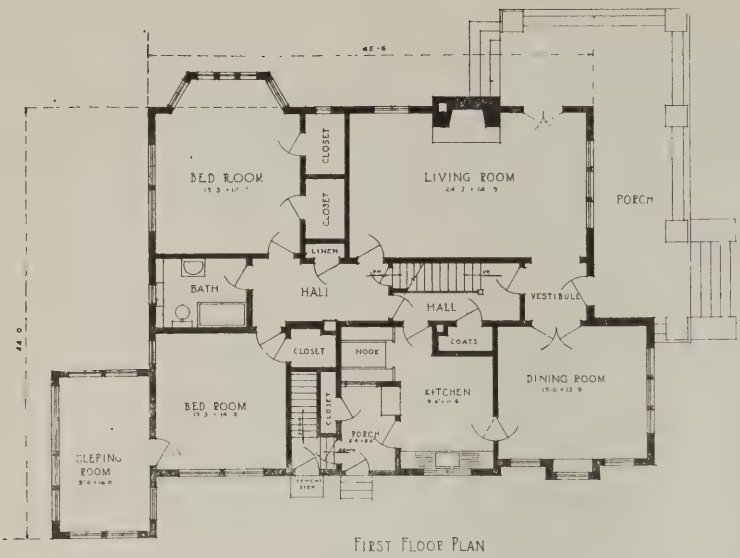
Some McNaghten Developments

The first development and building project of the McNaghtens was what is known as the Soda Ash addition, so named from its proximity to the soda ash works of the Solvay-Process Co. The next development was in the highest class residential section of Hutchinson known as Hyde Park. With the advent of the city plan the McNaghtens were the first developers to accept it in spirit as well as in the letter. In the development of their Farmington tract, illustrated herewith, they employed Hare and Hare, landscape architects, Kansas City, Mo.,

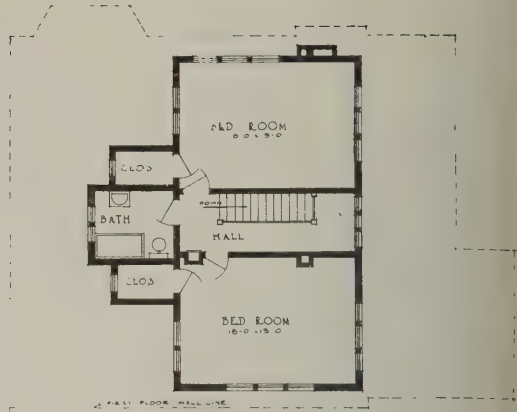
to make the layout so as to have it harmonize in every particular with the city plan.

The Farmington development contains 10 acres of park, playgrounds for children, tennis courts and a small lake. Lots sold from \$400 to \$1200 with building restrictions ranging from \$3000 to \$6000 houses.

The newest development is the Bungalow Colony. The two previous developments were in class A residential districts, but the Bungalow Colony is designed for the wage earner of the narrowest means. However, instead of packing these little houses on narrow lots in unattractive surroundings, the McNaghtens spent the same trouble, energy and money on the development plan as on the highest class residential work. In this case Mr. Bartholomew himself was employed to make the development plan. Possibly it is the only case on record of a builder employing a city planner of the calibre of Mr. Bartholomew to lay out lots,



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Floor plans of "aeroplane" bungalow

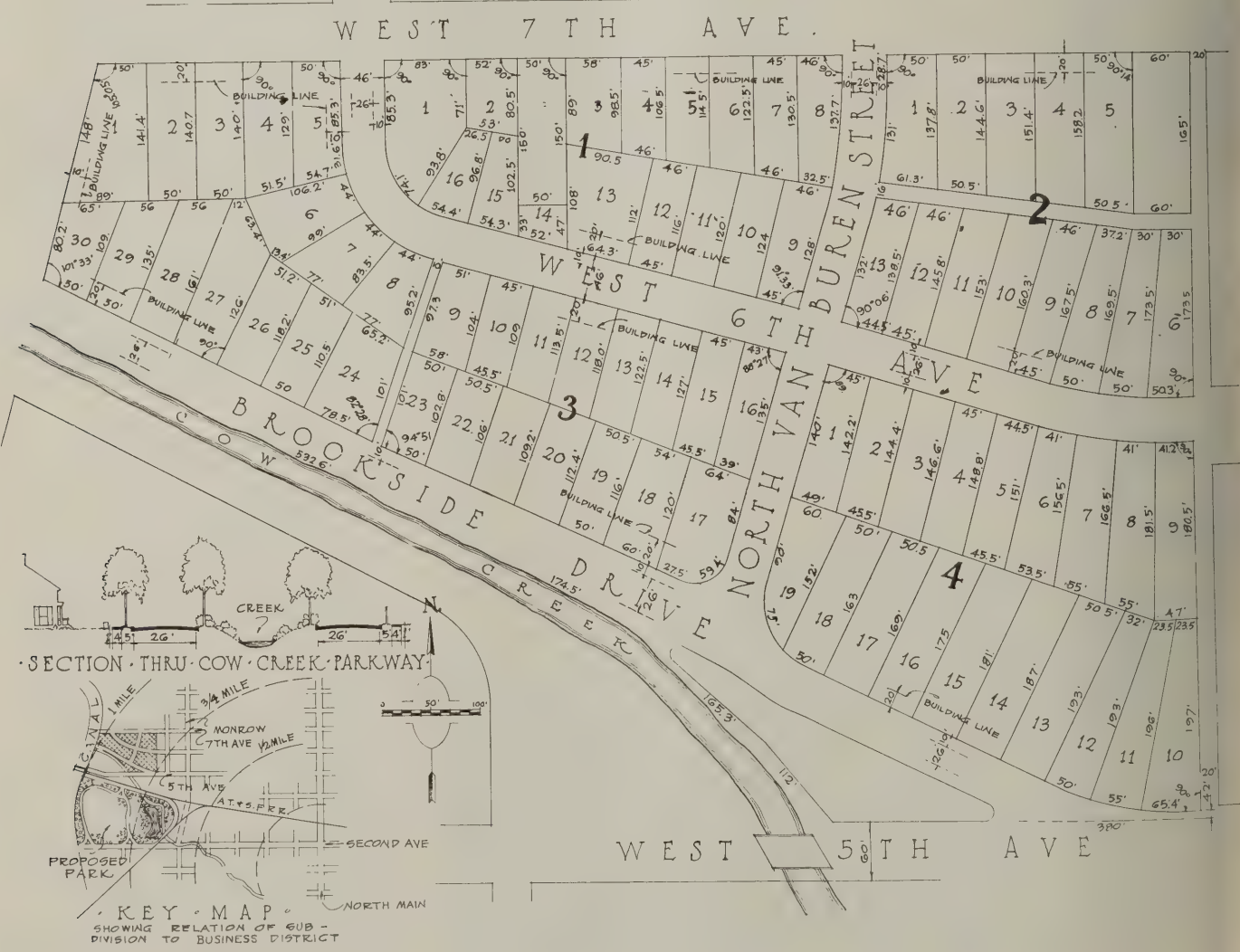
the average price of which was at the start about \$400, to be built up with houses to cost as little as \$1500. This development, too, has its park, its boulevard and its beautified water course.

When asked why such high class talent was employed to develop a colony of small

cottages Mr. McNaghten, Sr., replied: "The best is always the cheapest." In every addition the company has given title to the public on a neighborhood park and has presented these absolutely free to the city fully landscaped, and there are no "Keep off the grass" signs in sight yet.

Building Work

As already outlined, the work of the three McNaghten companies merge into one another and all are conducted in the same office, so that for operating purposes they may be considered as a single organization with the following departments: Farm and



ranch sales, city sales, insurance, loans, building, accounting, nurseries.

The building department operates both as building contractor and as a speculative builder. The purchaser of a lot is of course under no obligations to engage the building department of the company to design or erect his house. Where he does so, however, he not only gets the benefit of a large and efficient building organization but the financial assistance of the company's loan department.

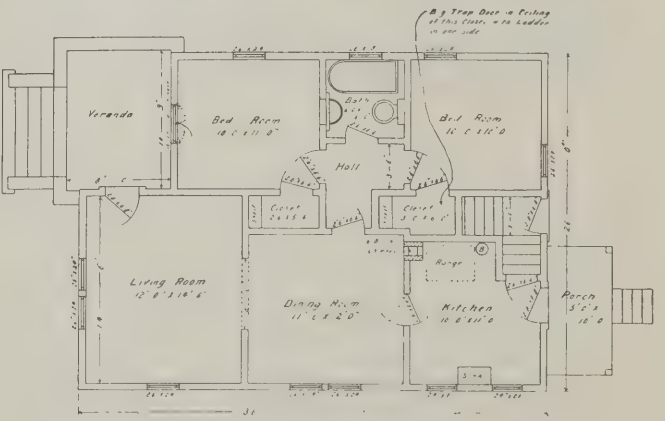
Three separate loan plans are available to purchasers of McNaghten lots: (1) The straight loan made for a term of years with interest payable semi-annually and all the principal due at the expiration of the term. With these the privilege is given of paying off \$100 or any multiple thereof on the principal at interest paying dates after a certain length of time. These loans are made at 8 per cent for a three-year term

with the option of paying all the loan off after three years. No loan of over \$5000 is made on this plan. (3) The Building and Loan Association plan which provides for a loan for a term of 75 or 107 months. Monthly payments of principal and interest are made like rent, with the privilege of paying any or all the principal on 30 days' notice. The interest rate varies with current conditions. Loans are made in this manner up to 50 per cent of the cost of the house and lot.

The building department of companies has its own architectural and construction staff. J. C. McNaghten, Sr., treasurer and manager, buys his lumber direct from the producer in 10 or 12-car lots. He buys his tile and brick direct from the producer and gets his cement at wholesale prices by special arrangement with his dealer. He operates his building work under open-shop conditions.

attractive. The dining room and living room may be combined in one very large room. The kitchen has a complete built-in cabinet, containing broom closets, paper chutes, flour bins and sink drain boards. A built-in breakfast nook completely equipped is included. The bed rooms and bath room have built-in linen closets.

The basement and foundation plan is particularly interesting and attention is especially called to the sectional drawing on the insert sheet. The building has a concrete foundation, but the cellar wall proper is built of hollow tile with their faces 2 ft. inside the concrete foundation wall. This leaves a space approximately 2 ft. in height and a shelf 2 ft. in width all around the interior of the cellar. The shelf is covered with a smooth concrete surfacing. The appearance of the cellar is pleasing and the large amount of shelf room provided is a godsend to the house-



Typical houses and plan in the "Bungalow Colony" of the Suburban Investment Company, Hutchinson, Kan.

with one-year prepayment option, or a five-year term with an 18-month prepayment option. (2) The Metropolitan Life Insurance Co. loan plan, made only on a new house built within the present year, the interest and 3 per cent of the principal being payable semi-annually, the loan to run for 15 years. By this plan 87 per cent of the principal is paid off during the term of the loan. The interest rate is 7 per cent,

The character of the building work he does is well illustrated by the house shown in the insert sheet of this issue of NATIONAL BUILDER. This is a hollow tile bungalow with Kellastone stucco finish. With a two-car hollow-tile stucco garage on a \$1000 lot Mr. McNaghten put a price of \$7500 on this house, which price he said included a "nice profit."

The floor plan is unusually compact and

wife for storing preserves and a very handy scheme for getting rid of garden rakes, hoes and other tools that are generally under foot. This construction also insures a cool, dry cellar.

Other examples of the McNaghtens' work are shown in less detail.

For completeness of service given, from city planning to financing, probably few builders even in the larger cities have any better organization.

Reinforced-Concrete Dormitory Erected by Student Labor

Cincinnati Structure Proves Average Boys Under Competent Supervision Speedily Become Fair Building Mechanics

IN this day when apprentice systems in the building trades is a live subject of discussion in the construction industry the fact

had a considerably better income than most of the members of the school faculty. In any event the school authorities decided that

the logical place to reduce costs was in the labor end of the job.

The building was designed by a capable



Architect's perspective of completed building: God's Bible School, Cincinnati, Ohio

seems to have been lost sight of that a considerable volume of modern building has little need of the so-called skilled trades. An interesting demonstration of this fact is the recent erection in Cincinnati, Ohio, of a six-story reinforced concrete building, containing 60,000 sq. ft. of floor area, almost wholly with labor supplied by inexperienced boy and young-men students.

Cincinnati has an institution known as God's Bible School for the training of evangelists, preachers and teachers of religion. Like many other religious institutions it has very little extra capital to spare and when it came to putting up a modern building to house the printing plant, offices, and furnish dormitory facilities the utmost economy was necessary.

The city was then in the throes of a building trades' labor controversy and wages were at the war peak. Very likely the average building trades laborer at current wages



Diagrammatic sketch showing method of construction

structural engineer and architect, Wm. E. Bodenstein, who used every effort to make the structure simple and easy of erection. Mr. Bodenstein also gave much of his own time to supervision of the job during erection.

A contract was entered into with the W. F. MacConnell Co., of Cincinnati, general contractors of large experience, to supply all the tools and erection equipment, simple working plans and expert supervision. The trustees of the school agreed to purchase all the materials and building equipment and supply the necessary labor. On account of the character of the institution the consent of the various building trades' unions was obtained and they agreed not to make trouble.



God's Bible School under construction, using student labor



Forms for roof in place, showing special type of shoring

Students as Builders

Except for a carpenter, a bricklayer and a power plant engineer, who was a regular employe of the school, virtually all the labor was furnished by the Bible students, working in half-day shifts during school terms and all day during the vacations. There were about 200 students in the school at the time and about 75 of these were working each week. They were paid wages, which were a material help toward paying their educational expenses, but these wages were about half the current union scale for building trade laborers.

With the occasional help of a skilled carpenter these students built and erected all the form work. They ran the concrete mixer and elevator, placed all the concrete, and in fact did all the construction work except the bricklaying. Before the end of the job a few became somewhat proficient in this operation. With the help of the

power-plant engineer the students installed the electrical and steam-heating systems and the simple plumbing.

Did a Good Job

Mr. MacConnell, who has had experience in construction work all over the world, is quoted as saying: "It is just as plumb and true a job of concrete construction as could be found anywhere in the United States in a six-story building. I have been watching the work from an experimental standpoint and have been surprised with the results obtained by the use of these students."

Of course great credit is due to the man responsible for supervising and instructing the students in their work. That man is W. F. Agness, an experienced foreman and building superintendent. A sample of the "simple" plans which the contractor used to guide and instruct his student labor is shown in an accompanying cut.

The building is a typical simple reinforced



Finished room, showing that columns and girders "line up"

concrete structure with no especially interesting details. Some of the details are shown herewith that the reader may appreciate the character of the labor performed by the students.

The floor system was constructed on what is known as the "dome" system. The "domes" are corrugated steel forms placed on the wood-form floors. They overlap slightly so that when laid end to end they form a continuous system of beam and slab or forms. A panel of metal lath fits in the bottom of the dome and these remain with their upturned edges embedded in the concrete beams. In the completed floor these metal lath panels span the open area between the bottoms of the floor beams and carry the plastered ceiling of the floor below. This system of form construction of course greatly facilitated the handling of the job with inexperienced labor.

The shoring under the concrete girders and floor beams was also of a simple type designed and patented by Mr. Agness and

ment. The material used was tile single wall 10 in. thick. We plastered all outside walls directly on the tile. The material company guaranteed the tile to be moisture proof and said we could use same in the way we did and get satisfactory results. Now every driving rain we get the

inside walls are wet and the tile company say too much lime was used in the mortar. The mortar was mixed of one barrel of white lime to which was added from 1½ to 2 sacks of portland cement. Now the question is, whose fault is this condition? Did we use sufficient cement in the mortar

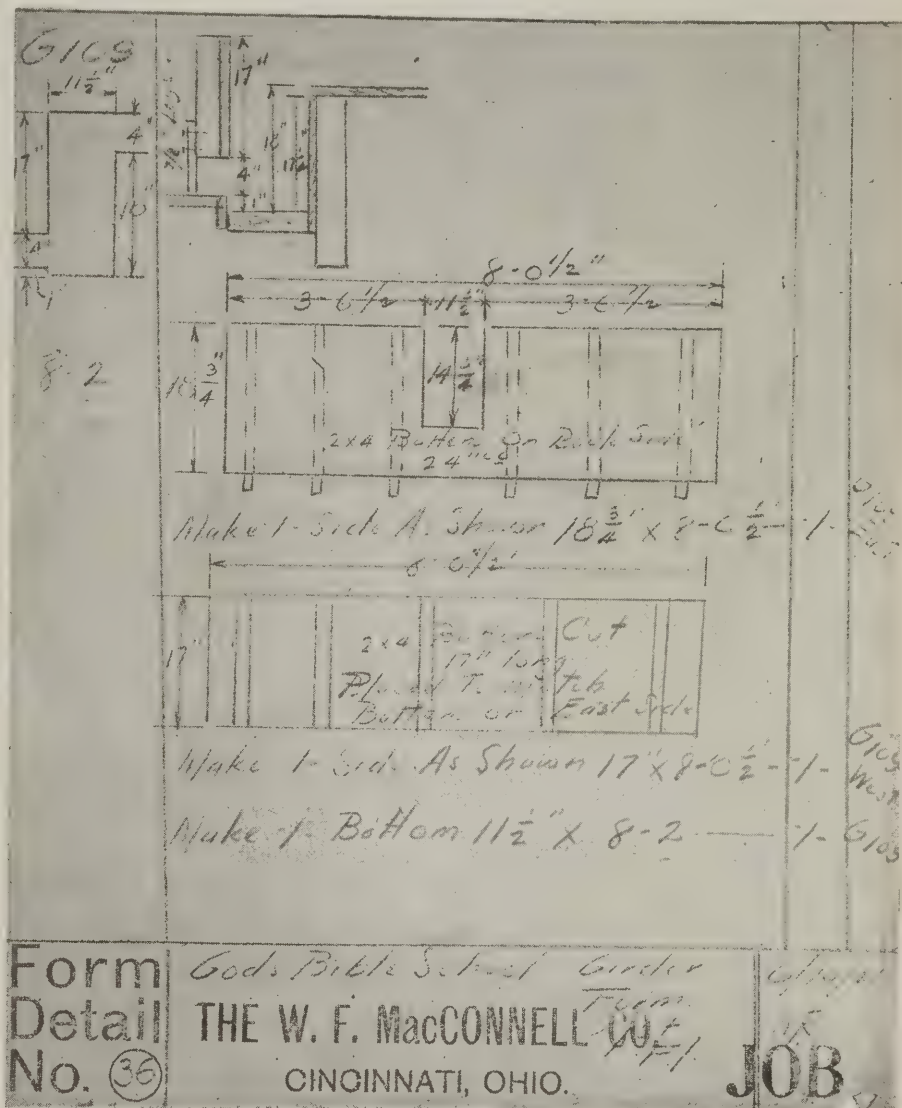


W. F. Agness, superintendent and student instructor

on this building for the first time. The doors are automatically released by knock-down a wedge. The work was carried through without serious accident or injury to any of the students. Altogether it furnishes a very interesting object lesson of how little skill is required of the so-called skilled building mechanics really need to have for the erection of many common-place buildings.

Tile Garage That Leaks

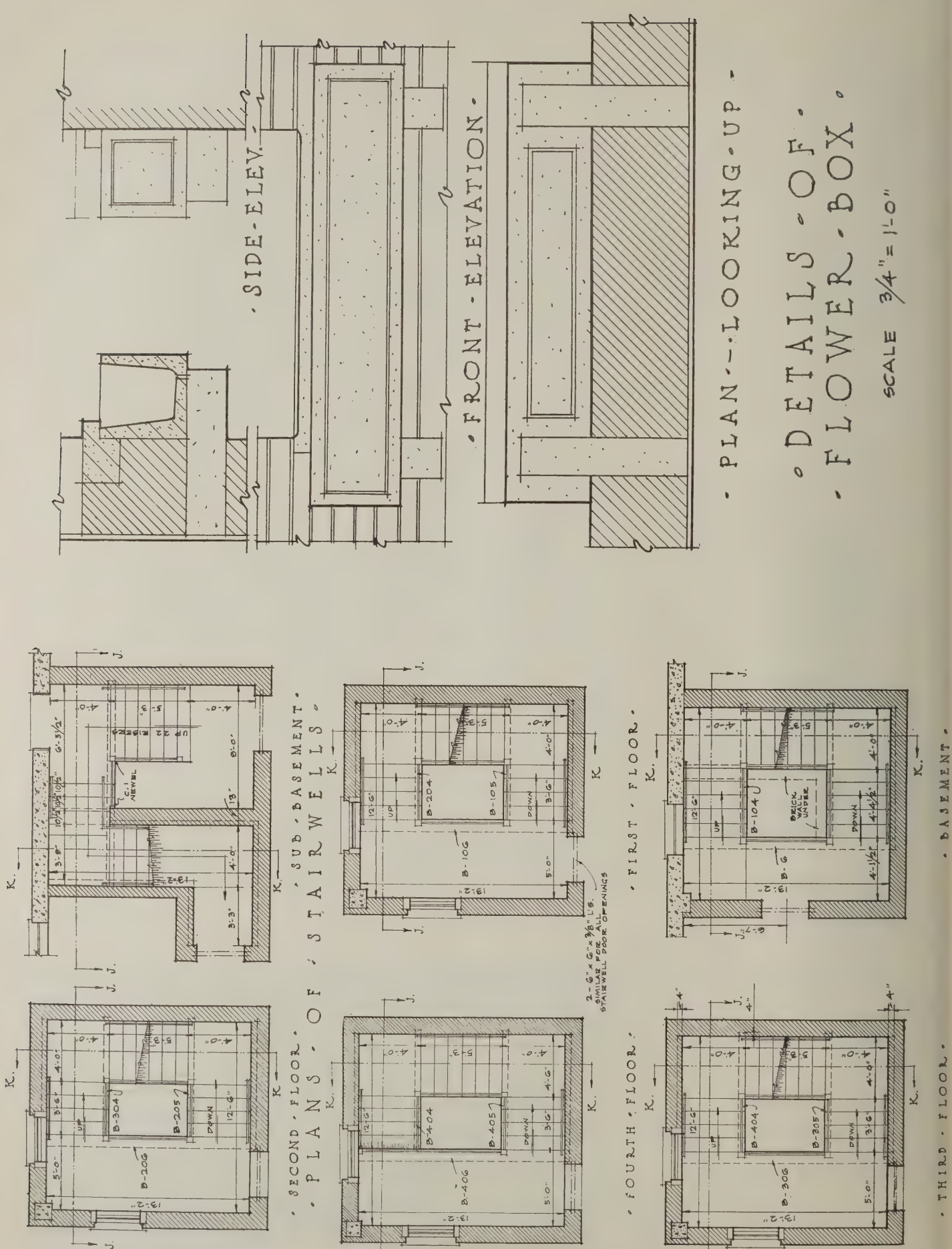
SOUTH Dakota contractor writes: "We have a condition here that is very peculiar, and would thank you for your opinion. We built a garage here this summer, the front part of which, downstairs, is used for show room and office. The upstairs for 30 ft. back is an apart-



Reproduction of "simple plan" made by superintendent for students' use



Steel "dome" forms for floor construction of God's Bible School



Detail plans of God's Bible School

to make a good job under ordinary conditions?"

The Portland Cement Association replies: "Paragraph 29 on page 12 of the booklet, *Recommended Practice for Portland Cement Stucco*, gives the proportions that should be used in portland cement mortar and stucco. The explanatory notes on page 13 give the reasons behind those recommendations. You will note that the volume of hydrated lime should not be greater

Engineer's Handbook:

"In storage warehouses and buildings of a similar nature, where no artificial heating is required, condensation can be almost eliminated by proper ventilation. . . . Power houses, paper mills, round-houses and similar structures with concrete roofs, however, are a class of buildings which require the best of insulation and ventilation to prevent condensation."

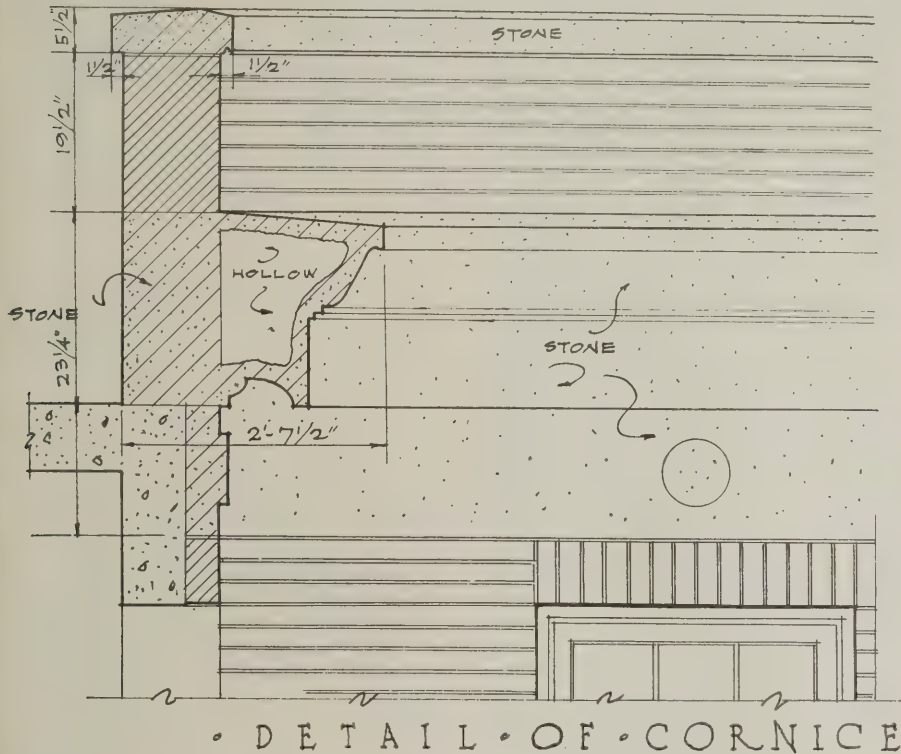
"The following paragraph is quoted from

page 614 of Hool & Johnson's *Handbook of Building Construction*:

"All masonry walls above grade that are to be plastered on the inside should be given a coat of damp proofing, so that the moisture will not come through and stain the plaster. This precaution is not so necessary if the walls are to be furred and lathed on the inside before being plastered."

"The following paragraph is quoted from page 41 of a booklet entitled *Hollow Tile for the Home*:

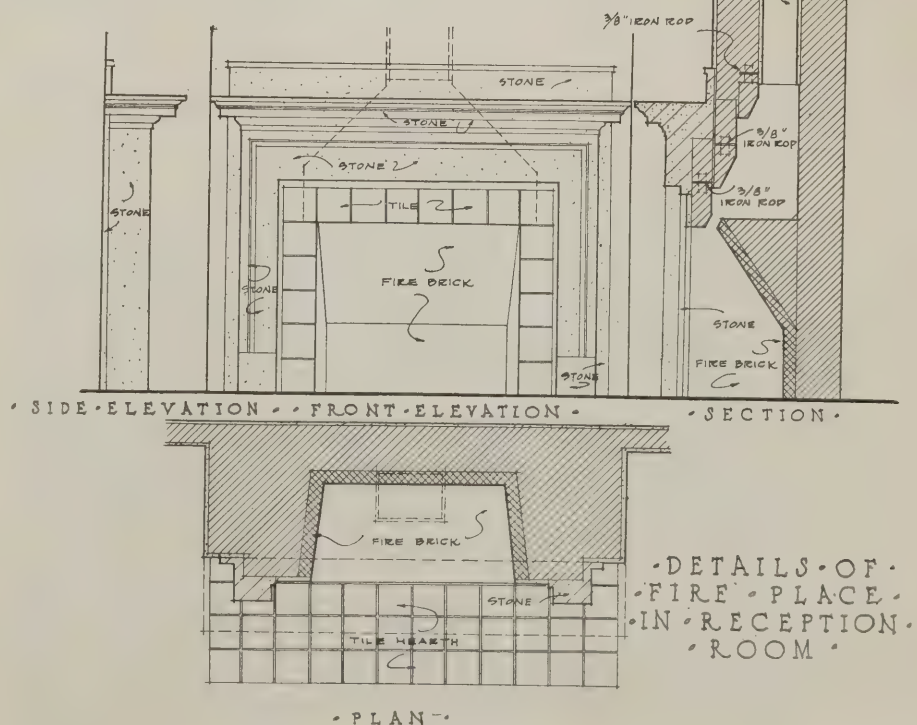
"While in the majority of hollow tile residences the stucco and inside plastering is applied directly to the tile wall, it is recommended, especially in northern parts of the country, that the tile be furred and lathed on the inside. This adds to the insulation and overcomes any possible faulty construction."



than one-fifth the volume of portland cement. Quite frequently moisture appearing on the inside of walls is not due to penetration of water from the exterior, but to condensation of moisture from the air because of the difference in temperature between the wall and the air in the room. That phenomenon is similar to the condensation of moisture on the outside of a glass of ice water in hot weather. To prevent such condensation, furring is often applied to the inside surface of the walls. Then lath is applied to the furring and the inside plaster is applied to the lath. The use of these furring strips provides an air space between the wall and the plaster, which acts as an insulating medium. The following paragraph is quoted from page 896 of Kidder's *Architect's and Builder's Pocket Book*:

"The outside walls of fireproof buildings are generally finished on the inside by plaster applied directly to the masonry. When the walls are of brick, it is often desirable to fur them so that there will be an air space between the plaster and the masonry to prevent the passage of water."

"The following paragraph is quoted from page 15 of Hool & Johnson's *Concrete*



Detail plans of God's Bible School

Distinctive Small Houses

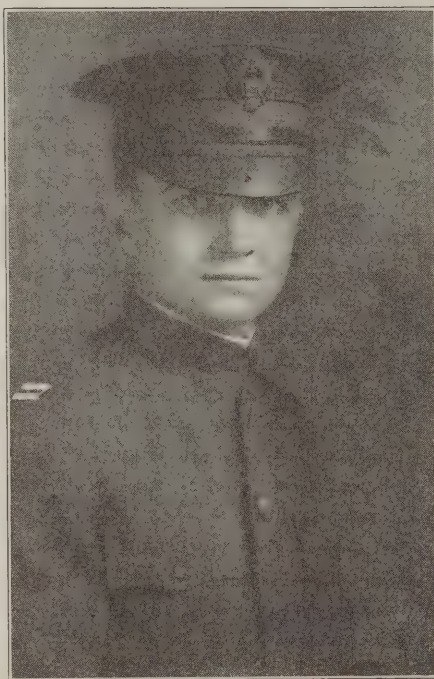
Bell Construction Company of Houston, Texas, Succeeds in Putting "Class" Into Homes of Very Modest Dimensions

EVERY builder will admit that one of the hardest things to accomplish is to put "class" or distinction into small houses, especially where they are built in groups. To build economically, simplicity of design and construction are absolutely essential; and most up-to-date builders now recognize that "gingerbread" decorations and details are bad taste, waste and poor investments. The distinction in appearance must come from really essential differences in design and not from meaningless exterior trimmings.

A young builder of Houston, Tex.—a very young man, in his early twenties—seems to have solved this problem very effectively. He is Charles C. Bell, Jr., whose father, Charles C. Bell, is a prominent lumberman of Booneville, Mo. During the war Mr. Bell served as one of the youngest, if not the youngest, captain in the army.

Mr. Bell is keenly alive to the necessity of keeping up-to-date. He has found out that houses have selling points that are just as important factors in the success of their builders, as are special features in automobile bodies, or any other manufactured products. The first essential is an attractive exterior and pleasant surroundings. Another is an interior tastefully

From these photographs and his notes a local architect works up plans for his next batch of houses—not slavishly copying from the houses shown, but incorporating



Charles C. Bell, Jr.

without the charge often made by architects that such builders as he *steal* their designs. He merely tries to *absorb* their best ideas for the use of his own architect, always viewing the new houses that he sees from the business attitude that automobile manufacturers view the new body designs of other manufacturers. The aspiration is to excell, not to copy.

The views and floor plans herewith are fair samples of the work Mr. Bell is doing in Houston. These little houses are built to sell at from \$6000 to \$7500. As building trade wages in Houston are still at top-notch figures these prices are probably a little above the average for similar houses in other more fortunate cities. Also all financing in Houston is on an 8 per cent basis which of course adds to the ultimate cost of a house.

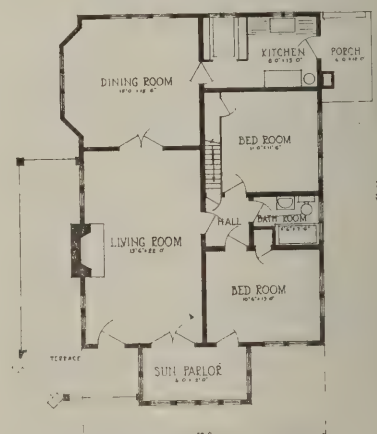
These houses are built to suit the home needs of families with incomes ranging from \$1800 to \$2500 per annum, which make up by far the largest group in all our big cities. They are built to sell for a modest cash payment down with monthly installments, the same as rent, which take care of a considerable part of both principal and interest in five years.

No Second Mortgage Financing

Aside from the attractiveness of these houses and the efficiency and skill shown in their design and construction the most in-



House No. 1



Floor plan of House No. 1

decorated and with up-to-the-minute built-in features.

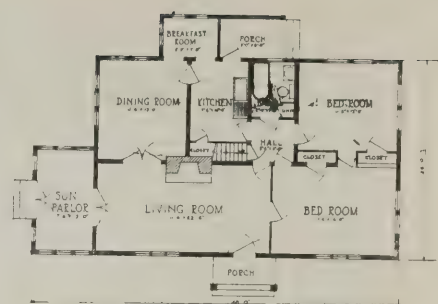
To keep up-to-date on his planning, Mr. Bell makes an annual pilgrimage to California. He comes back with an album of photographs and full of new enthusiasm.

ideas from many. Mr. Bell is much pleased with the new pictorial section of NATIONAL BUILDER because it serves the same purpose as an idea-gathering trip; and he believes many other builders can make use of such pictures as he does; and do it

interesting feature of the operations of the Bell Construction Co., is its system of finance. In the first place it buys the lots it is going to build on outright, so that house and lot go to the purchaser as an entity.



House No. 2—Front and side view



Floor plan of House No. 2

Construction Co.—goes to its banker and obtains its own loan for a 5-year period to the extent of 60 per cent of the face value of the collateral. This with the cash payment furnishes the necessary amount to finance the building operations.

The bank charges a 2 per cent commission for making the loan, but in return for this commission it makes all collections of interest or monthly installments from the makers of the individual notes, thus relieving the building organization of a large amount of foreign detail. These collections are credited to the builder's own loan from the bank. When this is paid off (60 per cent of the face value of the notes) the remaining indebtedness on the houses is so reduced that it can be readily converted into a first mortgage loan and taken up by the savings department of the bank or sold to an individual investor. Should a home purchaser go back on his monthly payments, the builder, of course, is called upon by the bank to furnish new security to cover this part of the collateral.

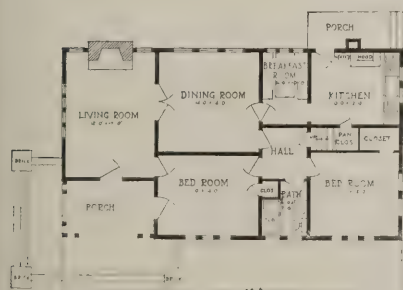
The 40 per cent of the building price not furnished by the bank represents the cash payment, the builder's profit and the part of his capital temporarily tied up. In order to work with banks in this manner a builder naturally has to give some proof of his own financial resources. He must



House No. 2—Front view. See also large illustration, page 33 of Style Sheet

Take the case of a \$6500 house as an example. The prospective purchaser is expected to make as large a cash payment, as he can, but there are no rules nor regu-

With a bunch of these notes as collateral, say \$100,000 worth, the builder—the Bell

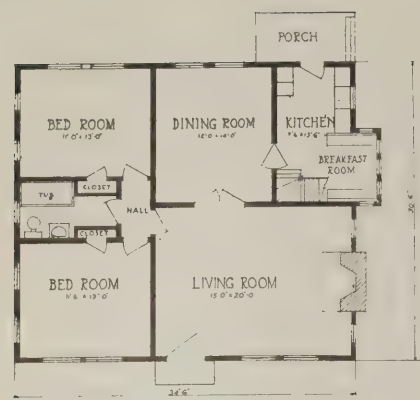


Floor plan of House No. 3

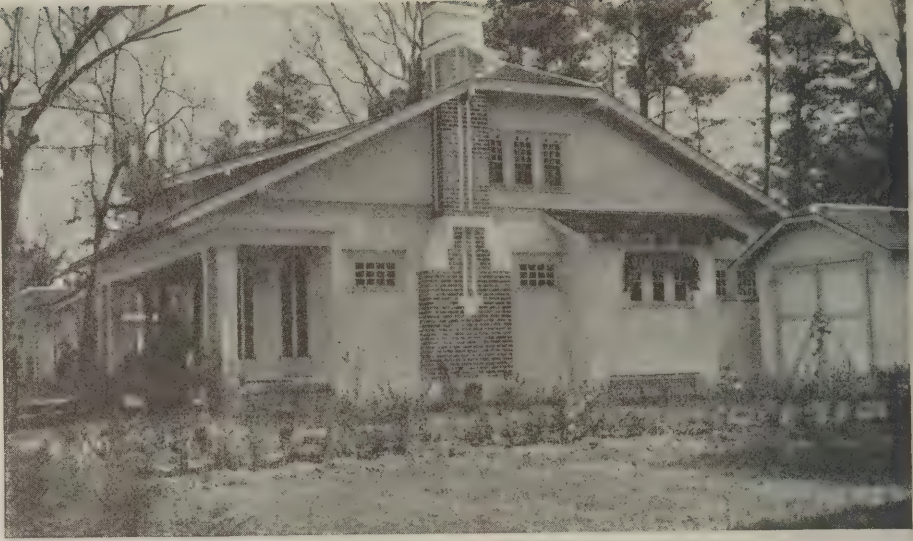
lations governing this amount. Suppose, for instance, it is \$1000. The balance of the payment \$5500, is made in the form of a single note, bearing interest at 8 per cent (the current rate in most Texas cities on all real estate loans).



House No. 3



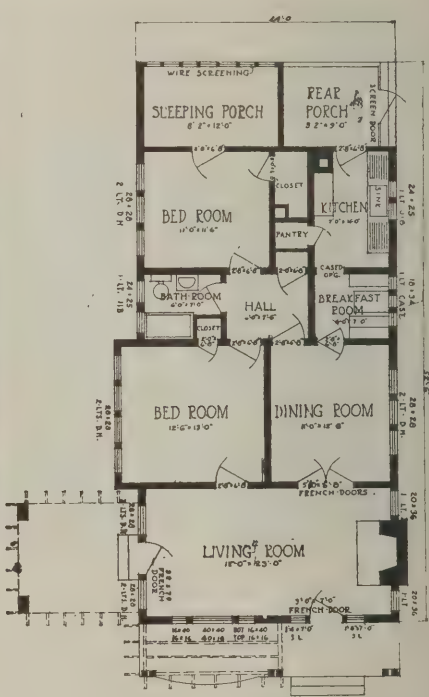
Floor plan of House No. 4



House No. 4—See also pages 33 and 34 of Style Sheet



House No. 5



Floor plan of House No. 5

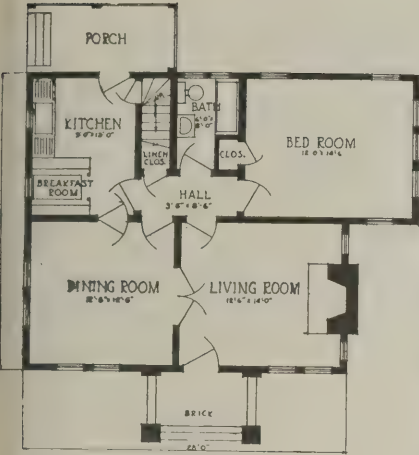
houses have to be good houses even at the expiration of five years. He has to have faith in his own houses because he may

not realize all his profit until the five years are up. Until the expiration of that time he is actually investing his own profits

in these houses at 8 per cent interest. There are no second mortgages in this scheme of operations and no commissions or discounts, except the 2 per cent charged by the bank in the first instance, and this is a legitimate charge since it covers all the overhead in connection with collections. The builder of course discounts the purchasers' notes the same amount. This, however, is much less than the customary brokerage commissions generally paid by house purchasers through building supply dealers in this and other Texas cities. To keep track of the monthly payments C. C. Bell, Sr., devised the blank form illustrated herewith. This form has since been adopted by other Texas builders quite extensively.



House No. 6C—See pages 34 and 35 of Style Sheet



Floor plans for Houses 6A, 6B,
6C and 6D

House No. 6D—See pages 34 and 35 of Style Sheet

RECORD SHEET OF MONTHLY PAYMENTS

Mr. _____

Lot _____ Block _____

Monthly Paym't

No. When Due When Paid

%

Interest Paid to Due Date

Date of Note

Principal

Apr.

May

June

July

Aug.

Sept.

Oct.

Nov.

Dec.

Jan.

Feb.

Mar.

Apr.

May

June

July

Aug.

Sept.

Oct.

Nov.

Dec.

No. When Due When Paid Interest Principal

Jan.

Feb.

Mar.

Apr.

May

June

July

Aug.

Sept.

Oct.

Nov.

Dec.

Jan.

Feb.

Mar.

Apr.

May

June

July

Aug.

Sept.

Oct.

Nov.

Dec.

Blank form devised by the Bell Construction Company to keep a record of monthly payments, and which has been copied extensively by other Texas builders

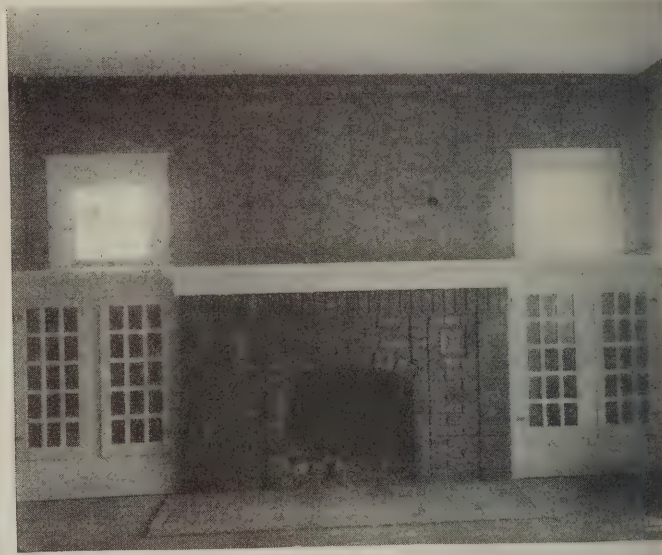
"Tells the World"

Incidentally the Bell Construction Co., does not believe in "hiding its light under a bushel." The view herewith showing one of the company's signs proves that. This sign, however, does not go with every job. In this particular case the company was invading a new section of the city where it has some live competitors to meet.

The sign invites home seekers to inspect the materials and workmanship going into a house under construction—not at all a bad selling argument when used in connection with the scheme of financing the building, as already outlined in the preceding notes of this article.



A billboard invitation to inspect the quality of material being used in the buildings under construction. Used by the Bell Construction Company in competitive districts



Typical arrangement of breakfast alcove and fireplace

To Avoid Unnecessary Cutting of Commercial Lumber

IN the manufacture of lumber, especially in the large mills that cut fir and pine, there is great advantage in having the lumber of uniform length. The most economical length to handle appears to be 16 ft.

In the stacking of lumber it is very necessary to have it of uniform lengths so that it can be properly held in place while drying. Even after the lumber is dry, ends of boards projecting from the pile will usually become checked and warped, and of little value.

On account of these and other reasons that might be mentioned, it is common to manufacture lumber in lengths which are multiples of 2 ft.; 12, 14 and 16 ft. being the ordinary standards. Shorter lengths may come in on account of the limited lengths of logs which it is economical to

take from the tree, or as a result of cutting off defects in the trimming. The shorter lengths are usually sold at the same price as the 14-ft. material, and although in reality it costs the manufacturer more to produce them, many of the consumers seem to be of the impression that they should obtain this material at a greatly reduced figure.

Lumber and timbers are produced in lengths greater than 14 or 16 ft., but such material usually commands a greater price.

In the designing of a house not infrequently the size of a room may be changed by 6 in. without any material inconvenience, and the use of joists 2 ft. shorter may result. The height of the ceiling of a room may be changed an inch or two in order to avoid extra lengths of studding or the plate may be double in place of single, and many other expedients may be resorted to in order to utilize the full length of the lumber as it comes from the saw, the resulting building being just as satisfactory and just as well constructed, and at a

lower cost.—From the preliminary report of Secretary Hoover's committee on the minimum requirements for small houses.

Hard Pine Floors

OIL is the best wearing finish for hard pine floors. Varnish does not do so well, as it is apt to come off. It is the opinion of the most expert that floors of this wood should not be either varnished or shellaced. Here is a very good finish: First stain the wood with an oak stain, rather dark, and rub off the excess stain with a cloth as you proceed. This will leave the grain of the wood showing fine. When dry enough apply a coat of a mixture of raw oil and turpentine, equal parts. Wipe it off dry. It is well to rub this excess liquid across the wood and to rub it well into the softer parts. Repeat this operation until the wood will take up no more oil. Such a finish will not scratch or show marks and it is very easily renovated.—A. A. Mun Kelly.

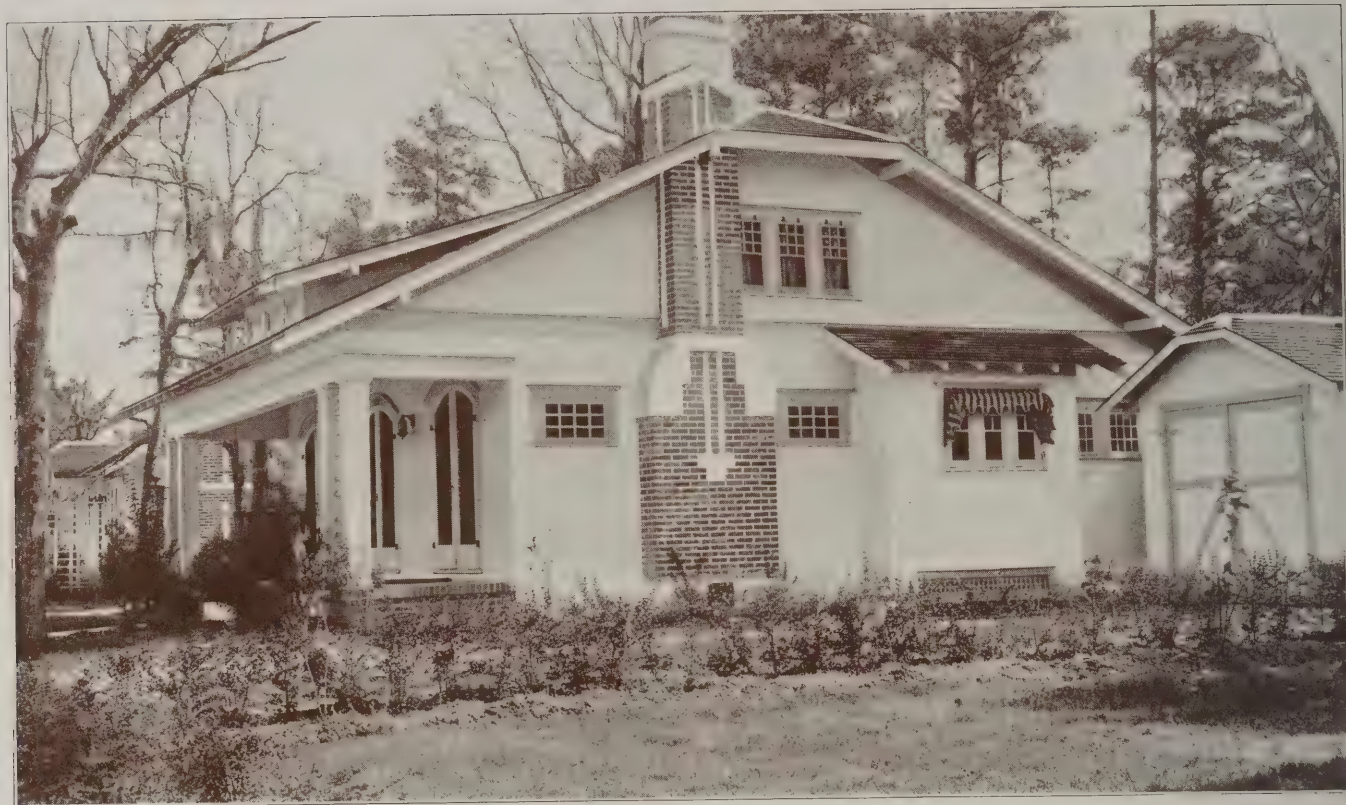
National Builder Style Sheet



Bungalow. Bell Construction Co., Houston, Tex. See additional views and plan as House No. 2, page 29



Bell Construction Co., Houston, Tex. See plan of House No. 4, page 30



Bell Construction Co., Houston, Tex. See plan of House No. 4, page 30



Bell Construction Co., Houston, Tex. House No. 6A. See floor plan, page 31



Bell Construction Co., Houston, Tex. House No. 6B. See floor plan, page 31



A "company-inviting" residence in California



A bungalow on the hillside at Waukesha, Wis., showing use of field stones in construction



Bungalow, Elmhurst, Ill.



A Southern California Residence



Another Southern California Type



Double Bungalow, Dallas, Tex.



House in Wilmette, Ill.



Artistic stone houses built by Ernest Flagg, prominent New York architect, on his 500-acre estate on Staten Island, Borough of Richmond, New York City



Another view of the Flagg house showing ideal adaptation of building to its surroundings—considered by architects the most important thing in home architecture



Another Flagg house, Staten Island, New York. Note the covered back porch and Southern atmosphere



Small cottage with shed attached—the tenant house on the Flagg estate, Staten Island, showing that beauty and fitness are attainable even in a \$5000 or \$6000 structure

Needham System of Concrete Building Construction

Houston, Texas, Builder Has Devised Scheme to Greatly Reduce Costs in the Construction of Small Bungalows

SLABS of reinforced concrete, cast and seasoned at a central plant, and thereafter handled exactly as lumber or structural steel is handled, is the actual accomplishment of a Houston, Tex., building firm, the Needham brothers, who do busi-

ness under the name Needham System, Inc. Today they are competing with lumber in the construction of low priced bungalows in a real "lumber town."

when erected form dovetail sockets at the upper end, which are locked together when the concrete cap beam or wall plate is poured. The bottom is locked into the foundation as shown. The walls are continuously hollow with air circulating open-



Bungalow complete and ready to move into

ness under the name Needham System, Inc. Today they are competing with lumber in the construction of low priced bungalows in a real "lumber town."

The pictures herewith tell practically the whole story of the erection of one of these bungalows. The working drawings accompanying show the details of construction and wherein they differ from frame building work. Thus far bungalows of this type have been constructed on single isolated lots. Were they built in groups it is obvious that many erection economies could be introduced.

Patented System

The Needham system of building is composed of slabs of pre-cast reinforced concrete 16 in. wide, which are made in the shape of a channel. These slabs can be made in any length to suit the job, and

ings through the beam, which communicate with the space between the opposing side slabs, whereby continuous horizontal and vertical circulation of air is obtained. This is designed to assure the elimination of moisture condensation. Therefore the hollow wall concrete house has stood the test of the critics.

The full length slabs for a bungalow, or one story of a taller building, are sufficiently light in weight that they are readily carried and erected by four laborers. The weight of a slab is about 300 lbs. They are delivered to the job in motor trucks and stacked at the building site like lumber.

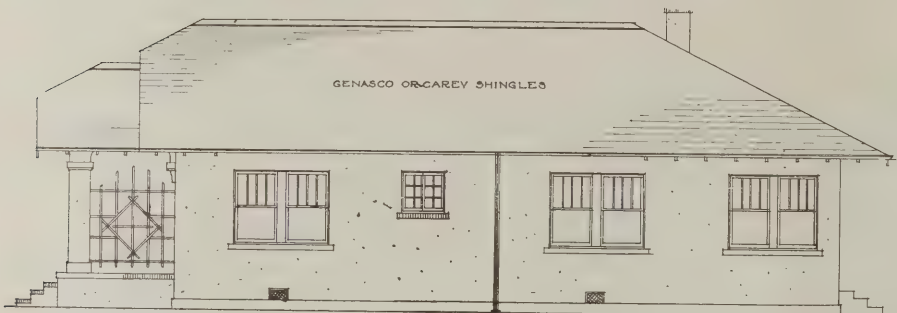
The erection of the building proceeds as follows: First the foundation is poured as in ordinary building construction. Of course there is a continuous foundation wall or bearing of concrete. The wall is not less than 10 in. wide at the top, the

placed; those resting on foundation walls have square ends. A strip is then nailed to the top of joists parallel to walls to form the line of inside wall. These first floor joists must not project beyond inside wall line. The carpenters then erect partitions and ceiling or second story joists as an ordinary construction. After the ceiling joists and floor joists are in place the carpenter cuts a short piece of board in between each joist and the depth of the joist just inside the face of the wall. The building is now ready for the erection of the Needham system walls. If there is a second story, the carpenter can be put at work erecting his partitions and if not can erect his non-bearing partitions or such other work as he may have.

The inside slabs of the Needham System are set first. After three or four inside slabs are set the hollow space is slushed



FRONT ELEVATION



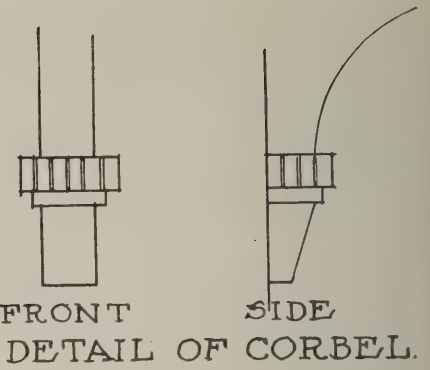
EAST ELEVATION



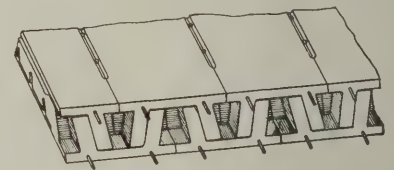
WEST ELEVATION



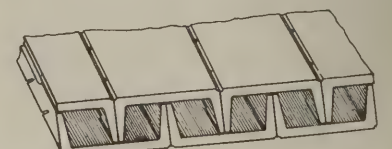
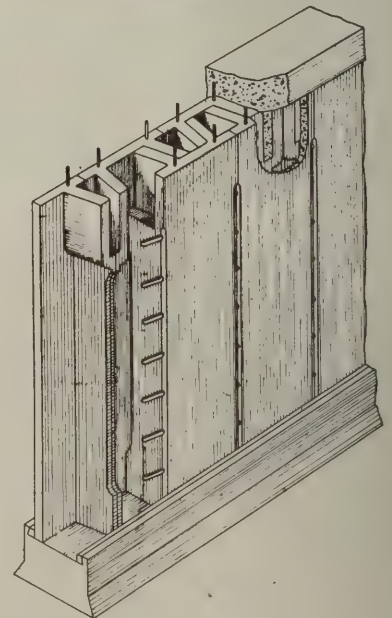
Extra wide foundation walls to receive concrete uprights

FRONT SIDE
DETAIL OF CORBEL.

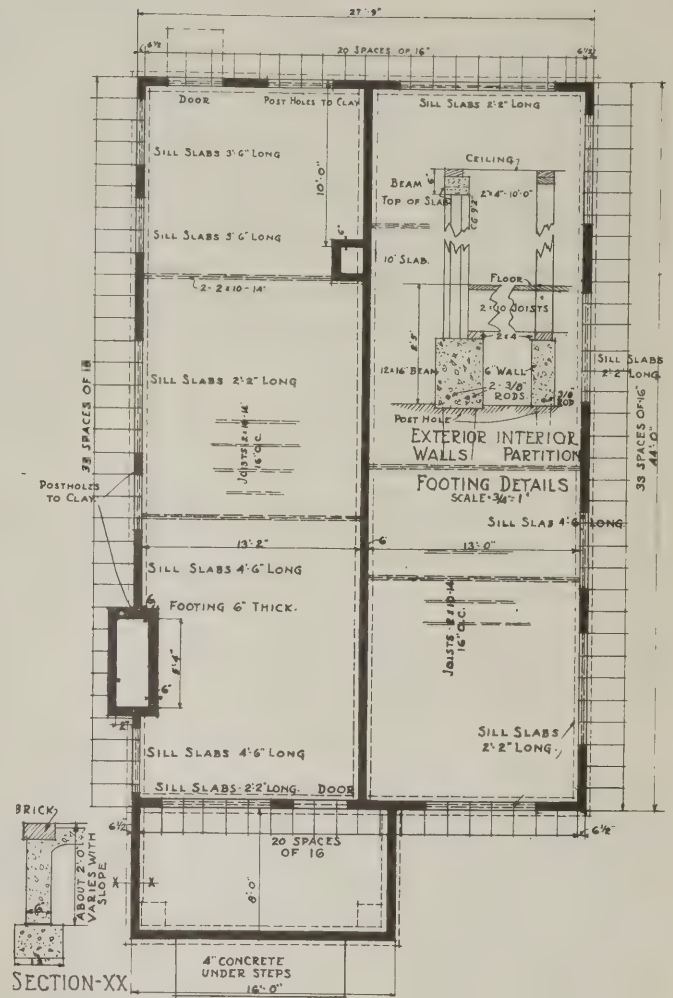
with grout and the outside slabs are set. So on until entire wall is built. As soon as the outside slabs are set the carpenter places a wood board outside the wall entirely around it to hold Needham slabs in place and at same time form a mould with the board cut between the joists for the concrete girt, which is run around top of wall. The ends of the joists are notched so that the form extends slightly below the top of the slabs. This concrete girt also fills up the small depressions formed at the top of the slabs, thus locking the entire structure together. The ceilings or



TOP OF WALL BEFORE BEAM IS POURED.



BOTTOM OF WALL AS SET ON FOUNDATION.



Floor plans of bungalow



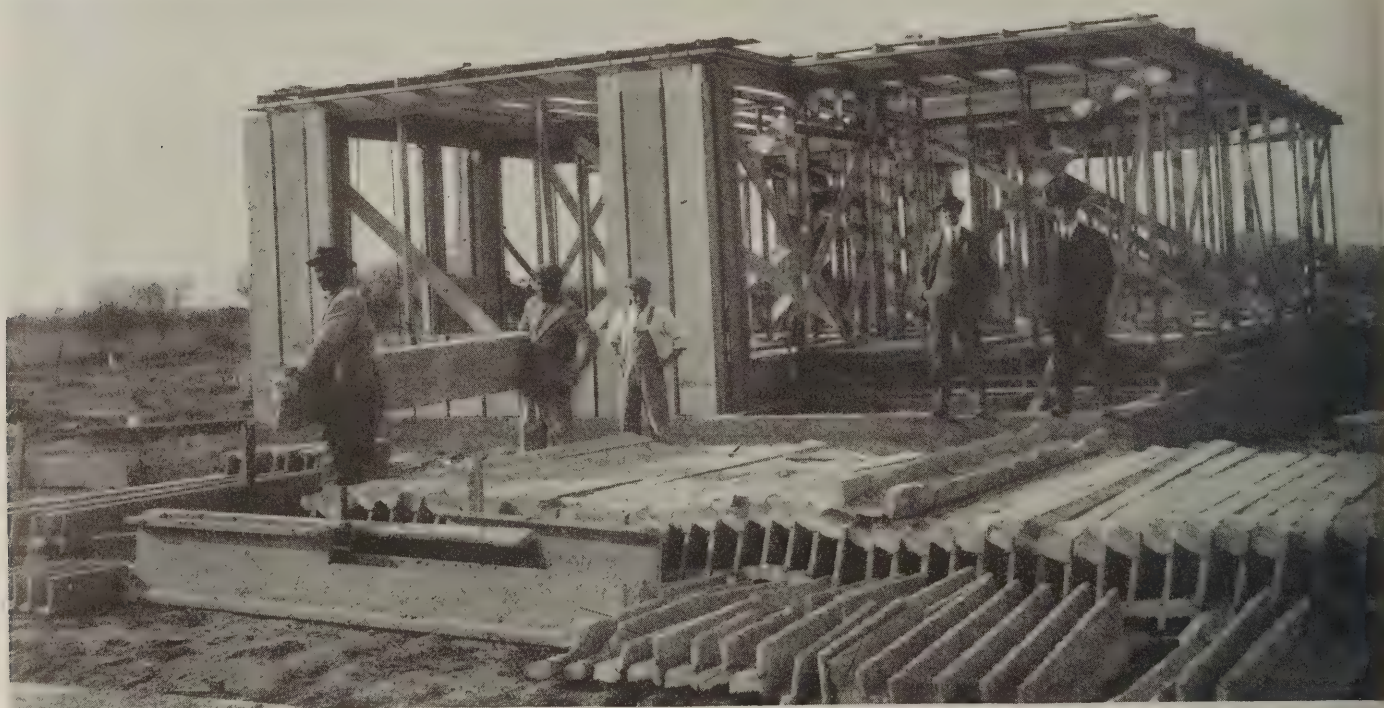
Bungalow roofed and ready for stucco finish



Concrete channel members handled like lumber



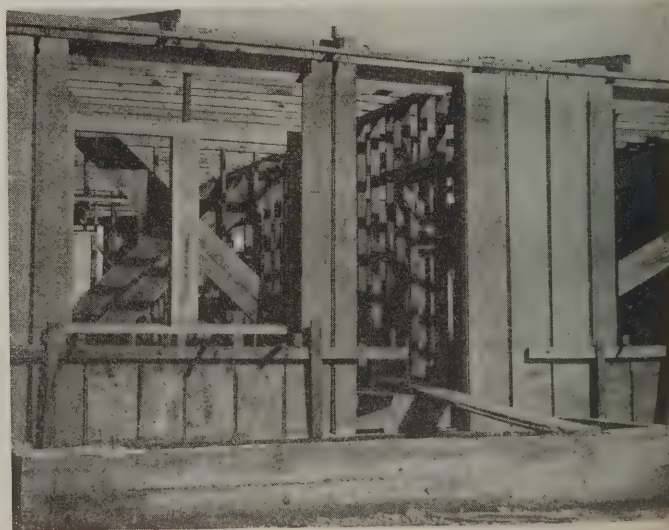
Stacking the concrete lumber on the job



Construction view showing rough character of concrete



Forms in place for concrete. Lintels over window frames



Window frame in place (left)

second floor joists are anchored to the wall construction by means of the reinforcing rod of the vertical rib which is left projecting from the end of the slab. This is shown in one of the detail sketches. Construction for two-story structure proceeds along similar lines as for one-story structures. For two-story construction the vertical rods of the slab project from the bottom of slabs.

Any type of door and window frame may be used with this wall construction; the recommended window frame is that used in ordinary frame and stucco construction. A small stiff-leg derrick of very light construction has been used to very great advantage on construction of this type house in Houston.

To carry the ceiling joists during the erection of the concrete exterior wall temporary studs are spaced just sufficient to carry the load. These are removed as soon as the joists can be tied into the walls. Since the walls are provided with air space plaster may be applied direct to the interior surface of the slabs, or the usual furring used if desired.

The exterior is stuccoed directly on the concrete with any finish or kind of stucco desired. The use of one set of slabs only



Placing concrete uprights in position



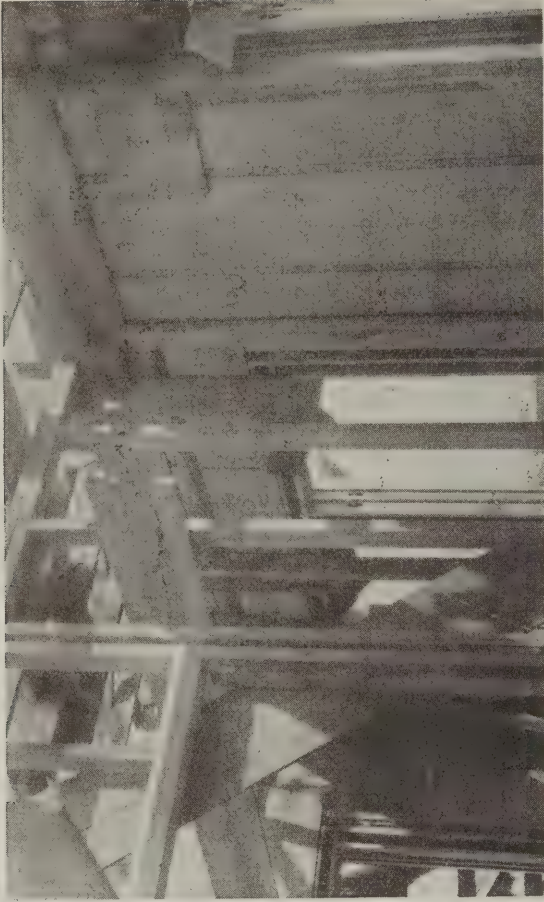
Corner with slabs in place



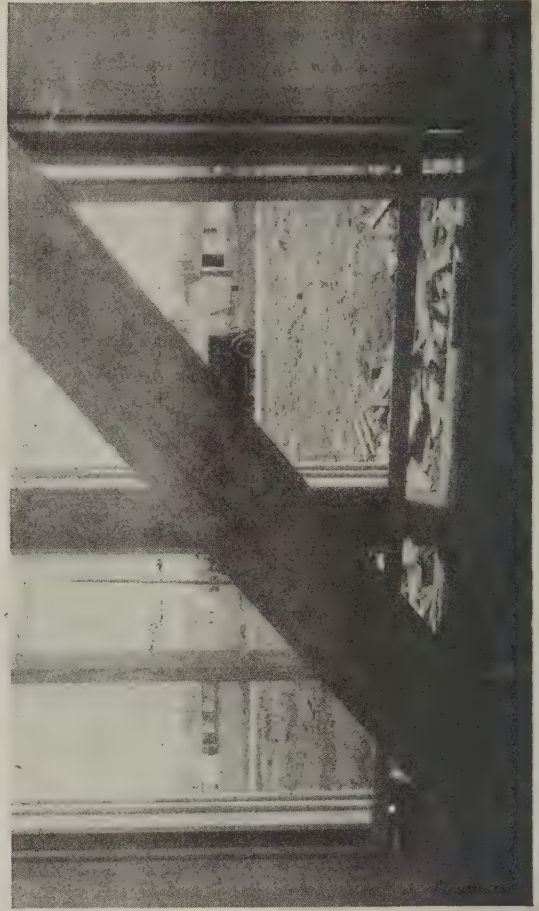
Near view of slabs in place



Near view of window opening



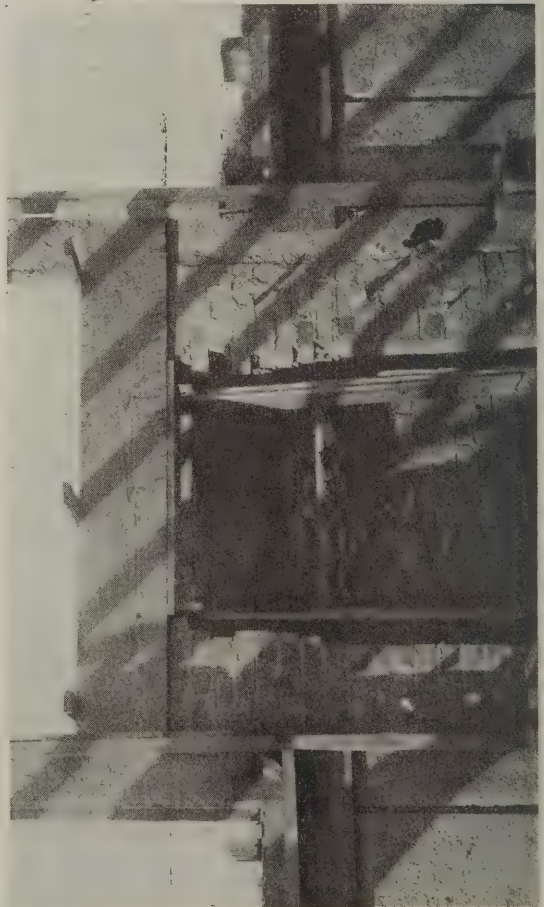
Interior framing and temporary studding



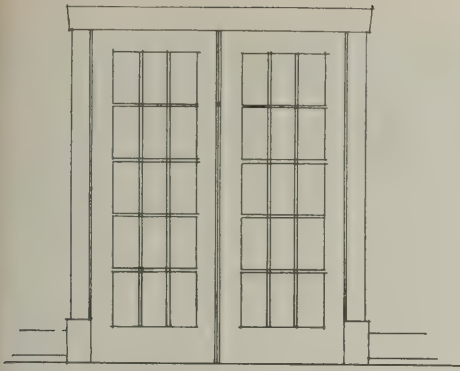
Base of window ready for brick sill



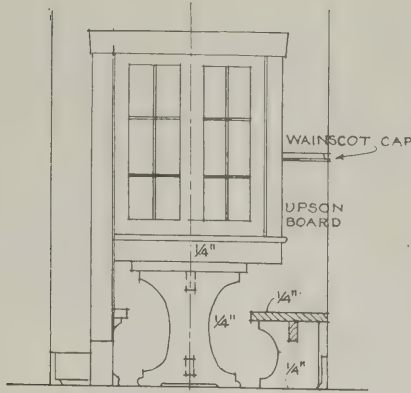
Window lintel forms from the inside



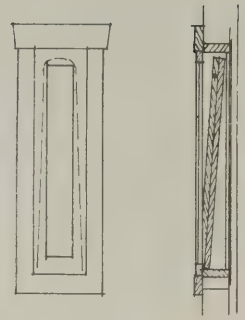
Brick fireplace under construction



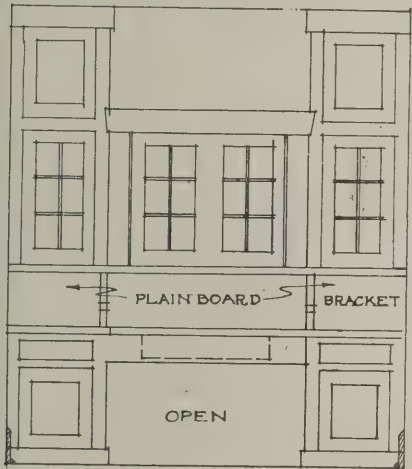
-FRENCH-DOORS-



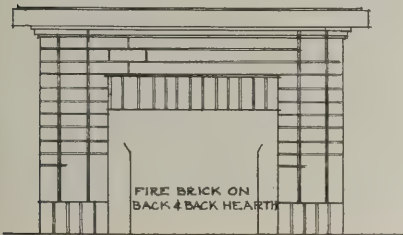
ELEVATION SECTION
-BREAKFAST-NOOK-



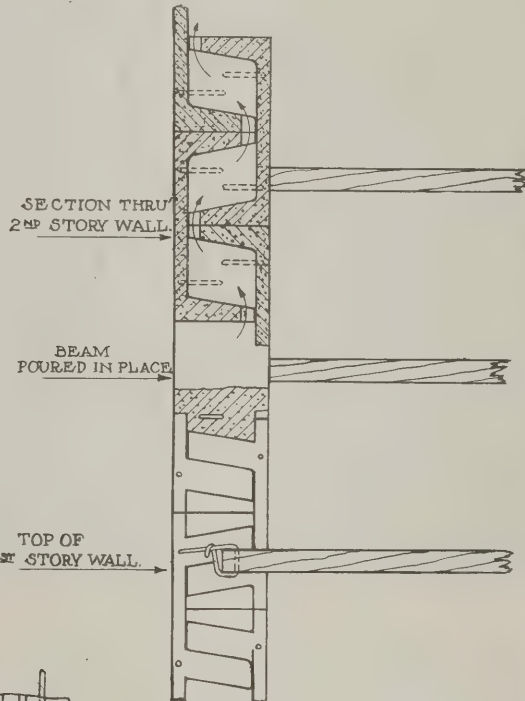
ELEVATION SECTION
-IRONING-BOARD-



-KITCHEN-CUPBOARDS-



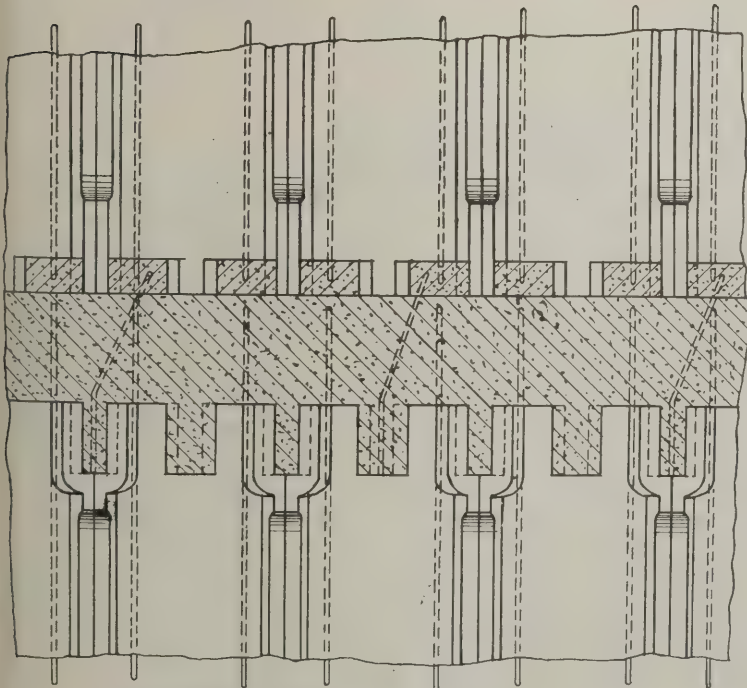
-MANTEL-



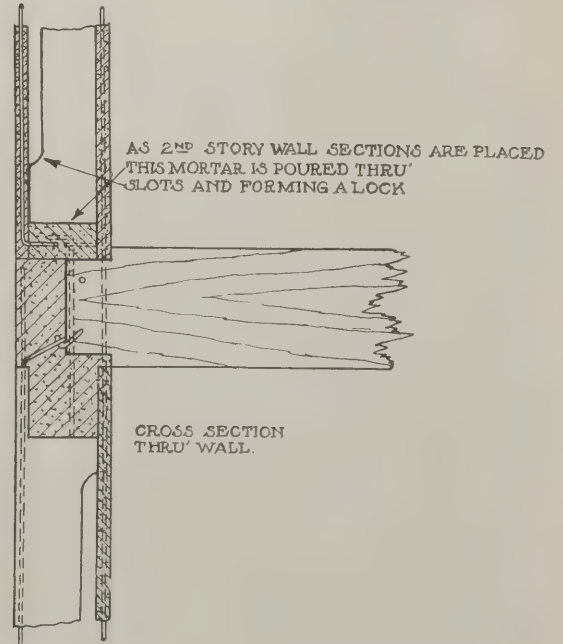
SECTION THRU
2ND STORY WALL

BEAM
POURED IN PLACE

TOP OF
1ST STORY WALL



LONGITUDINAL SECTION THRU BEAM
FRONT SECTIONS OF WALL NOT SHOWN.



AS 2ND STORY WALL SECTIONS ARE PLACED
THIS MORTAR IS POURED THRU
SLOTS AND FORMING A LOCK

CROSS SECTION
THRU WALL



Interior of living room of concrete bungalow



Concrete bungalow with brick veneer

(the interior ones) as one of the views shows, also gives an excellent construction for a brick veneer exterior. Various other details of construction are shown in the photographs and drawings.

The Needhams have been in the concrete construction business for over 20 years and they fully appreciate that the cost of constructing concrete houses has been a serious handicap to extending the use of concrete into this field. Their system has been devised largely with economy of erection in view.

They make the following estimate of the cost making and erecting the concrete slabs:

Cement, 1 sack @ \$.83½.....	\$.835
Gravel, 4 cu. ft. @ \$.14.....	.560
Sand, 2 cu. ft. @ \$.04½.....	.090
Reinf., 19 lbs. @ \$.04.....	.760
Total.....	\$ 2.245
(The above quantities are sufficient for three slabs, 1'4" x 10'0")	
Cost per slab.....	\$.74 1/2

Cost per sq. ft. of slab.....	.05 6/10
Cost of making slabs:	
One foreman @ \$8.00.....	\$ 8.00
Two men @ \$3.00.....	6.00
One man @ \$3.50.....	3.50

Total cost one day's operation.....	\$17.50
(Above gang will make 25 slabs per day. Cost per slab, 70c)	
Cost of material per slab.....	\$.745
Cost of labor per slab.....	.70

Labor and material per slab.....	\$ 1.445
Cost per sq. ft. of slab.....	.10 4/5
Cost erection per sq. ft. slab.....	.01
Cost per sq. ft. of wall, about.....	.23

The slabs and the system of using them have been patented, but up to this time the Needhams have been too busy building houses themselves to spend any effort getting other contractors to take up this system. They tell NATIONAL BUILDER that their policy will be to sell territorial rights to manufacture the slabs and erect buildings under this system on a basis of 5c per capita population. In addition they expect a royalty of 1c per sq. ft. of wall manufactured.

Fallacies of Heating

Application to Drying Out Plaster

*By Professor Henry Adams, M. Inst. C. E.

IT must first be understood that air at any temperature can hold moisture, or vapor of water, in suspension, but the amount so held will depend upon the temperature; the warmer the air, the greater the amount of moisture it can contain, the maximum for any given temperature giving what is called "the saturation point," anything short of this giving the relative humidity, which can be calculated as a certain "percentage of humidity." All air contains more or less moisture, and, whatever the actual amount, a continued fall of temperature of the air will of necessity reach the saturation point, any further fall rendering the moisture visible, as fog, mist, or dew. The saturation point for any given temperature is therefore also the dew point. It frequently happens that while the general bulk of the air in a room is at a temperature far above its dew point for the contained moisture, if a tumbler of cold water be brought into the room, moisture or dew will be deposited on the outside, because the air in contact with the glass will have its temperature lowered below its dew point. Or, as another example, if the temperature suddenly rises after a spell of cold, damp weather, the varnished wallpaper in a house will be found covered with moisture, from exactly the same cause as brought the moisture on the glass. "Washing day" in an artisan's dwelling may show the same things from the same cause. When the temperature of the condensing surface rises above the dew point for the air in contact

with it, the moisture gradually disappears.

Heat alone, without changing the air, cannot drive out or absorb moisture; it can only convert it into vapour, which remains where it was generated until carried away by a current of air. In a drying closet of a laundry the actual amount of heat is a secondary consideration; the more important matter is that a current of ordinary dry, clean air should pass through and carry with it the maximum amount of moisture—that is, it should pass out in a saturated condition. The heat applied has two duties to perform—first, by raising the temperature of the air, to increase its capacity for holding moisture, and, secondly, by reducing the specific gravity of the air, due to its expansion, assist in causing its upward flow through the outlet ventilating flue, while the fresh air comes in below.

Drying Plaster

In drying the walls in a house newly plastered it is customary to put a fire bucket on a course of bricks or a heap of sand in the middle of the room; the radiant heat from the fire warms the walls of the room so that the air in contact with them can hold a greater amount of moisture. Moist air is lighter than dry air, and rises; therefore provision must be made for it getting away through the top of the window, while fresh air comes in at the bottom, or under the door.

There is another point to note in connection with the evaporation of moisture. It takes about 5½ times the quantity of heat to evaporate a given quantity of water

that it does to raise the same quantity of water to boiling point, so that the evaporation of water from the wall tends to cool the wall by the abstraction of heat and so reduce the efficiency. The walls may be most quickly heated by keeping the windows closed and the door shut. There will probably be sufficient air to keep the fire burning for an hour or two, and the window must then be opened at the top. Care must be taken in going into a closed room with a fire in the centre that the carbon monoxide and carbon dioxide are not too strong for respiration, especially if a coke fire be used, so that if the top sash can be drawn down from the outside it will be an advantage. These explanations ought to make the whole matter quite clear, the common fallacy being that heat is the only thing necessary to dry moisture out of any material.

A word or two may be added as to the use of gas fires. They are commonly supposed to dry the air of a room and produce headache, so a saucer of water is frequently found on the hearth to moisten the air; but if a lighted taper be held over the water it will be found that a current of air sets directly from the water to the fire, carrying with it any moisture there may be, instead of letting it escape into the room. The writer has used gas fires in his offices for the last 42 years, and never felt any bad effects from them. Of course, the products of combustion are led direct into the chimney, as there is no gas stove that can be used without a proper flue, in spite of what the makers say to the contrary. If any exception can be made, it is in the case of a gas radiator with water circulation heated by ordinary fishtail burners and not by Bunsen or blue flame burners. Even these foul the atmosphere, but to so small an extent as not to be noticeable. A gas cooker or gas copper in a kitchen or scullery is very often seen without a flue, but the window is generally open, or should be, and so the air is kept within a reasonable degree of purity. The same may be said of a bath geyser; but the number of cases of asphyxia due to want of ventilation show the danger to be apprehended. Even when a flue is attached to a geyser and connected with the open air, care must be taken that there is no back draught causing the products of combustion to remain in the room.

Filing System for Architects' Offices

The American Institute of Architects has recently issued its Document No. 172 which is a complete outline of a standard construction classification and filing system for architects' offices, together with descriptions as to its use.

*Illustrated Carpenter and Builder, London, Eng.

The Design and Standardization of Mouldings

By Theodore F. Laist

THE form, proportion, and disposition of mouldings play an important part in the design of buildings; not only is the shape of the individual moulding of importance, but the manner in which it is combined with other mouldings, its proper grouping and proportioning to the architectural member of which it forms a part or to the structure as a whole, is of even greater importance to the success of the building when considered from the architect's viewpoint. In the skill with which this grouping and massing of mouldings is done, and the light and shade effects obtained, one recognizes the difference between the work of the trained architect and the practical builder untrained in design. This subtle difference may at times defy analysis but is apparent even to the eye of the layman.

There are some general rules of composition which may with equal success be applied to all arts. For example, there must be some motive or predominant feature which will catch the eye in every composition—whether picture or building—thus in a group of mouldings one should predominate over the others, the other members of the group will then support or add rather than detract from the main member, thus giving decided character.

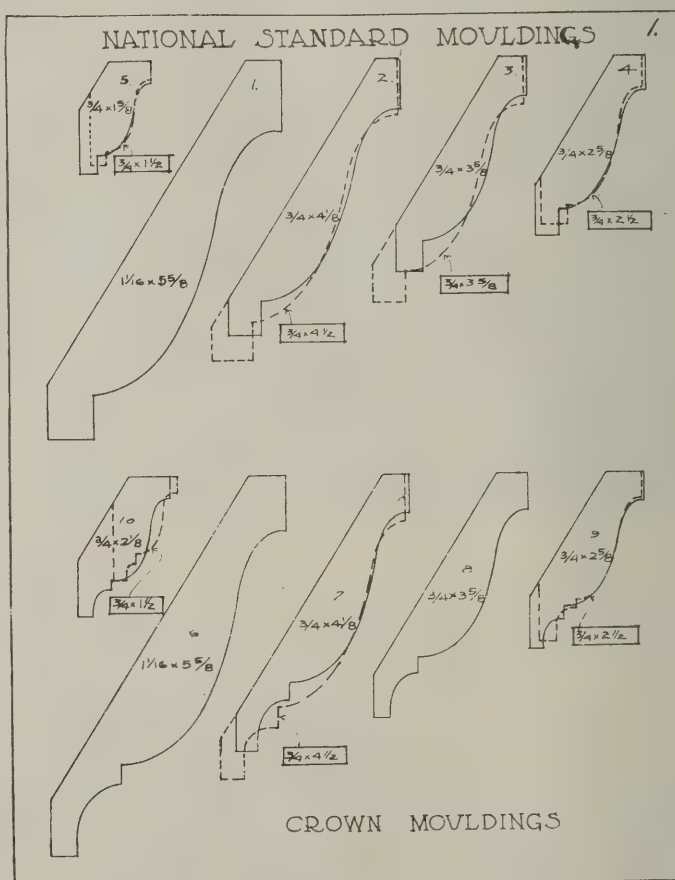
This same principle may be applied to any design; for example, in wall paper in which one figure is the predominant one. This is one of many motifs which may be adopted. Another is one in which it is desired to form a background in which case an all-over pattern is in order; that is, one in which all parts of the pattern are evenly balanced. Such patterns are not complete in themselves but require some architectural feature like a picture moulding, panel mould, chair rail, etc., to terminate them. Analogous to this sort of a pattern may be considered a series of uniform mouldings which can never be considered as a complete feature in themselves. They are, and look incomplete. The feeling they produce is that they can be continued indefinitely, thus imparting a sense of incompleteness or lack of finish. Again, it is a mistake to let one curved moulding run into another without the interpolation of a plain member, or fillet, as it is called. Unless this is done the effect will be undecided or "mushy."

If it is true that mouldings play such an

important part in the design of structures, it should be a matter of concern that the average stock moulding used by builders in ordinary house construction is bad rather than good and should be improved, and mouldings, to a certain extent, standardized. This is the logical thing to do, but difficult of accomplishment, when

mouldings to what they considered at that time a minimum, approximately 250. Thus we see that progress toward economy in number is being accomplished.

One may well imagine the difficulty involved in putting standards into effect in an industry as widely scattered as the lumber industry. In the year 1920 the National

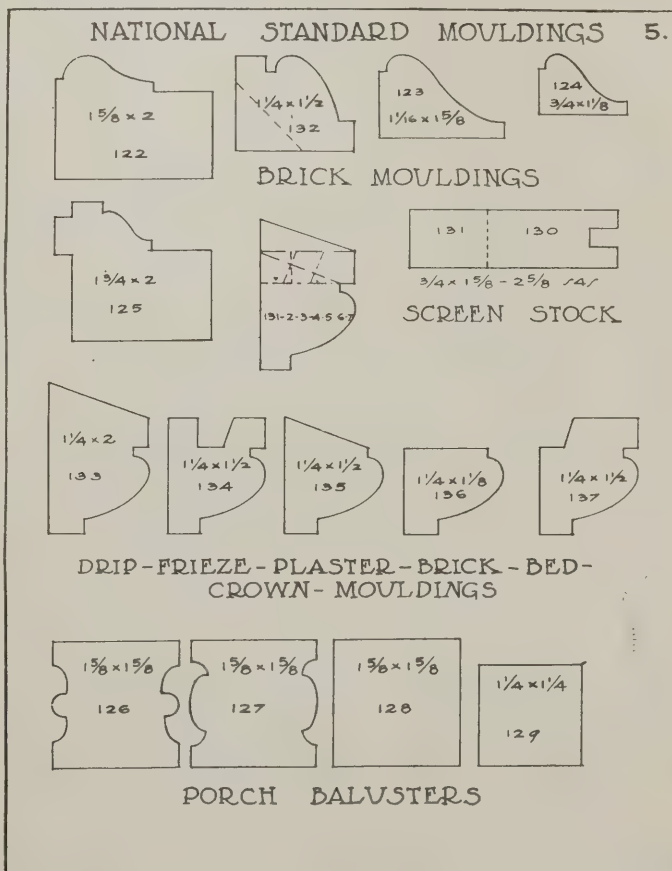
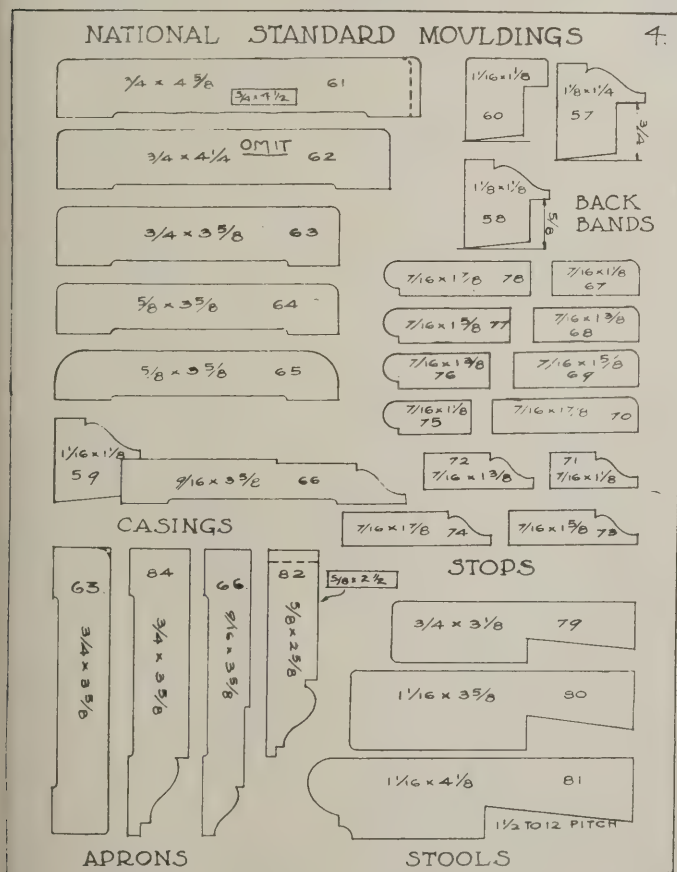
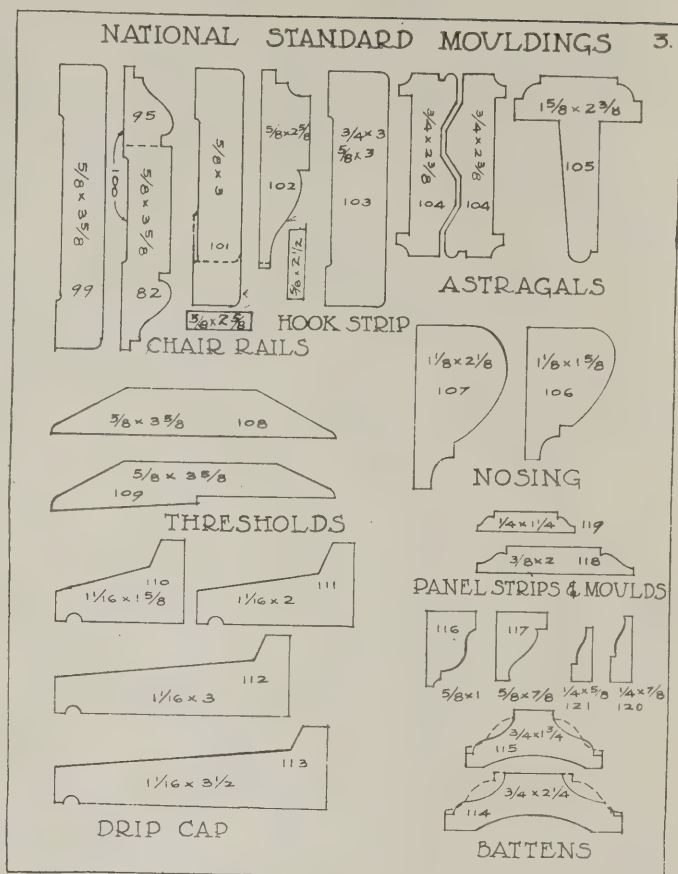
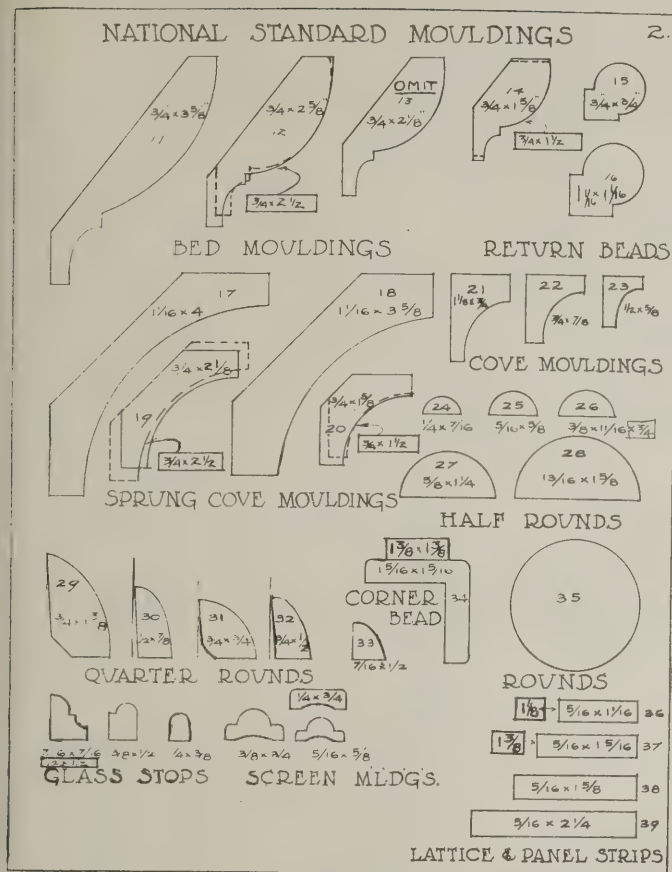


National standard mouldings, showing suggested changes in dotted lines

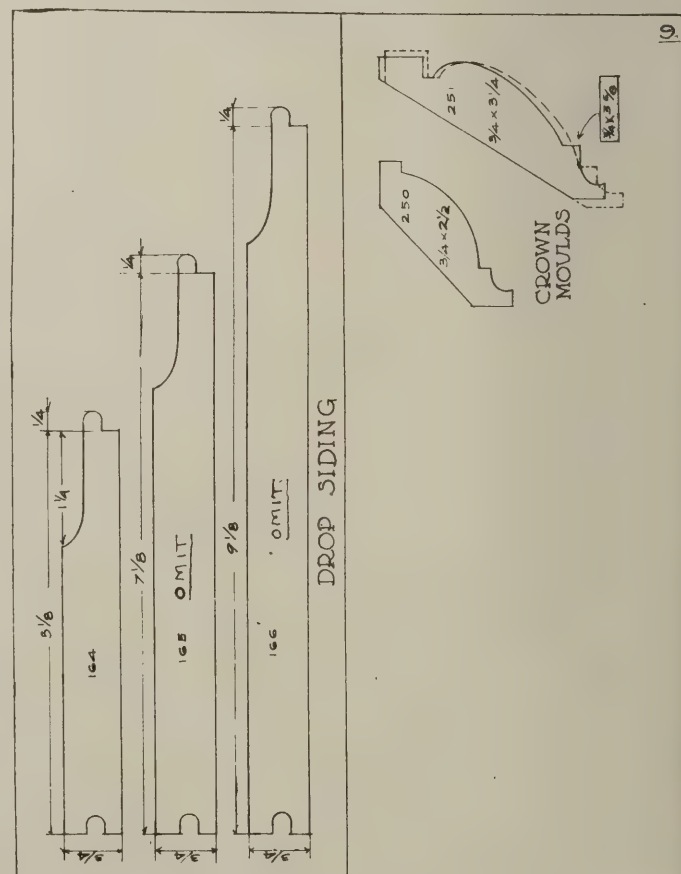
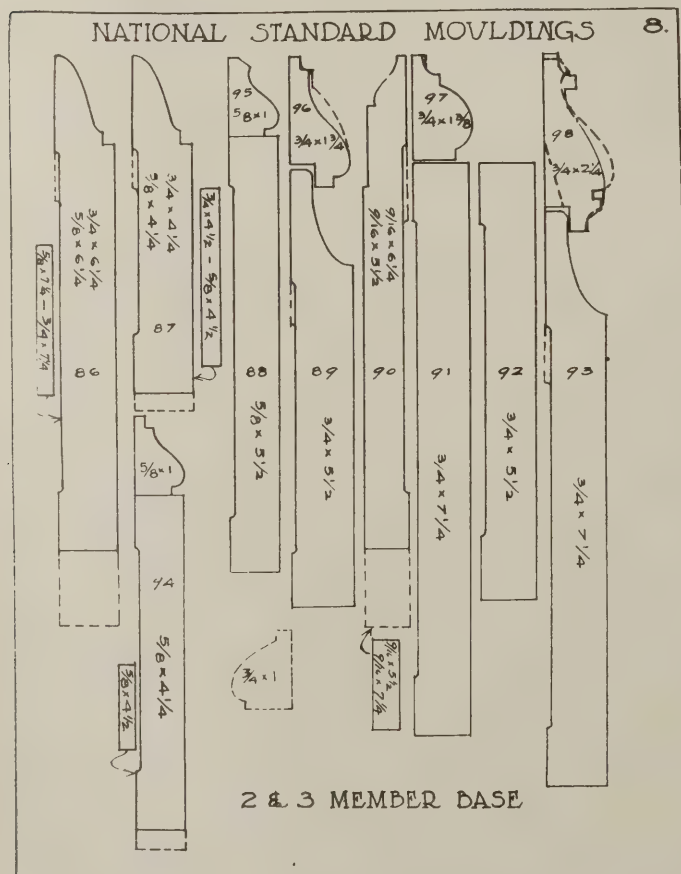
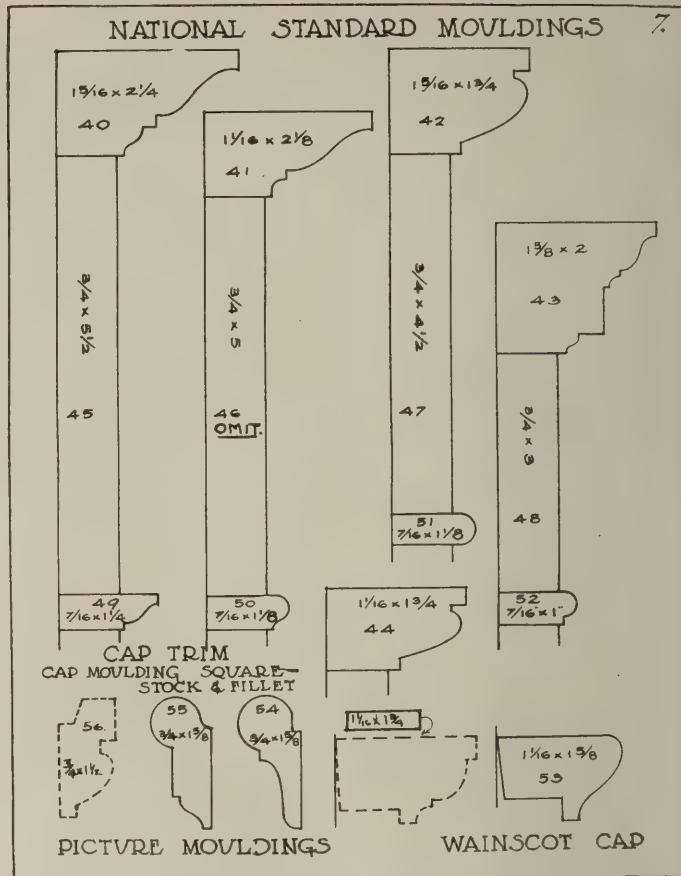
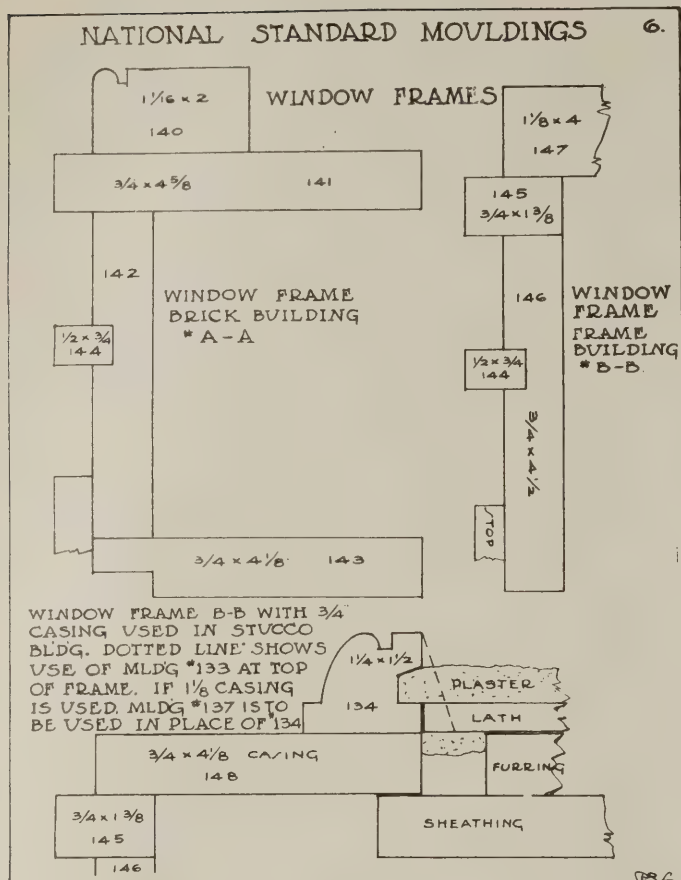
one considers that the average moulding book of lumber manufacturers consists of two hundred and fifty or more patterns, although it is perfectly obvious that a large percentage might well be eliminated.

The first moulding book put out by lumber manufacturers was printed in about 1888 and contained some 700 or 800 mouldings, from which each succeeding year a number were eliminated, until finally in 1913 the Southern Pine Manufacturing Company had reduced the number of

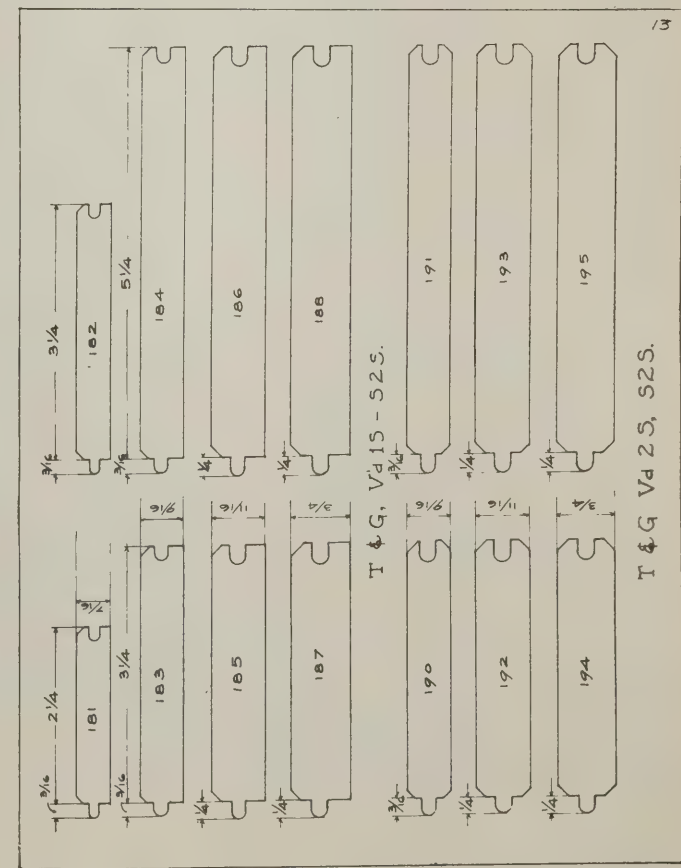
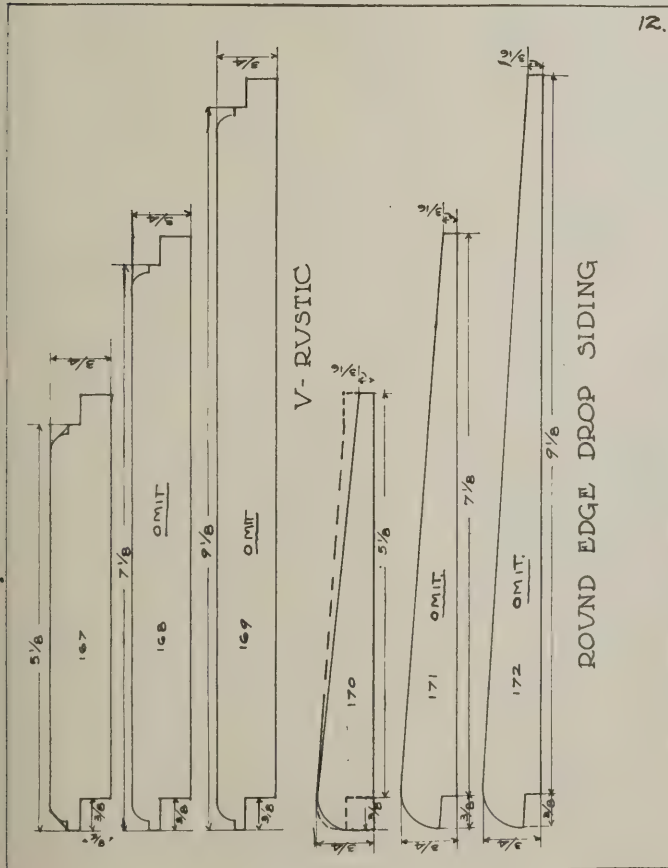
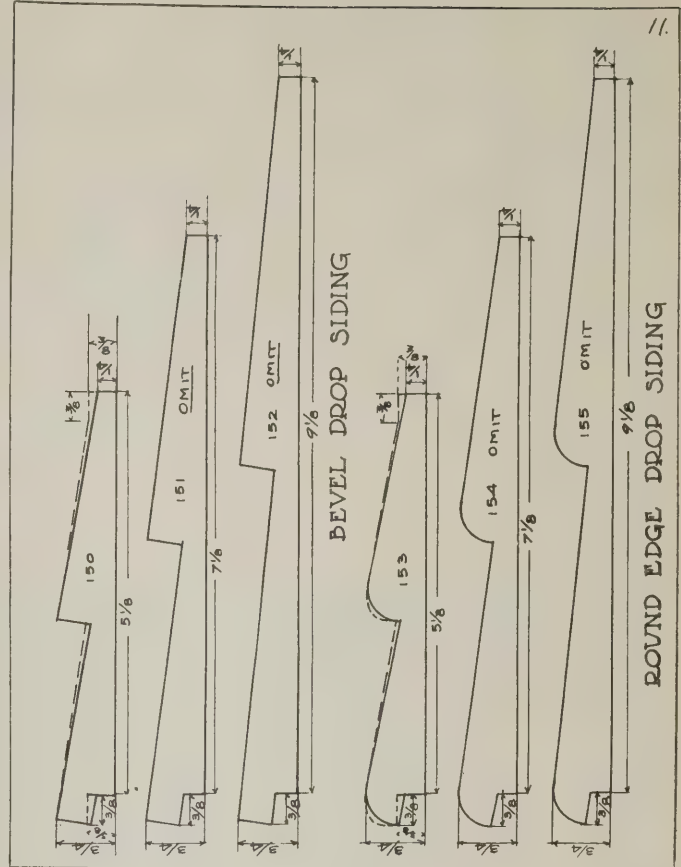
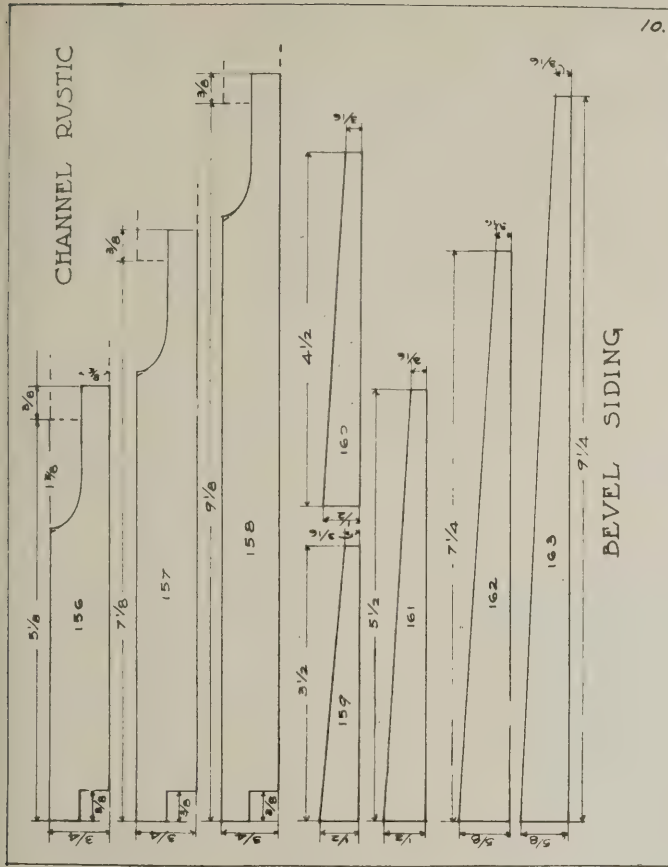
Lumber Manufacturers Association, the representative association of lumber producers, acting merely in the capacity of host, called a meeting of the manufacturers and retailers for the purpose of discussing the question of standardization of mouldings and the advisability of improving the moulding known as stock moulding as distinguished from mouldings of special design, and in common use by builders of ordinary work. A committee from the American Institute of Architects was asked



National standard mouldings, showing suggested changes in dotted lines



National standard mouldings, showing suggested changes in dotted lines



National standard mouldings, showing suggested changes in dotted lines

to cooperate, which they willingly and effectively did. The result of their deliberation was published in a standard moulding book.

Some of these mouldings are attached. The original profile is shown in solid lines and the recommended form in dotted lines. Just what will be the outcome of this Conference is hard to foretell for there is no unanimity of opinion as yet on the part of the trade as to just what standards ought to prevail. But is it not improbable that the new mouldings will gradually be adopted by the more progressive trade, and that new forms will be added from time to time and eventually come into general use.

The ordinary stock moulding, from the point of view of the architect or expert designer, is notoriously bad. Architects avoided stock patterns which, had they been more carefully prepared, could well be used in small house construction. At this time, when there is a tendency to cut corners and economize in building construction as much as possible, the question of standardization, not only of sizes, but of mouldings, naturally come under discussion. If architects can obtain good mouldings from stock they will no doubt use those instead of following the wasteful practice of making special mouldings for every piece of work.

Since it is manifestly impossible to carry in stock, or to prepare a sufficient number of patterns to meet the demands of anything more than that required in ordinary building construction, the architect for his more important work will, of course, find it necessary to prepare special designs.

What is the difference between a good and a bad moulding, and what is its function? Mouldings have not precisely the same function as an ornament. They are not designed to look at but to produce shadows and a play of light and shade. It is the beauty of the shadow cast and the gradation of light and shade that determine the beauty of a moulding. If the curves on a moulding are all exactly the same size, or the same depth the effect is monotony and lack of interest. On the other hand, if mouldings are so curved as to give the greatest contrast of light and shade, and there exists a predominance of one curve over another, there will be obtained an effect that is pleasing to the eye. Curves must be separated by plain fillets or angles or the combination loses all character. It costs no more to make a good moulding than a bad moulding.

The position of the architectural profession is clearly stated by Mr. Emery Stanford Hall of Chicago, who represented the American Institute of Architects in an address to lumbermen.

"In the first place there is no architect worthy of the name that is going to sign his name on a dotted line that he is going to use these mouldings and no other. Oth-

erwise he would be a fit candidate for the insane asylum. You are not adopting these mouldings for special buildings or special designs for special uses. You don't sell stock mouldings for that class of work, but there is a very large majority of the work of the country, the vast majority are the small houses, the inexpensive buildings which cannot be specially designed. They must be designed on the wholesale and must be designed with the practice of extreme economy. One of the essentials of extreme economy is standardization. In the past you have presented to an architect under those circumstances a collection of mouldings which would be a crime for him to use; absolutely against all the laws of good taste, laws which he has been educated in from his youth up. You have an opportunity at this time to adopt a series of mouldings which are in accord with good taste, or you have an opportunity at this time to adopt a series of standards which are not in accord with good taste. You have decided, I understand, in coming together here that it is desirable to standardize, to cut down the number of patterns in the interest of broad economy. All that the American Institute can ask of you is that those

standards which you do adopt shall be in accordance with the dictates of good taste.

"The thing that we have been discussing was in the nature of the mouldings that were presented to the conference and to the character of the mouldings presented to the conference, but my committee has not gone into the question as to whether there was a sufficiently comprehensive list of mouldings. We did object at the last conference to including in the catalog mouldings which were notably bad, simply because there was a public demand for them, created by their former sales. Now do I make myself clear? We stand for the mouldings as adopted by the conference, so far as they go, as being substantially correct from an architectural standpoint, as it is practical to make mouldings and sell them commercially. There are some of these mouldings, which, if an architect had a chance and the question of cost did not enter in, he would emphasize the mouldings more than you are able to do in a certain thickness of lumber. I think myself that there should be added additional mouldings to cover additional needs, but I think you will do very well to adopt this and then add the others later."

Architects' Progress Report

W. E. HULSE & CO., architects, Hutchinson, Kan., have a system of progress reports that would be valuable to other architects as well as to contractors. Such reports serve two particularly valua-

ble purposes; one to keep the architect, or main office of the contractor, posted on the progress of construction, and the other to form a permanent record of the job, which may be of great importance should any dispute arise over the time of any particular stage of the work.

They serve other useful purposes as well, such as forming a valuable guide in estimating the time required for various parts of the job, and of finding out whether the job is proceeding as rapidly as it should as per estimate.

Hulse & Co., make a simple tracing on a small scale, so that the four elevations and floor plans of a simple building take up only a single sheet the size of letter paper. Blueprints are made of this and the contractor is provided with enough of these prints that one or more may be filled in every week end by the foreman or superintendent on the job.

The scheme is to mark on the blueprint elevation of the building the stage of the bricklaying or other operation then in progress. The key with the drawing herewith shows how the principal operations are designated. To these are added such supplementary notes as may be needed. This building had two floors. The plan that is not labelled served for either foundation or roof progress record.

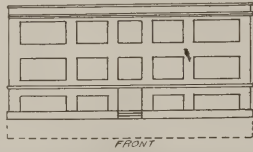
Such records have the advantage of being readily comprehended, even by foremen who are not experts on "system."

WEEKLY
PROGRESS REPORT

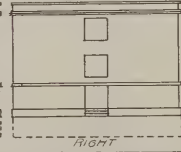
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W. E. HULSE & CO. - ARCHITECTS

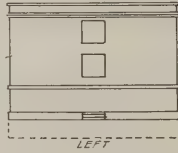
Bldg. City State Contractor Supt.



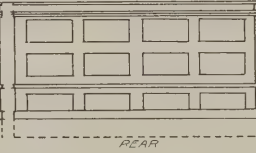
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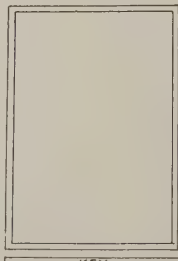
RIGHT



LEFT



REAR



FIRST FLOOR



SECOND FLOOR

KEY

PARTITIONS IN: SINGLE LINE

EXTERIOR WALLS UP: FILLED

IN SOLID

FRAMES SET: 

APPROX. LINE OF EXCAVATION OR HEIGHT OF EXTERIOR WALLS TO BE INDICATED ON ELEVATIONS

The Building Shows at Cleveland and New York

Cleveland Exhibition Has Real Professional Distinction;
the New York Exhibit is Largely of a Real Estate Character

BUILDING SHOWS or "Own Your Home Expositions" have become annual events in most cities. Their value in arousing enthusiasm for home building and home ownership can not be questioned, but if conducted with a real regard for their possibilities they can be made to serve other useful purposes as well.

This was demonstrated at the Cleveland, Ohio, show, April 22 to May 2, where the exhibits had real educational value for the architect, builder, contractor and building material dealer. Fortunately men of these callings were out in goodly number. On the other hand the New York City show held on the same days was given over almost wholly to real estate promoters and developers. Both served useful purposes but the Cleveland show was certainly the most satisfactory from the professional builders' point of view.

Such shows could be made of the utmost educational value to architects, contractors and professional builders. Their educational value to the general public should end with instructing people how to finance the building, where to get an architect or plans and the services of a contractor or builder, and in exhibits of up-to-date interior equipment. The attempt to educate laymen in the technique of building and the comparative merits of various building materials is labor and energy lost. More than that it vastly complicates the problems of the architect, builder and dealer and alienates their sympathy.

Doctors, lawyers, engineers, architects or other professional men do not and never will countenance popular education in the technique of their professions. Building, if conscientiously considered, is just as much a technical profession as any of these. To judge accurately of the relative value of different materials for various structures and under an infinite variety of conditions calls for a very high degree of technical knowledge and to put these materials together efficiently and economically, to say nothing of artistically, is no child's play. One great trouble with the building industry today is that the public thinks it knows all about it.

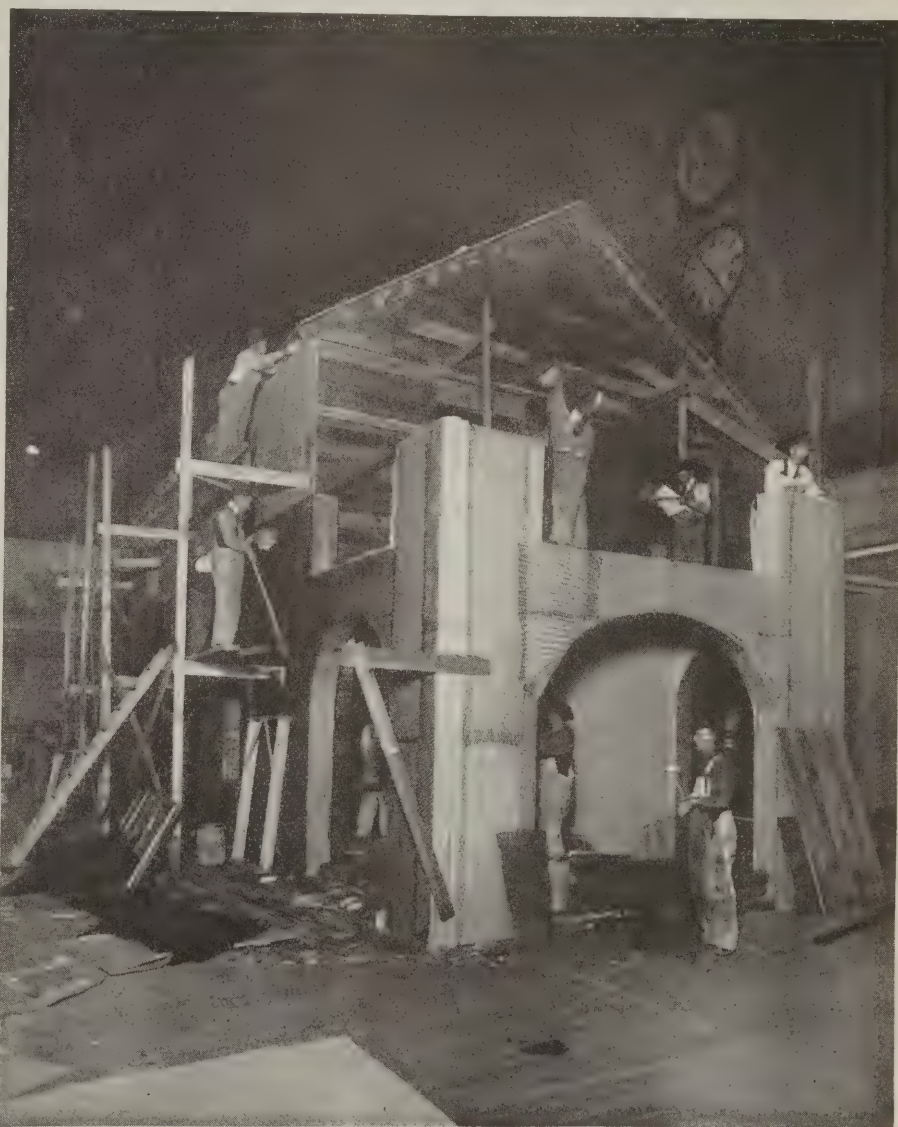
Probably architects and particularly contractors and builders, are partly to blame in not taking advantage of these occasions to

impress the public with the professional or technical character of actual building operations.

Cleveland Exhibits

One very noteworthy exhibit at the

Cleveland show was that of the Cleveland Lumber Dealers' Association. It was a display of model homes and ideal settings for them. The houses were designed by a firm of Cleveland architects and the landscape effects and every detail of the dis-



BUILDING A HOUSE IN FOUR DAYS

The Home Convenient, the full size house feature of the Fourth Annual New York "Own Your Home" Exposition which was held in the 69th Regiment Armory, April 22 to 30, under construction on the evening of the third day. Special laborers, carpenters, masons, painters, roofers and decorators worked in night and day shifts, completing the house on schedule late Friday night (the fourth day). Paper hangers, furnishers, and landscape gardeners took charge on Saturday and every detail was finished at three o'clock, the opening hour, on the fifth day



Exhibit of the Supply Dealers' Board of Cleveland



The treatments of materials in the exhibits were interesting and instructive



Each facade of this cottage showed a different treatment

play were executed by local concerns. The houses were all of wood and were mostly of colonial type. The model of a beautiful colonial mansion occupied the center of the stage. Tennis courts, a three-car garage, a summer house, a pool and other features of the entourage were appropriately placed with respect to the house. Around this central display, one walked in aisles simulating streets and viewed models of smaller homes, with their garages and natural surroundings.

No contractor or professional builder could view this display without visualizing the opportunities that are offered him for building beautiful homes for his community and what responsibilities rest upon him for building those homes well.

Another exhibit of unusual interest was that of the Supply Dealers Board of Cleveland, an association of about thirty independent dealers. They built a little brick cottage with a thatched roof mottled with variously colored asphalt shingles. A "crazy-quilt" chimney was a feature of their display—bricks of as many textures and colors as Joseph's coat, laid in a helter-

skelter manner. The house and the garden wall surrounding it, employed the same variety of brick, with a few tile, laid in the regular manner but mixed so as to give an interesting, mottled effect.

The Cleveland Builders' Supply and Brick Co.'s cottage was an inviting retreat. Each facade showed a different treatment of the materials handled by this concern, all harmoniously arranged, under the skilled direction of W. C. Carver, architect. A trumpet arch was a unique feature that suggested the possibilities of brick entrances. Other displays were also noteworthy, but space forbids their mention.

Of course, a comparatively few of the contractors of the country could visit this exhibition, although in numbers there were many in the trade who did see it. It will be an inspiration to them for all time, stimulating a host of ideas that they can bring to their customers. One could not help but be impressed with the number of exhibits of home conveniences and labor-saving devices and the interest shown in them. This suggests that perhaps the

contractor would find it profitable to look into the merits of these devices and possibly make use of them as selling points for the homes he builds.

Grate Fire Illusion for Steam Heated Room

THE Foy and Starr Company of Cincinnati have put on the market what they call the "Magic Fire," which is a grate illusioning live coals and fire, put into mantels, and which can have the electric heat unit or not, as desired. The grate is filled with nuggets of broken glass of cloudy texture. Concealed in the grate behind the glass are incandescent bulbs, around which revolve fans with toy windmill blades, which reflect the lights from the bulbs, and produce a glitter which makes the grate appear to be full of glowing coals, with a dancing flame over the top. When one sees this fire it seems to radiate warmth, and one can scarce believe there is no fire until he takes up a piece of the "coal" and finds that it is not hot. The idea is to use this to illusion a grate fire in steam heated apartments.

A Woman-Planned Small Apartment

Some New Ideas in the One-Room-Kitchenette Apartment Introduced by Mrs. M. A. Winterson, Wife of a Chicago Realtor

THE one and two room apartment has been very popular in Chicago ever

the main street and 100 or 125 ft. on the side street.

The two left-hand apartments contain two living rooms. The end apartment hav-



The Winterson Apartments, Chicago, Ill.

since the advent of high rents. It has become popular with typical, city, married couples with no children, and probably will always remain so because of its easy house-keeping facilities as well as its economy. There is more competition in this class of apartment-house design in the Chicago zone now than with almost any other type of building.

Bungalow designs by women are quite common. In many instances the wives of builders and architects are of great help to them in laying out homes, particularly bungalows. Mrs. M. A. Winterson, who is in the real estate business with her husband in Chicago, under the name Winterson & Co., has graduated from the bungalow field into apartment-house design.

The views and plan herewith of the Winterson Apartment building show some of her ideas carried out by a Chicago architect, Allen E. Erickson. The building is notable from having to fit a lot 30 ft. wide. These frequently occur in Chicago where 30 ft. is the standard lot width, and all the lots but the corner are built up. The corner lot then has a 30-ft. front on



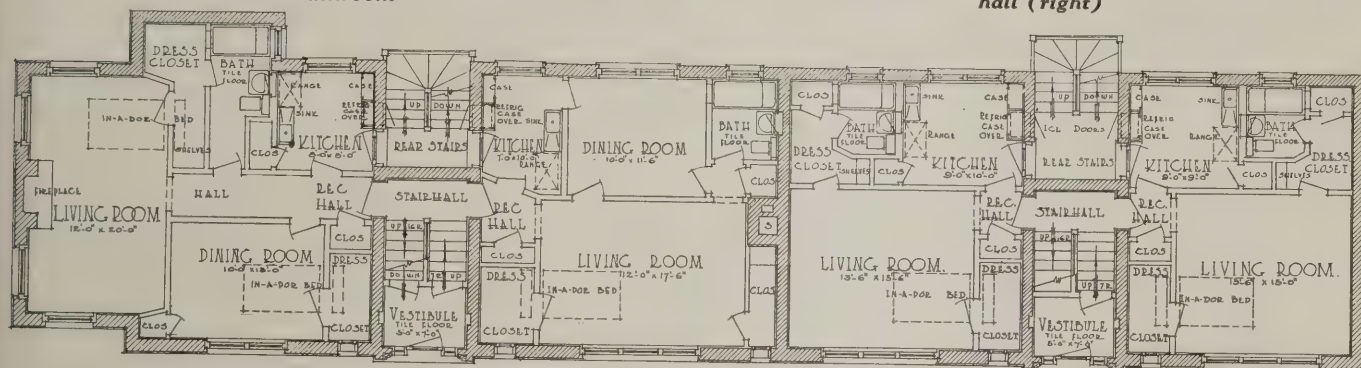
A woman's idea of kitchen convenience—Note kitchen closet



Living room of right-hand apartment, showing entrance to bathroom



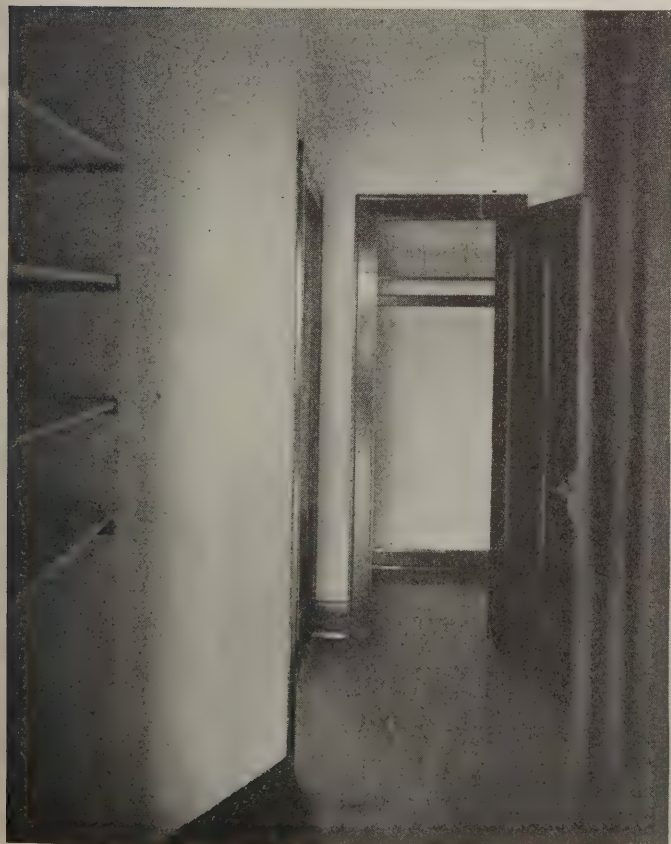
Living room, showing in-a-door bed closet (left), entrance hall (right)



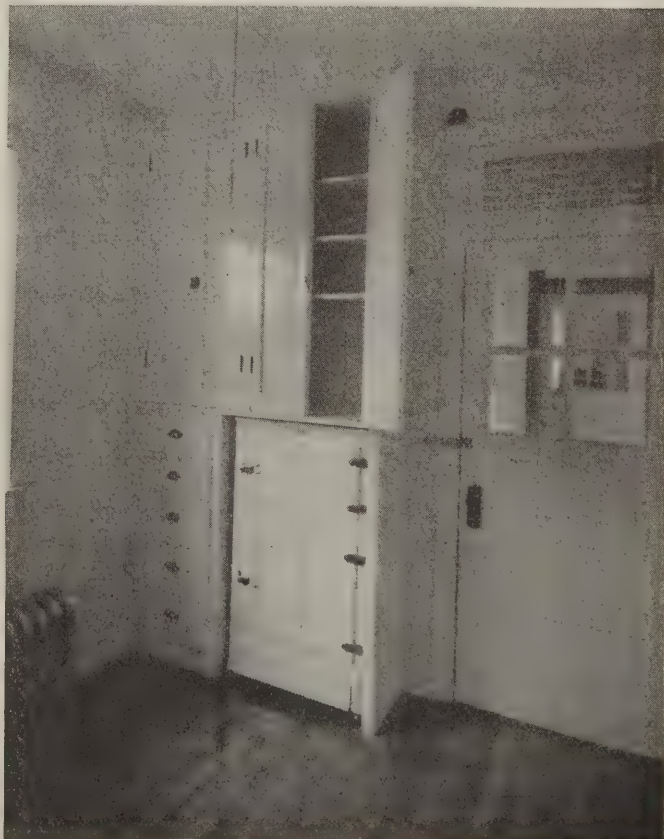
"WINTERLSON APARTMENTS"
A.E. COE, TALMAN AND BLAINE PL.
CHICAGO, ILLINOIS

FIRST FLOOR PLAN.
SCALE: 1/4" = 1'-0".
SECOND AND THIRD FLOORS SIMILAR.

ALLEN E. ERICKSON
ARCHITECT
CHICAGO, ILLINOIS.



Interior of dressing closet, showing clothes closet in rear, bathroom door at left and shelves at extreme left



Built-in kitchen cabinet with handy tier of drawers and outside icing refrigerator



Entrance hall, showing clothes closet (door open) on the left

ing two street sides is of course made the most elaborate and desirable. This apartment by use of in-a-door beds provides for two sleeping rooms. An interesting feature of this apartment is the arrangement of the bed so as to provide a passage around one side, through the bed closet, into the dressing closet and bathroom.

Every inch of space in this floor plan has been utilized for family purposes with

The bed closets are all made large enough to serve as clothes closets as well. All except one have outside windows. A particular feature is made of the extraordinary amount of closet room provided. Even the one-room apartments are provided

with entrance halls and hall closets. Another special feature are the dressing-room closets between the living room and the bath room, which insure a little more privacy than usual in the one-room apartment.

Radio Equipment and Lightning

DURING the next few months thousands of wireless telephone and other radio equipments will be subjected for the first time to the effects of lightning storms. This bare statement of fact may not appear to be of unusual significance or as relating particularly to the subjects of safety engineering, conservation of property or protection against personal injury until an analysis is made of the circumstances and conditions affecting the situation.

Perhaps the fundamental requirements of any lightning protection device is the assurance that a permanent, reliable and effective ground connection has been made and will be maintained and that the air terminals are securely and directly in circuit with the ground.

It is also a well-established fact that lightning discharges have no liking for magnet coils or other inductive devices and will seek almost any other path in reaching the ground than to pass through such coils, often jumping considerable distances in or-

and always maintained while the equipment is not in actual use, the conditions for damage from lightning are far more serious than they would have been before the wireless equipment was installed. An exception should probably be made for those equipments having inside aerials and with no wires extending above the roofs.

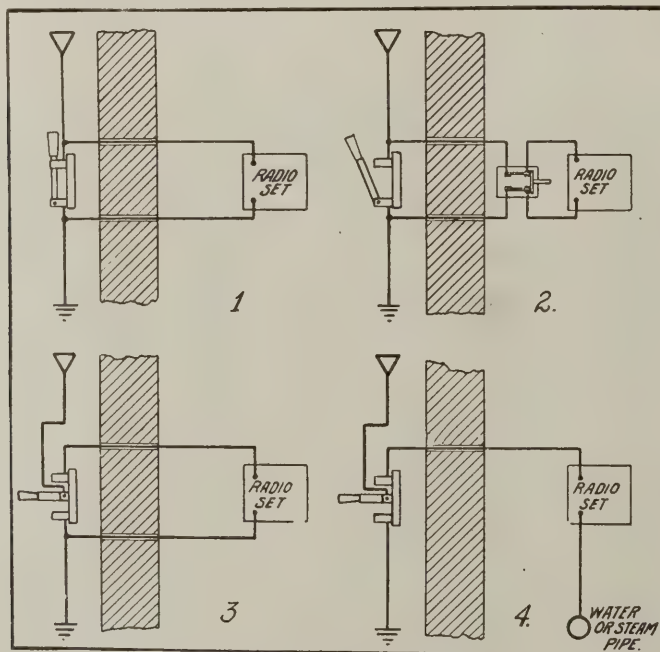
The ground wires for all outside aerials in particular should be kept out of the building as much as possible but may with propriety enter a cellar or basement in order to be connected to the water piping to obtain a good ground. In all cases special care should be taken to have the ground connection as short and free from bends and turns as practicable.

During lightning storms and at all times when not in use, the direct ground connection should be established and maintained.

The manner in which the ground connection is made to the equipment and to the aerial wire is one of importance, as even with the best of intentions the work may be done in such a way as to introduce unnecessary and possibly unexpected hazards. This may be better understood by reference to the several diagrams shown.

In Fig. 1 the aerial is found to be attached to the radio set at all times and the set forms a shunt across the terminals of the grounding switch. This is the least expensive form of installation using a switch. Where it has occurred to the operator that he may ruin his set by this construction he may install a supplemental switch within the building for disconnection of the set as shown by Fig. 2. It is most probable that a person would open this inside switch, but neglect to close the outdoor switch after using the set. Under this condition the entire outfit would be left without any ground connection. Assuming that the inside switch was left closed and the outside switch remained open as required for operating, any inductive discharges or lightning would have to attempt to pass through the coils of the set before reaching the ground wire and would probably find some other discharge path, puncture the coil or both.

A double throw switch is shown in Fig. 3 and is representative of general good practice, while Fig. 4 is similar except for the separate interior ground for receiving purposes, which is to be recommended.—*Data of the National Board of Fire Underwriters.*



Grounding radio equipments

all of a woman's ingenuity for such designing. A particularly good selling argument, according to Mrs. Winterson, is the kitchen closet, found in all the apartments except the middle two-room one. The refrigerators are all built into the kitchen wall so as to provide for outside icing.

der to follow a better path to the earth.

With these preliminary remarks we can now consider the make-up of a simple wireless telephone receiving set with its aerial wire, a ground connection and a tuning coil between them. Unless a direct path to ground from the aerial wire is provided

Tentative Minimum Requirements for Small House Construction

Summary of the Preliminary Report of the Building Code Committee of the United States Department of Commerce on Safe and Economical Construction

Part I—Walls

ONE of the big things that Secretary Hoover of the Department of Commerce is doing for the construction industry is the work of his committee on building codes. There are as many varieties of building codes as there are cities having building codes. Such codes are nothing more or less than specifications designed to control minimum requirements of construction. Therefore they are of equal interest to architects and contractors both in the cities where they have codes and in the country where there are none.

Building codes, like various practices in the building industry, have just grown up with the industry. In the case of specifications covering the design and construction of one and two family houses they follow rule-of-thumb and local precedent rather than engineering or scientific principles.

For the first time in the history of the industry a thorough-going study of the fundamental principles of house-building is now in progress. Engineers and architects of national reputation and large experience in the design and construction of all types of building are now developing the essentials of good construction as applied to houses and two-family homes. The object is to simplify as well as standardize many construction methods.

A preliminary report of the committee, was issued March 30. What follows is a summary of certain sections of this report. Other features of the report will be treated in subsequent issues of NATIONAL BUILDER. The committee is anxious that this report be fully discussed by qualified persons. Architects, contractors and builders are urged to report their views before final action is taken.

Thickness of Brick Walls

For a height of 30 ft., with an additional allowance of 5 ft. for the peak of a gable, a solid brick wall 8 in. thick is sufficient for an exterior wall provided at least every sixth course is a header course. Such walls are already allowed in many cities but their universal acceptance would effect a large saving.

The minimum thickness of party or division walls may be 8 in. for the uppermost 20 ft. of height exclusive of the gable walls, but at least 12 in. thick for the remaining lower portion. Chases are not to be allowed in any 8-in. walls.

Cement or Lime-Cement Mortar Necessary

The mortar used in laying up 8-in. walls must be cement or cement-lime mortar. By cement mortar is meant a 1:3 mix of portland cement and sand, with an allowance of 10 per cent of hydrated lime by volume of cement used, if desired. The cement lime mortar is made in the following proportions 1 cement, 1 lime, 6 sand.

The committee does not yet sanction the use of straight lime mortar in 8-in. walls for the reason of its weakness in compression and slowness of set as compared with cement-lime mortar. Where walls of greater thickness are used and reasonable care is taken to prevent undue loads the use of a straight line mortar should be optional.

Hollow Tile, Block and Brick Walls

The minimum allowable thickness of exterior walls built of hollow tile, hollow concrete blocks or tile, or hollow walls of brick is 8 in. for the uppermost 20 ft., and at least 10 in. for the remaining lower portion. An extra 5 ft. is allowed on the 20 ft. when gable ends are used.

The following reasons are given for allowing hollow tile and hollow concrete blocks less latitude than brick in the construction of 8-in. walls: (1) These materials are more variable in quality than brick and are not as fully classified according to accepted standards; concrete blocks especially need constant local inspection to insure a fair quality of material; (2) walls of these materials have less weight than those of solid brick and are therefore slightly less stable; (3) walls of hollow units are more liable to destruction in case of fire than are brick walls; tile and blocks made of certain materials being especially liable to damage; (4) the larger size of units, the difficulty of obtaining even mortar beds and the fact that webs

are not always superposed are considered to reduce the relation between strength of units and strength of wall as established for solid brick walls; the greater difficulty of anchoring joists and of bonding cross walls is considered to detract somewhat from the stability of such walls as compared with that of solid brick. Experience reported with walls of hollow units indicates, however, that the above considerations are not sufficiently important to justify a general increase in their thickness for small houses over that required for solid brick.

Party or division walls of hollow tile or hollow concrete block must be 12 in. thick and no block or tile can be broken for insertion of joists or building members. No chases are allowed in 8-in. non-bearing walls nor in any hollow wall 12 in. or less in thickness. Beams, joists or other concentrated loads must rest on bearing plates or courses of tile, brick or concrete. Broken building tile is not allowed for this use.

Frame Construction Walls

In frame construction exterior walls must be composed of 2x4-in. studding spaced not more than 16 in. on centers. All walls must be securely braced at corners (method of bracing not specified). Exterior walls except those of dwellings or parts thereof not more than one story high, must be sheathed with boards not less than $\frac{3}{8}$ in. thick, laid tight and nailed to each stud with not less than two 10-penny nails. Where sheathing is omitted all corners must be diagonally braced and such other measures taken to secure rigidity as may be necessary. Wood sheathing may be omitted when other types of construction are used that are proven of adequate strength and stability.

When joists are supported on ledger or ribbon boards, such boards must not be less than 1x4 in., must be laid into the studs and securely nailed with not less than two nails to each stud; in addition the floor joists must be well spiked to the sides of the studs.

Party or division walls between frame buildings occupied by not more than two

families each may be constructed of wood studding filled between with masonry or other incombustible material (loose material must not be used), and covered on both sides with metal lath and plaster. Such walls must be supported below the first floor by a masonry wall not less than 8 in. thick. Not more than four families are permitted in attached frame dwellings without a party wall of masonry, the same as required for similar walls in masonry-walled buildings.

Brick Veneer Walls

Masonry veneer applied to walls of frame structures must rest directly upon the masonry foundation of the structure, and must not be less than $3\frac{3}{4}$ in. thick. Flashing must be installed along top and bottom of veneered walls and around all openings. Other necessary precautions must be taken to prevent moisture from penetrating behind the wall. The masonry veneer must be securely attached to the frame structure at intervals of not more than 12 in. vertically and 14 in. horizontally. Masonry veneer must be provided with a backing or sheathing securely attached to the framework of the structure. Where space is left between sheathing and veneer, firestops must be installed at each floor level and opposite the intersection of partitions.

So far as structural stability is concerned well built veneered dwellings of the same height and under the same circumstances are considered the equal of those with solid 8-in. brick walls. However, this does not mean that veneer construction should be used below the first-floor line, or that it should be superposed on a 12-in. brick wall of any height as is permissible with an 8-in. brick wall. Veneered construction was considered to resist exposure (outside) fires far better than frame and is held by some to offer practically as good exterior fire resistance as an 8-in. wall. The resistance of a veneered wall to interior or internal fires is about the same as that of frame construction, except that when the space between the veneer and sheathing is poorly fire-stopped, difficulty is experienced in extinguishing such fires.

Stucco on Frame Construction

Flashing or other expedients adequate to prevent the penetration of moisture behind the stucco surface must be used around all wall openings and at all other exposed joints or edges. The studs must be continuous from foundation to rafters, and back plastering is required where sheathing is omitted. Where wood sheathing is used it must be of boards not less than 1x6 in., securely nailed to the studding. Sheet metal lath used for the stucco base must be expanded lath weighing not less than 3 or 4 lb. per sq. yd. Wire lath for stucco base must be woven or electrically welded and not lighter than No. 19

gage, with $2\frac{1}{2}$ meshes to the inch. Woven lath must have stiffeners at 8-in. centers. Wood lath must be standard quality narrow lath 4 ft. long and not less than $\frac{3}{8}$ -in. thick. Where back plastered construction is used the plaster must be of sufficient thickness to extend back at least $\frac{1}{4}$ -in. between the studs.

Penetration of moisture behind stucco

USABLE "STUFF" FOR WIDE-AWAKE BUILDERS

THESE are the tentative recommendations of a committee of experts. It may be many months before they are published in final form. In the meantime building goes on apace.

Wouldn't it be the best selling argument in the world if you said to a prospective purchaser, Mr. Man, MY houses are built as well as prescribed here? Probably many are building as well or better than these minimum requirements. If you are of these, why not cash in on that fact?

You will find these suggested maxims of fair building practice interesting. If you disagree, or want to commend them, write to the editor of National Builder. What's wanted is a free and full discussion; and the experience of practical builders is most needed.

The committee which submits these tentative specifications is composed of five well-known structural engineers and two architects. The engineers are Ira H. Woolson, consulting engineer of the National Board of Fire Underwriters; William K. Hatt, professor of civil engineering at Purdue University; Rudolph P. Miller, former superintendent of buildings, New York City; John A. Newlin, engineer of the Forest Service Laboratory, and Joseph R. Worcester, consulting engineer of Boston, Mass. The architects are Edwin H. Brown of Minneapolis, Minn., and Ernest J. Russell of St. Louis, Mo. Frank P. Cartwright, of the U. S. Bureau of Standards, is the secretary.

surfaces must be prevented. Poorly drained stucco surfaces should be avoided; copings, cornices, exterior trim and the frames of all openings should be carefully flashed or otherwise designed to carry water away from the stucco. Roof drainage should be built to prevent leakage and water should be carried well away from the stucco surface.

Wood sheathing laid horizontally is less apt to result in stucco cracks than when

laid diagonally. Ledger boards and diagonal corner braces let into the studs are advisable, and where sheathing is omitted bridging of the studs midway of each story is recommended. Such bridging must be kept back at least $\frac{1}{2}$ in. from the outside face of the studs.

Substantial building paper between furring and sheathing improves the heat and moisture insulating properties of the wall. Insulating material such as building paper may also be used effectively between back plastered construction and the inner plastered wall.

Metal furring and metal or wire lath should be galvanized or painted and securely stapled to the sheathing or to the wooden frame. Metal lath should be laid horizontally, the joints being butted and securely tied or laced with wire. Lapped vertical joints should occur over supports and should be well stapled to avoid lines of weakness. Wood lath is not recommended for cement stucco, but is satisfactory for use with magnesite stuccos. Surfaces to be stuccoed should be moist but not wet enough to yield moisture to the coat applied. Stucco should be machine mixed where possible, and careful attention given to obtaining uniform proportions and thorough mixing.

Three coat work is desirable. No coat should be richer in cement than 1 to 3; and lime should not be added in greater proportions than $\frac{1}{2}$ the volume of cement. Plastering should be carried on continuously in one general direction without allowing the plaster to dry at the edge. The second coat should follow the first within 24 hours, and in back-plastered construction the backing coat should be applied directly following completion of the brown coat. All necessary precautions should be taken to prevent the plaster from drying out before attaining its set.

(Another installment will deal with other details of house construction.—Editors.)

Wealth of Information Available for Realtors

"THE most complete modern library of real estate information on Chicago and vicinity is owned by the Chicago Real Estate Board," J. Soule Waterfield, board manager, says. "We have zoning maps from 100 different cities, a real estate record of all transfers of property here since 1910 listed by streets and numbers, the original plat book of Chicago, maps of all north shore towns and everything west to Proviso. Our fire atlas shows the minute construction of buildings. All this information is available free to our members.

"Maps of the Forest Preserve districts, the lake front developments and railroad properties are on the walls."

Sanitation, Heating and Lighting of Suburban and Country Houses

By Edward E. Ashley, Starrett and Van Vleck, New York City

No. 7: Materials—Fixtures—Closets—Bathrooms

IN considering fixtures, let us first consider the materials of which they are manufactured. There are three materials generally used:

- (a) Vitreous china,
- (b) Porcelain,
- (c) Cast-iron enameled.

Vitreous china and porcelain pottery dates back to 206 B. C. However, the de-

velopment of its use for toilet articles took place in the 19th century, although large stone and bronze bowls or baths were found among the ruins of the Egyptians and Romans.

due to its quality and method of handling allows for the expansion and contraction which these larger pieces of pottery require. It may be finished in different colors, depending on the glaze or enamel used, but is generally finished in cream white. Porcelain ware is not of as fine a texture and is absorbent and will craze.

Cast-iron enameled ware is understood to

will collect dirt and be difficult to clean. Consider, for example, the china pedestal lavatory with its simple symmetrical yet graceful lines with the china handled faucets and waste knob, also the enamel iron tub with the supplies over the rim with china indexed faucets and waste. Are not these a vast improvement over the same type of fixtures found in a bath room of 1895?

The water closet or toilet has made a steady march of progress, for today in place of the old hopper and enclosed wash down to the syphon wash down, which when operated closely resembled the roar of Niagara, to the noiseless syphon jet with its white seat, china tank and cover. Nothing to get out of order, save an occasional washer and simplicity in itself to clean.

The kitchen and laundry fixtures have not been neglected in this line of progress, and the well equipped kitchen has its porcelain or enameled iron sink with its integral drain board and back or for the less pretentious the sink and wood drain boards, always one and possibly two. Compare the present porcelain or enameled iron tubs to

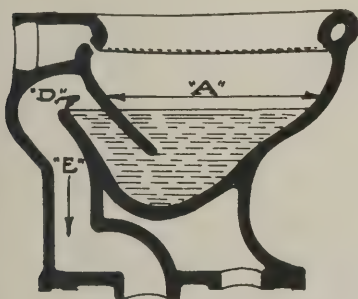


Fig. 40—Syphon jet closet

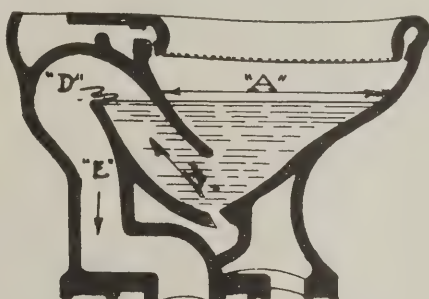


Fig. 41—Syphon action washdown closet. Reverse trap

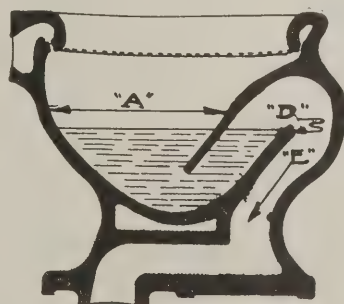


Fig. 42—Syphon action washdown closet

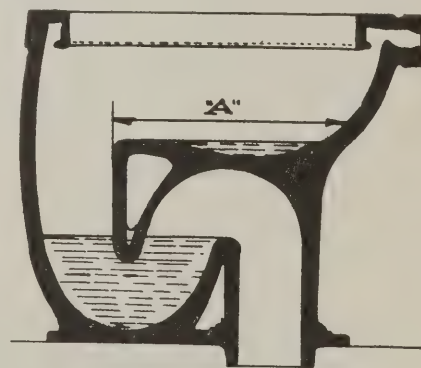


Fig. 43—Washdown closet

in a high temperature oven or kiln. Generally only the interior or exposed surface of the fixture is so treated, but as is the case with bathtubs, they are finished inside and out. It will not craze and is non-absorbent; it is used for bath tubs, lavatories, sinks and tubs and is most satisfactory.

The present day tendency is to make fixtures as simple and plain as possible, avoiding ridges, embossing or moulding which

the smelly wooden tubs with warped and twisted covers.

Plumbing Fixtures

In the choice of plumbing fixtures, utility, servability, quality and relative cost must all be considered, and also most important, what service will the manufacturer give after I have placed my order?

Before going into the matter of arrangement of plumbing fixtures in the house, it

Porcelain as used in the plumbing trade is understood to designate a fixture of a fine clay moulded into required shape allowed to dry slowly, then coated with a white glaze or coating, placed in a kiln and fired, and when completed has the general appearance of vitreous china, excepting that it is heavier in appearance. It is particularly adapted to making large pieces such as bath tubs, wash trays and large sinks. For

would seem necessary to describe briefly the several fixtures which are most commonly used.

Water Closet

There are three types of water closets—syphon-jet, syphon-action wash-down and wash-out, each differing from the other in the arrangement of the trap.

The Syphon-Jet Type of Closet—This is recognized as the very best type of water closet made. It has a more positive, quicker and quieter action, a larger water service and deeper seal and a larger outlet passage than any other closet. It is longer than any other type closet, permitting a much larger trap way. This allows the water level to be brought up higher, resulting in a considerably larger water service, completely covering the surface of the bowl (A).

The instantaneous flushing peculiar to this closet is acquired by a direct stream of water from the flushing inlet being forced up the outlet passage (B).

The large trapway and passageway to the soil pipe reduces the liability of the pipe to clog and makes this closet the first choice.



Fig. 44

The Syphon-Action (Reverse Pattern)—This action of this closet differs from the syphon-jet in that the flushing or syphonic action depends upon the rush of water from the flushing room of the bowl raising the

water level (A) in the bowl sufficiently to force the water over the dam of the trapway (D). This water, being slightly retarded by the construction of the outlet passage, fills the downward passage (E) and starts the syphon.

Owing to the trapway running toward the back of the closet, this fixture is very often taken for the syphon-jet. It has not so large a waterway as the syphon-jet nor is it as quiet.

The syphon-action type of closet is practically the same as the syphon-action-reverse, excepting that the trap outlet passage runs toward the front of the closet. This closet would be second choice and would be used where funds would not warrant the purchasing of the syphon-jet closet. It should, however, never be installed where the noise from flushing would be objectionable.

The Wash-Down Closet—This is a closet designed for factory use where it will be subject to extremely rough usage. It is simply a closet provided with an extra large passageway to eliminate the possibility of clogging and merely has a deep trap to seal

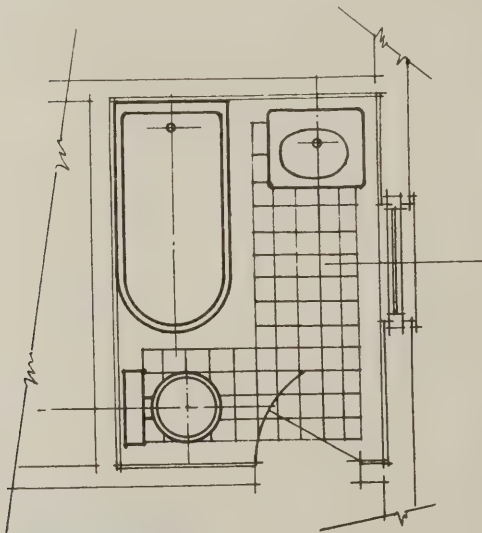


Fig. 45-A

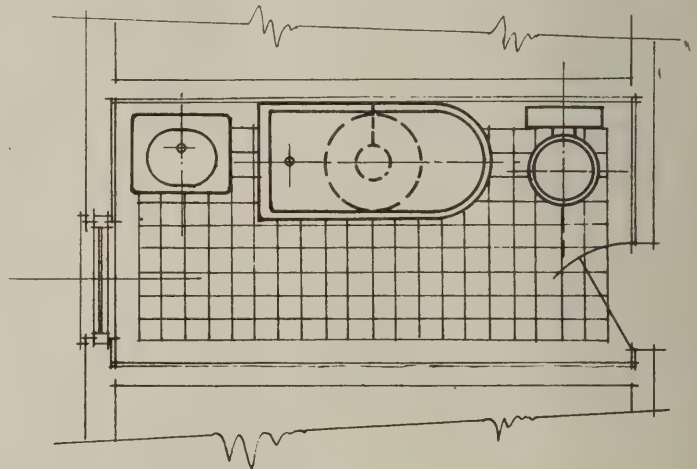


Fig. 45-B

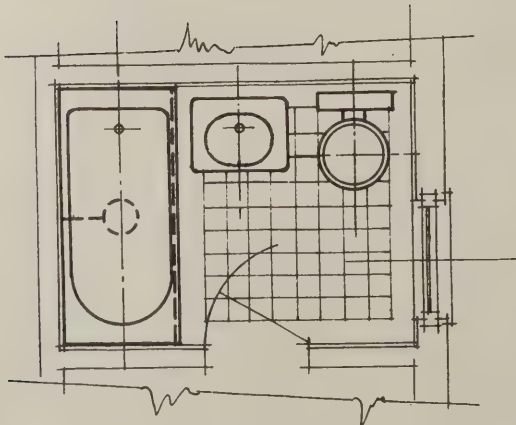


Fig. 45-C

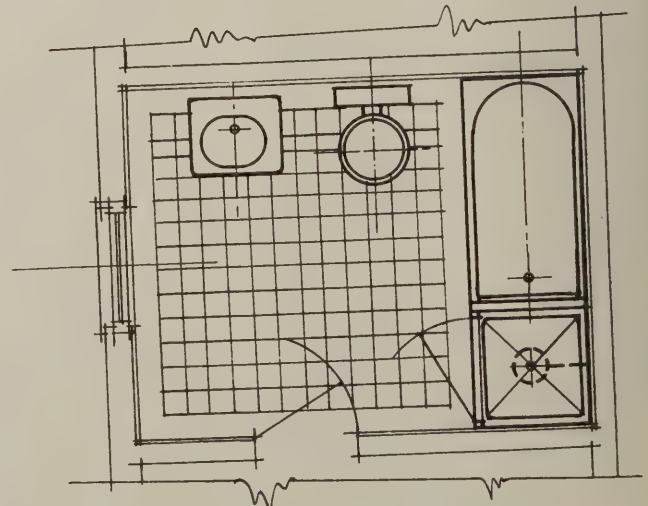


Fig. 45-D

against sewer air and has a very limited water surface. It is not at all adapted to household use.

Water closets should be provided with a flush tank—either high or low type—in preference to the flush valve, for with the varying conditions and water pressures the flush valve is more or less likely to give trouble and will be noisy.

The high tank is probably the most quiet, although it does not present quite the neat appearance of the low tank. The tanks in either case should be vitreous china provided with a cover and equipped with $\frac{1}{2}$ -in. float operated supply valve, which provided with substantial copper float will effectively close against the water pressure.

The discharge from tank should be of such design as will operate practically noiselessly, and after each discharge of tank will provide an after-flush or re-fill of sufficient volume to fill the closet trap. The flush pipe for the high tank shall be not less than $1\frac{1}{2}$ -in. diameter and that for the low tank not less than 2-in. diameter.

The closets should be provided with substantially constructed seats with covers. The seats finished with white pyralin are preferable, as they are practically non-destructible and easy to keep clean.

Arrangement of Fixtures—Bathrooms

In laying out a bathroom care should be taken that ample space is provided so that fixtures are not crowded and are all readily accessible, as should all the fittings and trimmings. The connections to soil and waste lines should be simple and as short as possible.

The lavatory should have the favored location so that best light may be obtained for shaving, etc. It should not be crowded into a corner, but plenty of arm room provided. It should have ample top; the bowl should be large and the water supply should be of sufficient volume to quickly fill bowl and so located that water may be quickly drawn into hands or glass.

The bath should be located so as not to shut off accessibility to the window and should be provided with extra large water supply and waste connections to facilitate filling and emptying. Avoid long horizontal waste connections, for these make emptying of tub very sluggish. The tub should be either 5 ft. or 5 ft. 6 in. in length, excepting only when space conditions require smaller and, preferably, of enameled iron, for if of porcelain it will require a considerably greater supply of hot water, necessary to heat the great mass of pottery to the temperature of the bath water.

The water closet should be of the silent syphon-jet type, for nothing is so annoying as to have the house re-echo with the flushing of a toilet. It should, for convenience, be of the low type; that is, the top bowl should be not over $13\frac{3}{4}$ in. in height. It should be provided with a vitreous flush tank with silent syphon and ball cock and

provided with a white seat and cover. There are several very good types of these seats on the market that have been tried out and are very reliable.

When desired, a shower bath may be added—either as a separate unit or by placing it on the bath tub—when, as a separate unit, it should be provided with a porcelain or enameled floor receptor with a large drain $2\frac{1}{2}$ or 3 in. The floor should be

waterproofed under this receptor to prevent water damage to the ceiling below. The most satisfactory shower is the one provided with independent hot and cold water control valves, notwithstanding the many statements that there are satisfactory mixing valves. The shower head should be located to the rear of the compartment and be adjustable.

(To be continued)

Brass Piping for House Plumbing

The Economy of Brass Piping Broadly Considered

AT the general conference on the housing problem held under the auspices of the American Society of Civil Engineers in New York City, in January, 1922, William H. Ham, general manager of the Bridgeport Housing Co., Bridgeport, Conn., said:

"For the complete plumbing of seven types of houses, the speaker obtained cost figures which varied from \$408 to \$475 per home, using 1-in. steel pipe for the water supply. The use of wrought-iron pipe would have added about \$8 to the cost, and brass pipe from \$35 to \$38. The cost of piping is a small part of the cost of the house. These houses averaged in value from \$4000 to \$8000.

"The selection of the proper kind of pipe is a serious question in all communities. The speaker wishes to inquire whether some water supplies are of such chemical quality that the use of brass pipe is inadvisable, and whether there are any data on the carrying capacity of new to four-year old brass pipe in comparison with the capacity of steel or iron pipe of the same age? Such data would be desirable to people who are buying homes.

"The speaker is removing a certain kind of pipe in 39 apartments, in which there were 120 leaks in the hot-water system alone, and about the same number in the cold-water system. The $1\frac{1}{2}$ -in. pipe is being replaced by 1-in. pipe, and the $1\frac{1}{4}$ -in. pipe is being replaced by $\frac{3}{4}$ -in. brass pipe. The speaker did not know, before he investigated the subject, that for a \$5000 or \$6000 house the difference in the cost for the use of brass pipe from the street to the house, and out to the hose connection, was only \$38. Such matters should be brought to the notice of the public, as they are important facts which affect the housing situation. The speaker's company bought from the government 257 houses in which steel pipe was installed, which will have to be removed in about six years. After $2\frac{1}{2}$ years of use, some of the pipe is rusted to such an extent that it is being removed in the damaged places.

"It would be well if water supply engineers not only codified these facts, so that instead of using $1\frac{1}{4}$ -in. steel pipe, one might use $\frac{7}{8}$ -in. or $\frac{3}{4}$ -in. brass pipe, but also furnished data as to localities in which brass pipe may be safely used."

Testing Fiber Board for Strength

THE strength of paper or fiber board varies greatly according to the amount of moisture in it, and this amount is continually changing with the atmospheric conditions. As the relative humidity of the air increases, the strength of fiber board declines very rapidly. A piece of corrugated board tested at the Forest Products Laboratory showed a decrease in strength, by the Mullen test, of 59 per cent when the relative humidity was raised from 65 to 97 per cent.

When fiber boards were subjected to a low, then to a high humidity, and later tested at the low humidity, the results were practically identical with those obtained before the increase in moisture. This proves that the boards had not been injured by the change in humidity, and that variations in the strength of the boards at different humidities are entirely due to a change in moisture content.

The experimental work shows conclusively that when fiber board is bought and sold on strength specifications, the humidity at which the board is to be tested must be stated.

Handy Man Book—Plumbing and Heating Encyclopedia is a 240-page catalog and price list of plumbing and heating supplies, describing and illustrating a great variety of types of installations, interspersed with tables and related data. A full index at the back of the book, and retail and wholesale prices with net discount sheet are given. Issued by the Hardin-Lavin Co., 46th and Cottage Grove avenues, Chicago, Ill.

Questions, Answers, Kinks and Discussions

Edited by V. L. Sherman

Herein is a Department of Mutual Help for the Exchange of Experiences and Ideas. It is Not Only Well Worth Your While to Give Your Experiences for What You Get Back from Others, but National Builder Pays You for Doing So in Good Hard Cash

Wall Plastering Around Chimneys

Soon after the issue of NATIONAL BUILDER for March of this year a few of us were discussing the illustration on page 21 showing wall plastering directly on the brick of the chimney (Fig. 1). The first

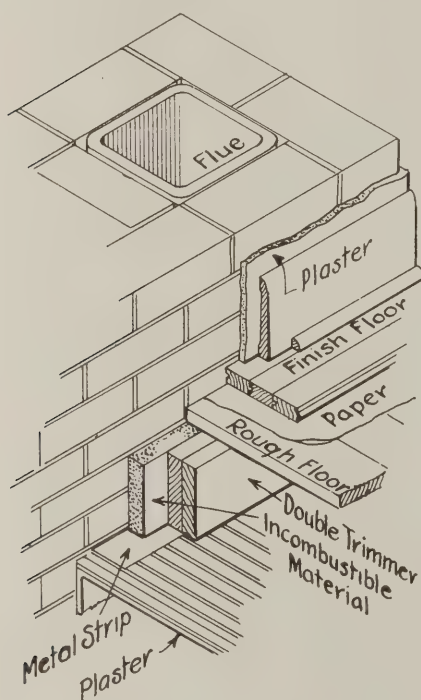


Fig. 1

point taken was that such work was an error in that the settling of the house or the shrinkage of the timber would cause plaster cracks where the chimney joined the house wall or a partition. This was answered by the statement that cracks of equal size were general in the house of average build owing to shrinkage of timber, and that as such shrinkage took place in the first year or two, and at the same time as there was likely to be some settling, no great harm was done. Whatever harm there was would be compensated for by the extra space, time, and

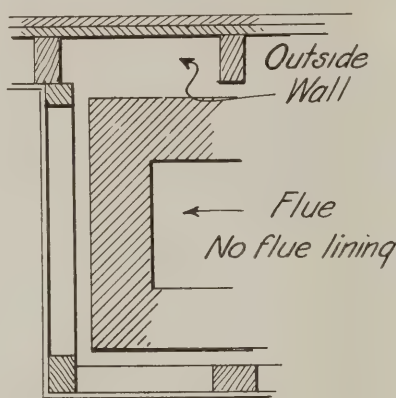


Fig. 2

material. One of the party suggested that prevalence of this method would lead to its use in buildings with unlined flues, which are common in the cheaper houses, and would upset all the work carried on for fire prevention.

The general conclusion was that while there was nothing out of the way in bringing the wall line to the brick, eliminating risk by insulation, keeping the framing away, and lining the flue, there was more chance for cracks in that the construction lying next the chimney was apt to hang to it as the frame settled.

In this connection Kidder says in his *Building Construction*: "In the Eastern States it is customary to furr around all chimneys with 2x3-inch or 2x4-inch studding, usually set flatways (except in outside walls). See Fig. 2. The object of this is to form a nailing for the base, chair rail or picture moulding, and also to prevent cracks that are almost sure to occur where a wooden wall joins a brick one. The studding should be kept at least 1 inch from the brickwork, and should be set plumb, bridged at least once, and the angles made square. If the chimney comes in a brick wall it is usually furred around in the same way. "In some of the Western States furring around chimneys is almost invariably omitted, and the author, after several years' experience with both meth-

ods, is of the opinion that, except against outside frame walls, it is better to use fire-clay flue lining and then plaster directly on the brickwork. Where the chimney is furred it is difficult to completely stop the space at the floor levels, and if fire does occur it has a chance to make considerable headway before discovery. By building the chimney as shown, (see Fig. 3), and covering the flush side with metal lath, lapped on to the studding, there will not be much likelihood of cracks."

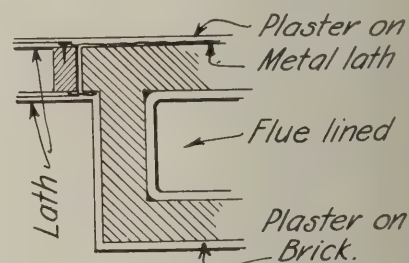


Fig. 3

Cracks will come wherever plaster is used and their recurrence does not seem sufficient reason for not plastering on brick. However, with painted or calcimined walls the difference between lath and brick under plaster is noticeable and probably makes the chimney line conspicuous where lath is used.

Heating Fixtures for Use With the Blow Torch

G. A. L., Washington, D. C., sends this suggestion: "As an aid in heating parts with the blow torch the fixture, as shown in Fig. 4, is exceedingly useful, and can be easily rigged up from a piece of pipe and two wrought iron supporting legs. The pipe is set at a height corresponding to the height of the tip of the torch flame, and an opening is cut in the center of one side. The parts to be heated are inserted through the end of the pipe. The opening in the center allows the blast to be concentrated on the

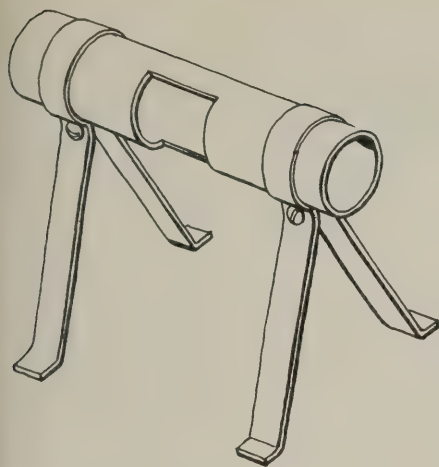
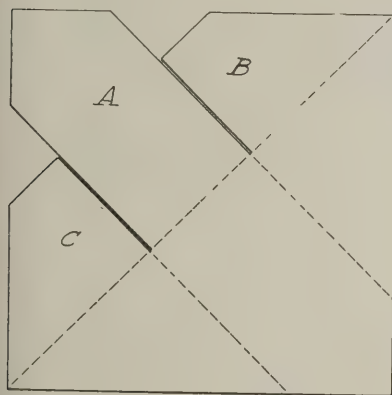


Fig. 4—Blow torch fixture

section to be heated, while the other parts of the work are protected by the pipe. As a soldering bit rest alone this fixture is a thoroughly worth-while addition to the mechanic's tool kit."

Making Screen Frames

J. N. F., Alton, Mo., writes: "In making screens and other frames I mitre the corners, then I cut a piece of tire 3 inches



Bend on dotted lines leaving A until last. A-B-C should be cut as wide as frame is thick.

Fig. 5

square, as indicated by drawing, Fig. 5, and nail neatly over the corners. It makes a first-class job."

More About Garage Rafters

B. P., a practical draftsman and builder of El Cajon, California, writes: "Referring to the article 'Garage Rafters' in your April issue, the builder wishes to employ a very useful principle, but in this instance, at a disadvantage, I believe, for now his beam would contain as much lum-

ber as 2x14, which would be much stronger than his reinforced 2x10. As to the relative value of his method over 'cross bridging,' I should prefer the way he does it. The cross bridging adds no entire strength; it makes the joists work together only, and the boarding on top would do that in this instance. But the 1x14 studs do help to support the piece in three ways: First, if they are well nailed from end to end they help to resist the tendency of the fibers to slip or 'sheer' as the middle is sprung down and the ends drawn in. Second: If well fitted at the top they do resist the downward action, but to a small degree—the angle is too low. Third: If the members break in any part but the middle they must take these down with them. I have used this method a great deal, but when I cannot get a rise of at least one-tenth of the run I do not use it. In building up flat roofs a strong job can be made of two scantlings tied and trussed together (see

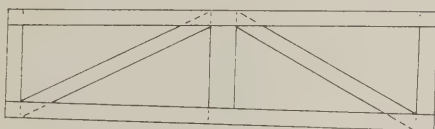


Fig. 6

Fig. 6) and the top members may be adjusted to make the water flow to any point desired."

My views in this may not sound orthodox, but the statement of S. P. that the roof boards would "make the joists work together" as well as the cross bridging does not quite suit me. From a number of experiences outside building construction I have found that the co-ordinated strength of members amount to a lot more than most of us realize. Some years ago on a trip down the Ohio I first noticed the "hump" which is so pronounced in a long side-wheel steamer with powerful engines. Each time the pistons came to the strongest positions of the cranks the paddle wheels would fairly lift the boat out of the water amidships. The fact was that the boat was just out for the spring and pretty stiff. Later as the timbers worked together the "hump" would become less. In any construction parts should sustain or relieve each other.

When a house is founded deep enough to catch vibrations through the earth and is well built the vibrations will travel through the whole structure so well distributed that you will only notice the vibrations when lying on a bed or lounge where the springs can pick it up. The same is true when vibrations are caused by moving floor loads or gusts of wind. But with houses where the joists are too light and the cross bridging a matter of form you will find very different results. Roof boards or flooring do not take the place of cross bridging.

Putting Plans and Elevations into Perspective

One reader, referring back to a paragraph in an earlier issue on sketching houses in perspective from the plans, says that he has tried the scheme out with considerable success by keeping a textbook on drawing directly under his nose while at work. He remarks that he would enjoy the process more if he could dodge the textbook occasionally, and asks help in a "comprehension of the technicalities."

There are numerous and long descriptions of the use of plans and elevations in making perspective drawings, some of them entirely ample and correct, but as complicated as the moves in chess. The average student of perspective drawing, shades and shadows and descriptive geometry gets to mid-channel and then loses his propeller. This description is short and may seem a bit loose to the finer sensed, but I am going to suggest the idea of an eastern professor who lost all patience with one of his scholars, made him a head rest with a peep hole, set him in front of a window, gave him a glass crayon and bade him mark the lines of the house opposite on the window pane. The scheme proved such a success that it was used a great deal later.

In Fig. 7 the ground plan of a house is shown tipped at an angle which will show the front and side. Windows and doors are indicated and the roof plan is dotted in. You are supposed to be looking down from above on the house, and on a person placed at the station point (in the figure the station point is by scale 80 ft. directly in front of the house corner) and on a very large sheet of glass marked vertical plane, which is placed at the house corner and at right angles to the line of sight from the station point. The edges of the house all strike the glass sheet in lines converging at the station point, and are so marked. Assume now that you take the place of the person at the station point and turn the sheet up in front of you. To do so you drop the points straight down from the vertical plane. They will mark the breadths as they would appear if you were marking on the glass.

The height of your eye above the grade marks the height of the horizon above the grade and may be taken wherever you like. In this case it is about 6 ft. Draw a horizontal line across the plane at eye level. Since parallel lines always meet if carried far enough you can mark a converging point, or vanishing point, on the vertical plane by sighting down to it on a line parallel to the side of the house. This point, dropped to the horizon line, provides the vanishing point in your perspective drawing. The corner of the house which lies directly in the vertical plane makes the height of the corner edge of the

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You Will Build as Well as You Know How When You Know How to Build

THAT heading is a mental teaser. If you know how to build you will know that you excel in some lines but not in others, or that it will pay you to get the assistance of architects or engineers to give life to your craftsmanship or managing ability. Then you will grow.

* * *

But—if you are content to build only as well as You—You Only—know how, you will be working up-hill, against the whole influence of industrialism and the credit that lies behind all easily salable and desirable goods or buildings.

* * *

That is shooting pretty high. But think it over. It will pay.

* * *

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* * *

First is the explanation of how plans to meet the requirements of any prospective home-buyer may be prepared from any design that hits his fancy. You will find that information on page 41.

* * *

Second: When you are asked how much you think it would cost to build a house "answer not a fool according to his folly" but study out that scheme of Short Cuts in Rapid Estimating, on page 48 and increase your business and reputation for knowing your business.

* * *

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Volume 65

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Number 7

The Situation

ALL things considered *producers* of building materials are showing considerable reluctance to make appreciable increases in prices. It is said that they are pretty thoroughly convinced that a continuation of the present building program hinges to a considerable extent on keeping prices somewhere near present levels, which, as every one knows, are still nearly double the prices of 1912 and '13. Unfortunately for builders the producers seldom control the ultimate sales prices to consumers, and there are numerous instances where jobbers and dealers have taken advantage of local shortages. Examples of this in the coal industry have lately received much publicity.

May records of building contracts let exceed all previous records, beating the April figure by 3 per cent. Thus far 1922 is something like 60 per cent ahead of last year, according to the F. W. Dodge Co. statistics. Every section of the country shows increasing construction activity, and nearly 40 per cent of the whole is residential. In view of the stand taken by some authorities that the housing demands in cities are being met, this figure is interesting.

In general, the total value of contracts awarded in May increased much more than the amount of floor space. This emphasizes the facts brought out by other data, indicating a substantial increase in the cost of construction. All index numbers of construction costs increased during May. Aberthaw's index for concrete construction rose from 157 on May 1 to 169 on June 1. This was due to the rise in both material and labor costs. Other indices showed similar trends.

The production of most building materials, as reported, also increased in May.

Freight Rate Reduction Negligible

The reduction in freight rates of 10 per cent, effective July 1, 1922, as applied to the rates authorized August 20, 1920, is relatively insignificant and was a great disappointment to producers of bulky building materials. B. F. Affleck, president of the Universal Portland Cement Co., Chicago, is authority for the statement that the freight cost from mill to destination will

be reduced only 4 or 5 cents per barrel, while the manufacturing costs, through lower freight rates on raw materials, will be lowered 1 or 2 cents per barrel. The total saving in freight rate, or the reduction in the price of cement it will effect, amounts to about one-fourth as much as the price was recently raised in the Eastern markets because of increased cost of coal and labor. Cement prices in the Central West were recently advanced by manufacturers 10 cents per barrel for the same reasons.

In the case of crushed stone, sand, gravel, brick, lumber and some other commodities, rate reductions in many instances greater than 10 per cent have been made since August, 1920, and present rates will not be affected at all.

The best thing that the rate decision can do is to give the assurance that conditions in that direction at least are fairly stable.

Coal and Railway Outlook Make Prices Uncertain

One thing the building contractor can be practically certain of, it would seem, is that prices during the *present* construction season will *not decline*. The coal strike has already added appreciably to the price of coal, which is a large factor of cost in the manufacture of nearly all building materials. When coal does move there is likely to be such a transportation jam as we had in 1920, and cars for construction material will be scarce and slow of movement. Added to this dubious outlook is the possibility, at least, of a strike of some or all of the railway crafts.

Doubtless it is a more or less general appreciation of some of these uncertainties that is causing the scramble to build now. Various authorities think that producers' prices have not yet fully reacted to this great present demand, but it is a fact that the index price of construction materials has been creeping up the last month or two and it is predicted that it will increase about 10 per cent more during the season. Such an increase will make it about 15 per cent above the price index at the beginning of the season.

Wage Situation

The situation of the building trades in

relation to wages does not appear to have changed much in the last week. In Chicago the agreement between the painters' union and the painting contractors has expired and the forced reduction of the wage from \$1.25 to 95 cents per hour has resulted in making the painters' union one of the outlaw unions, with which the Citizens' Committee, under the Landis award, is attempting to deal.

The Chicago building trades unions, or some factors in them, solicited the assistance of the construction labor department of the American Federation of Labor at the recent Cincinnati convention, but with little apparent success. The Citizens' Committee seem to have the situation more in hand than at any time yet, and if there is as much slugging as there was a while back, certainly less is heard of it.

The American Construction Council

The tragedy of the coal mines at Herrin, Ill., on the night of June 21, where some forty-four men working at the mines were murdered, came at the close of the organization meeting in Washington, of the American Construction Council, the proposals of which were announced in these columns last month. Elsewhere in this issue an abstract of the proceedings of the organization are given. It is obvious that if constructive civilization is to go on there must be a general rapprochement and a larger understanding of rights and wrongs in the industrial hive, and an arbitrament that will be acceptable to all right-thinking people established. The tragedy of the coal mines is a prototype of the tragedies that have been occurring in the construction industries from time to time for years. Men inflamed by passion and resentment at real or fancied wrong murder their fellow-men, among them those whose necessities compelled them to seek their bread at any opportunity—the innocent and the thug indiscriminately.

If the American Construction Council can bring a strong light to bear on *all the facts* affecting the construction industry, the strong sense of the American people can be depended on to do the necessary adjusting without the legal chicanery that has made a maze and mystery of our laws.

Two-Family Residence of Frame

By Theodore F. Laist

The Two-Flat Building as an Investment. See Working Drawings in Detachable Insert in this Issue

THE two-family residence has always been, and probably always will be, a very popular form of investment for people who wish to escape the landlord and at the same time do not care to shoulder the responsibility and expense of an individual home. Such buildings will usually pay for themselves within a reasonable time. There is no risk since it is seldom that the supply

of the two-flat building now as before the war; in fact, more good reasons why the average person should build this type of a home. Yet it is apparent to anyone that the number of two-family dwellings built within the last three or four years has fallen off tremendously. The reason for this is to be found in the large investment required. Before the war it was possible to put up a five-

trated in this issue, has been designed to meet the requirements of the small investor. The building has a frontage of 22 ft. and may, therefore, be placed upon a 30-ft. lot. It is designed to be built of frame, but may satisfactorily be built of frame, brick veneered or stuccoed. The architect has endeavored to give the building the appearance of an individual residence. It will not,



A small two-flat building that appears like a single residence

exceeds the demand, for the reason that the net returns are never equal to those from a six-flat or larger apartment building. Therefore this form of an investment offers no appeal to the large investor. The two-flat building is not a big money maker, but offers a safe investment and at the same time convenient home for the man of modest means, without burdening him with any great responsibility or indebtedness.

There are just as many reasons in favor

and six-room two-flat brick building for from \$6000 to \$7000, representing a total investment of about \$8000, involving a cash investment of about 20 per cent of this amount. It now requires an investment of from \$10,000 to \$12,000 for a very modest two-family building of this type, which does not include the cost of the lot.

Description of the Building

Size of Lot—The building, which is illus-

trated in this issue, has been designed to meet the requirements of the small investor. The building has a frontage of 22 ft. and may, therefore, be placed upon a 30-ft. lot.

The Floor Plan—Each flat has an individual entrance. The living room extends across the entire front and is entered from a small hall. This room is of large proportion—11x21. From the living room one passes directly into the dining room, in which there is concealed in a wall closet an upright bed which may on occasions be used, or if need be, the dining room may

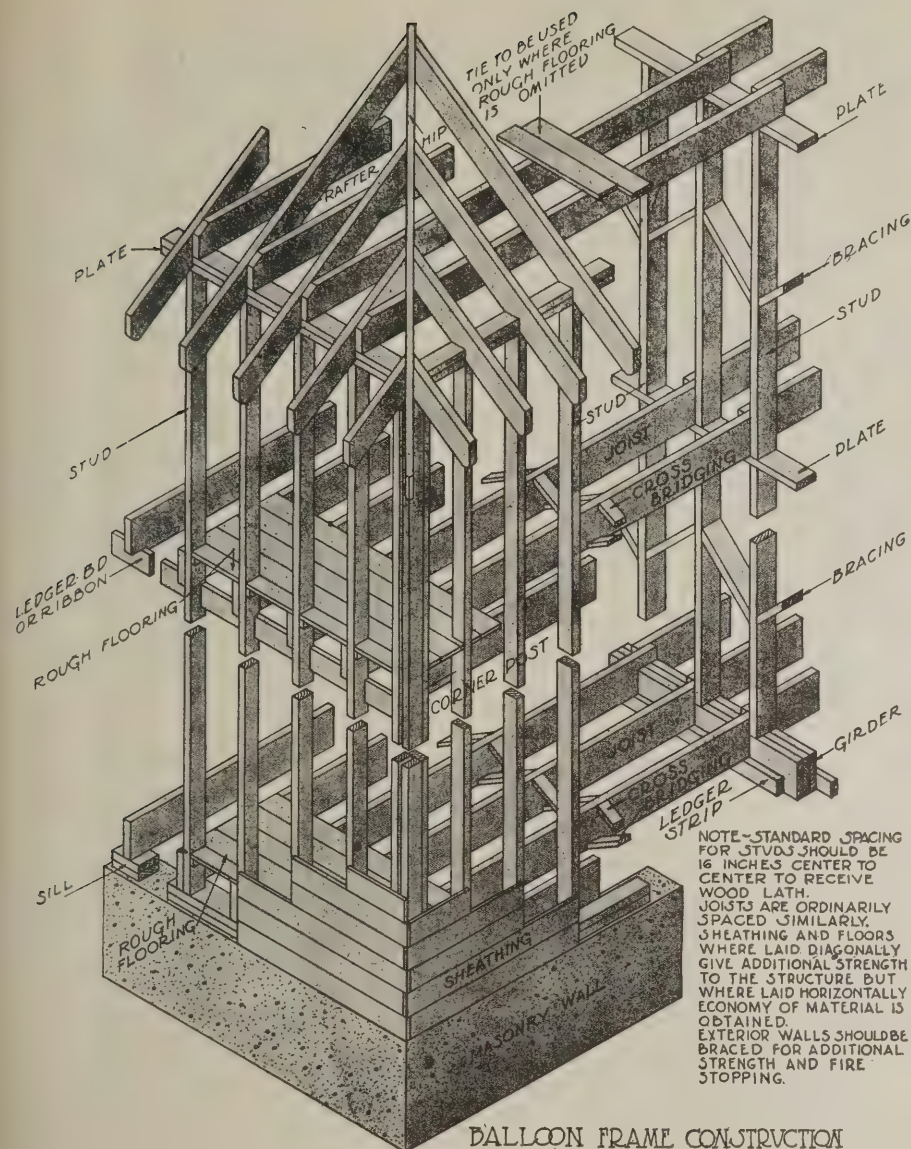


Fig. 1*

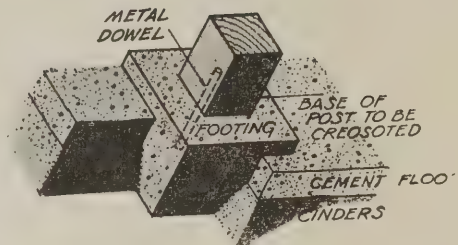
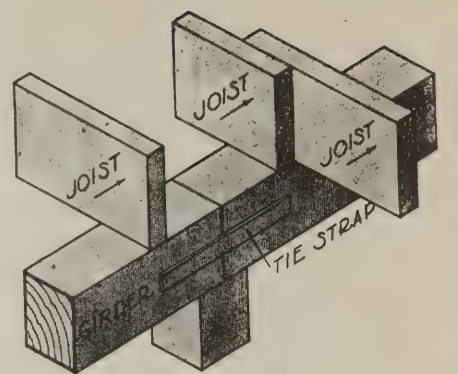
regularly be used for the dual purpose of a dining room and sleeping apartment. From the dining room one passes into a small hall around which are grouped the bathroom, a large bedroom, and linen closet. The kitchen is in the rear of the dining room, with which it communicates directly. A pantry of ample proportions is provided, space for a refrigerator which may be filled from the outside, and all other modern conveniences compactly arranged to avoid unnecessary steps are shown. From the kitchen extends a rear porch furnished with broom closet and other utilities.

The Basement—The basement is divided for the individual use of each tenant. The plans show each floor heated from a separate furnace, although if desired these two heating plants may be combined and operated by the owner, thereby insuring an increase in rent and a larger return, since the

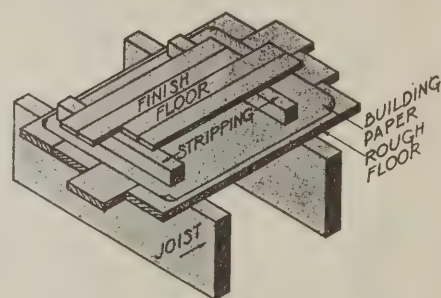
combined plants may be operated more economically than two single ones.

The Elevation—The front has been designed in Dutch colonial style, so popular for suburban residences. The popularity of the gambrel type of roof is not without good reason, for it enables the architect to design a house of narrow width in good proportions with great economy. One of the greatest difficulties in the designing of a house of this kind, only 22 ft. in width, is to keep the effect low. To accomplish this purpose the floor of the porch is kept but a few inches above the ground. The same effect may be obtained by raising the first floor level three or four feet above the sidewalk line and terracing the front.

The house would look well constructed with wide siding or shingles on the side walls surmounted by a shingle roof. If desired this house could be erected within the fire limits by veneering the wood frame with brick, or in some cities by constructing the exterior of wood sheathing covered with



Detail of posts in basement



Use of stripping in floors to provide space for conduits

Fig. 2*

metal lath and portland cement plaster.

Several alternative arrangements are suggested for the front. For example, the entire front porch may be glazed or one-third of the space might be enclosed for a sun porch and the other screened. For the sake of economy, the covered porch might be cut down to one-third its present size and the roof extended over only that portion. In this case the remainder of the area could be terraced and would become a very comfortable retreat, open to the sky, on hot summer evenings.

Construction Details

Frame—The frame will be of the type known as balloon framing which is used universally throughout the Middle West. The perspective presentation shows the arrangement of the timbers so clearly that even the layman will understand. The exterior is sheathed, the joists are cross bridged, and the floor double. The manner in which the double floors are laid is also shown. (See Fig. 1.)

*Reproduced by special permission from "Frame Construction Details," copyrighted 1920 by the National Lumber Manufacturers Association.

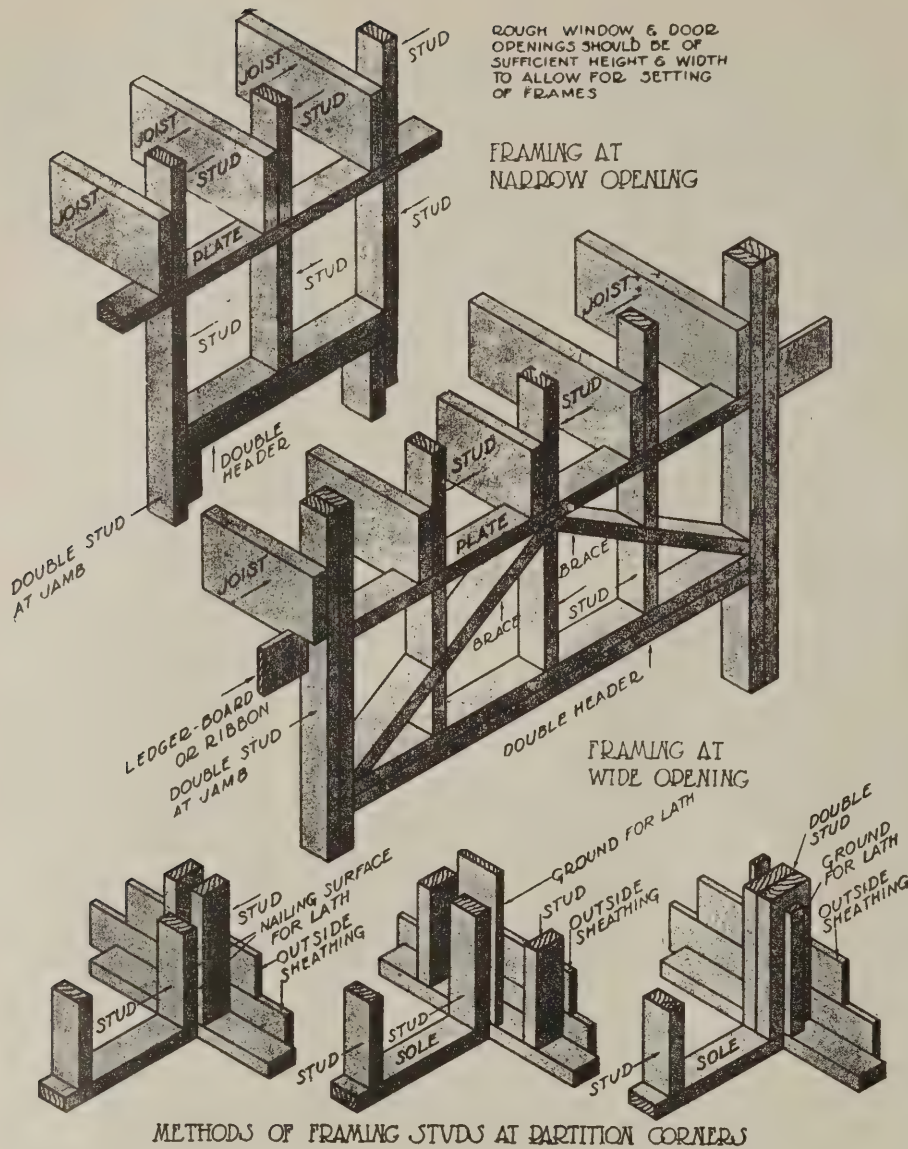


Fig. 3*

Framing Over Openings—One often sees cracks in plastering, especially over doors. This may be avoided by trussing over large openings or doubling the headers of narrow doors. (See Fig. 3.)

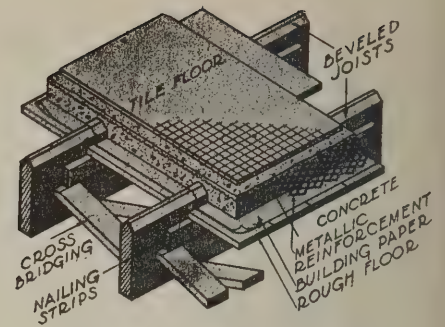
Tile Floors—There are several methods of laying tile floors on wood construction—one by cutting the joist to a feather edge and placing the rough floor between the joists, and the other, but which requires more thickness, by placing the floor directly on the joists. In either case the concrete should be reinforced by wire mesh. (See Fig. 4.)

Basement Walls—In order to make the basement walls, which are of concrete, impervious they should be water proofed. The basement floor is of concrete. The ceiling should be plastered to keep the dust out of the first story and also for fire protection. The ceiling generally may be plastered on wood lath, but over the furnaces metal lath and three coats of plaster should be used as an additional safeguard.

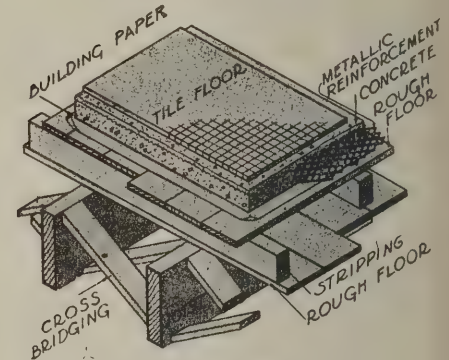
Basement Posts—The posts in the basement should be kept above ground by placing them on a concrete or stone block to avoid rotting.

The Floors—The floors should be double and the under floor laid diagonally, upon which is then placed deafening felt and floor strips between which the conduits are run. On top of the floor strips is laid the finished floor. The strips may be omitted on the first floor as the conduits may be exposed in the basement ceiling.

Fire Stopping—The building throughout should be fire stopped; that is, all concealed passages should be blocked off by wooden fire stops or stops made of brick or metal lath and plaster. A concealed passage will often permit combustible gases to pass from one floor to another in case of a very small fire. By such simple precautions as fire stops a fire may be confined to the space of its origin. The majority of fires are caused through carelessness and start in basements where rubbish is heaped up. If such rub-



Tile floor flush with main floor



Tile floor stepped up

Fig. 4—Methods of laying tile floors*

bish must be kept, it is wise to keep it in galvanized iron containers. Although there are laws enacted to minimize fires through carelessness it is wise to take every precautionary measure in constructing a building. This the architect has accomplished by shutting off all passages and plastering the ceiling, thereby minimizing the spread of fire.

Wood Gutters—The gutters on the exterior are of wood instead of the galvanized iron so often seen. These wooden gutters cut out of a solid timber cost no more than the metal gutters and last five or six times as long.

Special Features of the Interior

A special feature and convenience is the in-a-door bed in the dining room. This is concealed in a ventilated closet. As a convenience, if this room should be used regularly as a bedroom, provision has been made for a clothes closet off the passage to the kitchen and for another closet in the bathroom hall. The space under the stairway in this room may be utilized for a cupboard or sideboard.

In the kitchen an ironing board set in a recess gives an opportunity for keeping this useful but awkward piece of furniture out of sight when not in use. The pantry is of reasonable size and together with the closet provided for dishes should afford all the storage space necessary for a small family. The table is so placed that it may on occasions be used as a dining table. The refrigerator is so placed that it may be iced from the outside and does not encroach upon the floor space in the kitchen.

A broom closet on the rear porch affords

ample space for the brooms, garbage can, and other articles intended to be kept out of sight.

The main bedroom is provided with a wardrobe equipped with poles. This closet is of such proportions, being long and shallow, as to be much more serviceable than the usual closet. This room is provided with two windows for cross ventilation, and affords good wall space for bed, dresser, and other necessary pieces of furniture. It is only a few steps from this chamber to the bathroom through a hall and linen closet.

The bathroom is of more than the usual size, with a wide tub set in a recess. The floor is intended to be tiled and the walls finished in cement plastering. A medicine closet is located in a convenient space over the lavatory.

Specification and Investment

No detailed specification is given, suffice it to say, the house is designed for frame, and wood should be used throughout even for the roof covering. The variety of wood depends on the locality in which the house is to be built and on the means of the owner. No inconsiderable amount could be saved by using soft wood for the floors and trim.

This general statement, however, may be made—that the building, no matter where erected, if of wood should prove a very profitable investment; in fact, in many localities the income of one flat would take care of the operating expenses and pay off the building and loan mortgage. In this way the investor owning a lot with an investment of about 40 per cent of the cost of the building should after nine or ten years own the building; free of any incumbrance, having during that period the additional benefit of free rent.

Lumber Bill

Courtesy of N. C. Mather, first vice president and general manager, Lord & Bushnell Co., Chicago, Illinois.

Pcs.	Size	Lgth.	Feet	
4	4x 4	16	84	No. 1 Y. P. S 4 S
4	6x 8	8	128	No. 1 Y. P. S 4 S
1	6x 8	12	48	No. 1 Y. P. S 4 S
4	6x 6	7	84	No. 1 Y. P. S 4 S
2	6x 6	14	84	No. 1 Y. P. S 4 S
1	6x 6	20	60	No. 1 Y. P. S 4 S
66	2x10	22	2442	No. 1 Y. P. S1 S1 E.
33	2x 6	22	726	No. 1 Y. P. S1 S1 E.
118	2x 4	20	1534	No. 1 Y. P. S1 S1 E.
110	2x 4	9	660	No. 1 Y. P. S1 S1 E.
12	2x 4	16	132	No. 1 Y. P. S1 S1 E.
78	2x 4	14	702	No. 1 Y. P. S1 S1 E.
.....	1x 6	16	7000	No. 2 Y. P. S1 S.
.....	8"		3300	Clear Fir Channel Sid.
.....	1x 6		200	No. 1 W. P. S 4 S
.....	3"			Crown Mldg. 200 lin. ft.
.....	2x10	16	136	Sel. Norway S 4 S
.....	1x 8	16	146	Sel. Norway S 4 S
6	2x 4	16	66	Top Rail.
6	2x 4	16	66	Bottom Rail.
.....	1x 4	8	374	Clear Fir Flg.
6	2x 8	22	174	No. 1 Y. P. S 4 S
2	2x 8	6	16	No. 1 Y. P. S 4 S
4	2x 8	8	44	No. 1 Y. P. S 4 S
10	2x 8	12	160	No. 1 Y. P. S 4 S
16	1x 4	16	85	No. 1 W. P. S 4 S
.....	1x 3		1640	Sel. Com. Oak Flg.
.....	1x 3		640	Clear Maple.
8	2x12	12	192	No. 1 W. P. S 4 S
17	M	5/2		Clear R. C. Shgls.

Complete Schedule of Millwork

Millwork Schedule Furnished by the Morgan Millwork Organization

BASEMENT

- 2 Sgl. sash frames M-1821 28x12 1 lt. 1 3/4 r. Put up.
- 2 Sgl. sash frames M-1821 28x16 1 lt. 1 3/4 r. Put up.
- 2 Sgl. sash frames M-1821 28x22 1 lt. 1 3/4 r. Put up.
- 1 Mull. sash frame M-1821 28x22 1 lt. 1 3/4 r. Put up. 3" Mull.
- 1 Sgl. door frame M-1817 2-10x6-6 1 3/4 r. Put up.

FIRST AND SECOND FLOOR

- 4 Sgl. window frames M-1800 34x28 2 lts. 1 3/4 ck. Put up.
- 4 Sgl. window frames M-1800 30x28 2 lts. 1 3/4 ck. Put up.
- 6 Sgl. window frames M-1800 30x26 2 lts. 1 3/4 ck. Put up.
- 2 Sgl. window frames M-1800 26x24 2 lts. 1 3/4 ck. Put up.
- 2 Sgl. window frames M-1800 24x24 2 lts. 1 3/4 ck. Put up.
- 2 Sgl. window frames M-1800 30x18 2 lts. 1 3/4 ck. Put up.
- 1 Sgl. window frame M-1800 24x26 2 lts. 1 3/4 ck. Put up.
- 2 Sgl. window frames M-1800 28x16 2 lts. 1 3/4 ck. Put up.
- 1 Mull. window frame M-1800 30x26 2 lts. 1 3/4 ck. Put up.
- 1 Sgl. door frame M-1801 4-4x7-0 1 3/4 r. Put up.
- 2 Sgl. door frames M-1801 2-10x7-0 1 3/4 r. Put up.
- 2 Sgl. door frames M-1801 2-10x7-0 1 3/4 r. with transom above, 2-10x1-2 1 3/4. Put up. 2" T. B.

ATTIC

- 2 Sgl. sash frames M-1830 1-3 Rad. Put up.

SASH, WINDOWS, EXTERIOR DOORS

- 2 Cellar sash M-1161 2-8x1-5 s. s.
- 2 Cellar sash M-1161 2-8x1-9 s. s.
- 4 Cellar sash M-1161 2-8x2-3 s. s.
- 1 Cellar door M-670 2-10x6-6 1 3/4 glazed plain glass.
- 1 Pair doors M-686 opg. 4-4x7-0 1 3/4 glazed plain glass. Inc. T. Astragal.
- 2 Doors M-689 2-10x7-0 1 3/4 glazed plain glass.
- 2 Doors M-670 2-10x7-0 1 3/4 glazed plain glass.
- 2 Transoms M-1440 2-10x1-2 1 3/4 s. s.
- 2 Sash M-1830 1-3 Rad. Put up.
- 4 Windows M-1002 34x28 s. s.
- 4 Windows M-1002 30x28 s. s.
- 8 Windows M-1002 30x26 s. s.
- 2 Windows M-1002 30x18 s. s.
- 2 Windows M-1002 26x24 s. s.
- 2 Windows M-1002 24x24 s. s.
- 2 Windows M-1002 28x16 s. s.
- 1 Window M-1002 24x26 s. s.

INSIDE TRIM FOR EXTERIOR OPGS.

- 1 Side door trim M-9003 4-4x7-0.
- 2 Sides door trim M-9003 2-10x7-0.
- 2 Sides door trim M-9003 2-10x7-0, and tr. over 1-2 hi.
- 4 Sides sgl. window trim M-9003 34x28 2 lts.
- 4 Sides sgl. window trim M-9003 30x28 2 lts.
- 6 Sides sgl. window trim M-9003 30x26 2 lts.
- 2 Sides sgl. window trim M-9003 26x24 2 lts.
- 2 Sides sgl. window trim M-9003 24x24 2 lts.
- 2 Sides sgl. window trim M-9003 30x18 2 lts.
- 1 Side sgl. window trim M-9003 24x26 2 lts.
- 2 Sides sgl. window trim M-9003 28x16 2 lts.
- 1 Side Mull. window trim M-9003 30x26 2 lts.

INTERIOR DOORS

- 2 French doors M-689 2-10x7-0 1 3/4 glazed plain glass.
- 2 Doors M-800 2-8x7-0 1 3/4.
- 2 Doors M-800 2-6x7-0 1 3/4.
- 3 Doors M-800 2-4x7-0 1 3/4.
- 3 Doors M-800 2-0x7-0 1 3/4.
- 2 Doors M-800 1-8x7-0 1 3/4.
- 2 Pairs doors M-800 5-6x7-0 1 3/4.
- 2 Sash doors M-686 1-8x7-0 1 3/4. Glazed plain glass.

INTERIOR JAMBS AND TRIM

- 2 Cased opg. jambs 5-0x7-0 3/4x5 1/2.
- 2 Cased opg. jambs 2-6x7-0 3/4x5 1/2.
- 2 Inside door jambs 2-10x7-0 3/4x5 1/2.
- 2 Inside door jambs 2-8x7-0 3/4x5 1/2.
- 2 Inside door jambs 2-6x7-0 3/4x5 1/2.
- 1 Inside door jamb 2-4x7-0 3/4x5 1/2.
- 2 Inside door jambs 2-4x7-0 3/4x3 1/2.
- 2 Inside door jambs 5-6x7-0 3/4x5 1/2.
- 4 Inside door jambs 1-8x7-0 3/4x3 1/2.
- 3 Inside door jambs 2-0x7-0 3/4x5 1/2.
- 340 Lin. ft. door stops M-8542.
- 1 Pc. threshold M-8278 4-5.
- 4 Pc. threshold M-8278 2-11.
- 2 Pc. threshold M-8278 2-5.
- 4 Sides C. O. trim M-9003 5-0x7-0.
- 4 Sides C. O. trim M-9003 2-6x7-0.
- 4 Sides door trim M-9003 2-10x7-0.
- 4 Sides door trim M-9003 2-8x7-0.
- 4 Sides door trim M-9003 2-6x7-0.
- 2 Sides door trim M-9003 2-4x7-0.
- 4 Sides door trim M-9003 2-4x7-0.
- 4 Sides door trim M-9003 5-6x7-0.
- 8 Sides door trim M-9003 1-8x7-0.
- 6 Sides door trim M-9003 2-0x7-0.

- 640 Lin. ft. base M-8741.
- 570 Lin. ft. base mo. M-8740.
- 650 Lin. ft. base shoe M-8422.
- 450 Lin. ft. pict. mo. M-8262.
- 230 Lin. ft. chair rail M-8625.
- 65 Lin. ft. hook strips M-8625.
- 50 Lin. ft. shelf cleats M-8242.
- 16 Lin. ft. 1 1/2 pole.
- 2 Pc. corner beads M-8238.
- 8 Rosettes.

CASEWORK

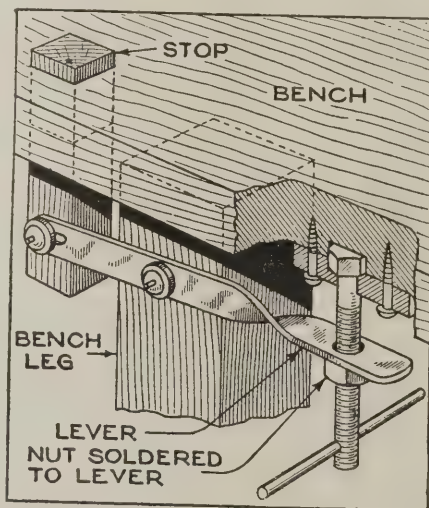
- 1 Buffet M-371, without panel at top, glazed per cut.
- 2 Medicine cases M-494, glazed per cut.
- 2 Linen cases M-576.
- 2 Linen cases M-576, with one door, no drawers, 1-10 wide.
- 2 Ironing boards M-445.
- 2 Wardrobes M-570.
- 1 Flight open or boxed stairs, 15 risers. Knockdown. No rough carriages inc.

EXTERIOR WOODWORK

- 4 Porch cols. M-2015 12x12-8-0.
- 2 Half cols. M-2015 12x6-8-0.
- 7 Pairs shutters M-1604 30x26 2 lts. 1 3/4.
- 1 Pair shutters M-1604 24x26 2 lts. 1 3/4.
- 3 Porch brackets 6x14-3-0 long.
- 40 Lin. ft. Crown Mo. M-8003.
- 40 Lin. ft. Pan. Mo. M-8139.
- 530 Lin. ft. Cove Mo. M-8060.

Adjustable Bench Stop

A BENCH stop, which can be adjusted to any height, or lowered so as to be flush with the top of the bench, is quite easily installed on any bench in the manner illustrated. A square hole is cut through the bench, in line with one of the legs; this hole is for the piece of oak that forms the stop proper. A flat-iron lever is



next made; twist one end of this to lie flat, drill a hole for a capscrew and solder or braze a nut underneath. Drill two other holes in the lever—one to pivot it to the bench leg and the other to fasten it to the lower end of the stop. This latter hole should be slotted, so that the stop will be moved upward in a straight line. Fit a bolt into the nut on the lever, then bore a blind hole in the underside of the bench, to receive the capscrew head, and screw a wooden block, with a hole for the screw shank, below it. Drill a small hole through the bottom end of the bolt for a turning lever, which may be a piece of stiff wire or a nail. To raise or lower the stop, it is only necessary to turn the screw either to the right or left.—L. B. Robbins, Harwich, Mass., in *Popular Mechanics*.

Remodelling an Old Brick House Into a Two-Apartment Building

IN remodelling old buildings it is a question if the very general reliance upon stucco to obtain a change of appearance is altogether fortunate.

Both in old wood or old brick houses of fairly good design there are features that have a good effect. It is therefore a test of the designer's knowledge and of his taste to make the changes in these materials so that the best that is in the house may be brought out, the opportunity to make additions allowing a chance to overcome any of the old unsightly arrangements.

The structure shown was an old brick house at the corner of Ninth street and Topeka avenue, Topeka, Kan. This is one of Topeka's fine residence streets and the old brick house had long outlived its usefulness.

George Senne, president and treasurer of the Senne Construction Co., Topeka, describes how he made the transformation as follows:

"I reconstructed this building into a two-apartment flat by adding on the left side two sun parlors, which fit in very nicely. I added one front door, and ran



Completed job—Old brick dwelling becomes modern two-apartment house

one partition on the side of stairs, to separate the first and second floors.

"The stucco was placed on the old soft brick which had been painted. I found that to make a good job of the stuccoing, a hatchet had to be used to cut off the old paint, to bond the stucco surface. I

used a magnesite stucco, which I believe makes the best stucco job on the market.

"I personally laid out the job. There were a few partitions placed, so as to make a complete two-family modern apartment. New oak floors, short lengths were added.

"The cost of remodelling was \$5000."



Old brick house, Topeka, being made over into two-apartment building



Extra door and hallway partition added



Brickwork prepared to receive the stucco surface



Detail of old brick post chopped with hatchet to make stucco bond

Apartment House for Thirty-Foot City Lot

One-Room Kitchenette Apartments—Plan Could Be Used as Unit in Court-Type Building

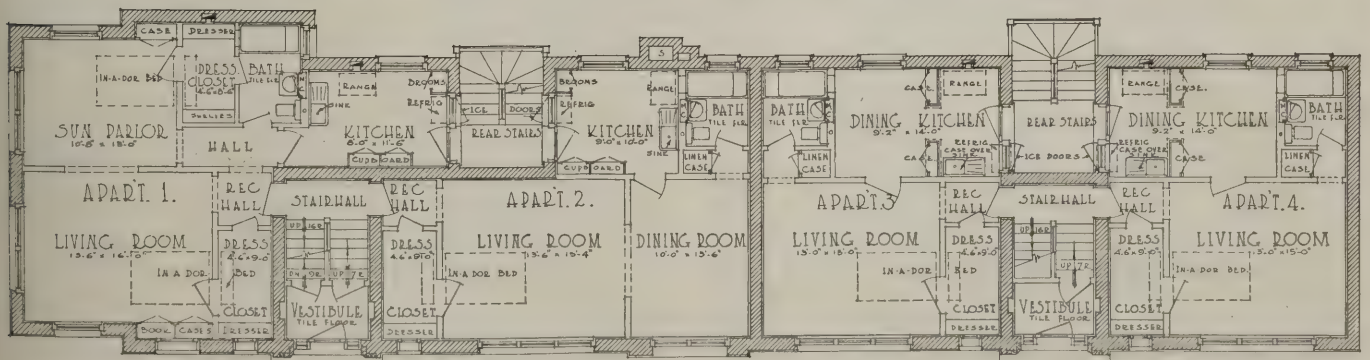
THE one-room kitchenette apartment is growing in popularity in other cities, but Chicago, in many respects, sets the pace. Therefore a new apartment of this type, just completed in Chicago, and designed for a 30-ft. city lot, is shown herewith. This is the "Martin" apartment house, the architect of which was Allen E. Erickson. The

contractor for the masonry was Arbid Morton, and the carpenter-contractor and owner is Martin Isakson.

There are a number of noteworthy features in this building. The in-a-door bed closets are extra large, so as to provide room for a dresser or shelves. They serve as dressing rooms as well as bed and clothes

closets. A unique feature is the entrance hall with door opening into the dressing closet. This permits one end of the closet to serve as a hall closet, with no waste space whatsoever.

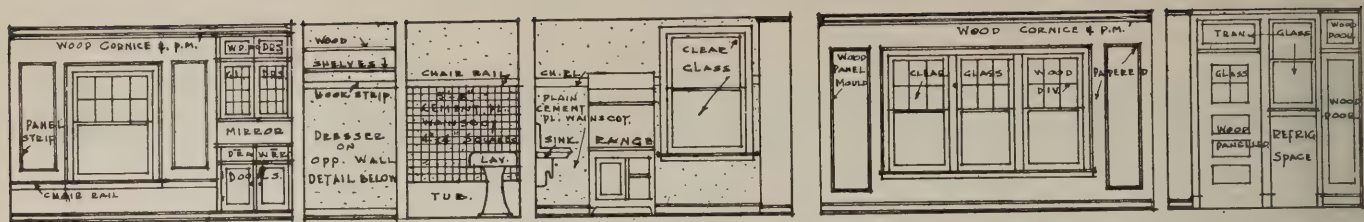
Another attractive and unusual feature is the combination kitchenette and dining room—something a little more elaborate than



"MARTIN APARTMENTS"
41 E. COB. WASHINGTON AND BLAINE ST.
CHICAGO, ILLINOIS

FIRST FLOOR PLAN.
SCALE 1/4" = 1' FOOT
SECOND AND THIRD FLOORS SIMILAR.

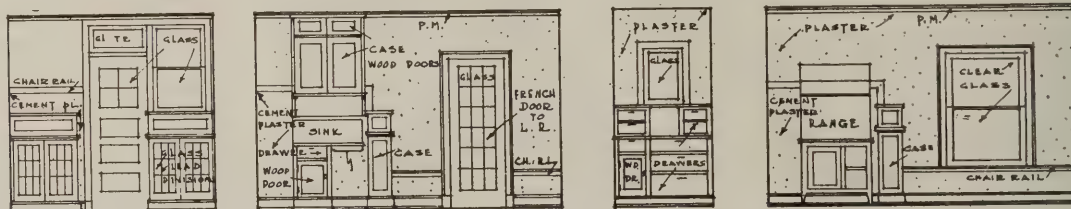
ALLEN E. ERICKSON
ARCHITECT
CHICAGO, ILLINOIS.

SUN OR
DINING ROOMDRESSING TYPICAL
CLOSET BATH.KITCHEN #1
KITCHEN #2 SIMILAR.LIVING ROOM #2.
OUTSIDE WALLTYPICAL KITCHEN
TO REAR DOOR

INTERIORS.

THREE - ROOM

APARTMENTS.

LIVING ROOM #1
EXTERIOR WALL.DRESSING VESTIBULE DETAILS
IN DR. CLOS. INTERIOR WALLS.LIVING ROOM #2.
INTERIOR WALL.DINING ROOM #2
INTERIOR WALL.DINING KITCHEN
TO REAR DOOR.DINING KITCHEN
INSIDE WALL.DRESSING CLOSET
DRESSER.DINING KITCHEN
OUTSIDE WALL.

TWO - ROOM. DINING KITCHEN

APARTMENTS.

DINING KITCHEN
TO DINING PORTION.LIVING ROOM
OUTSIDE WALL.LINEN
CASE.LIVING ROOM
INSIDE WALL.Living room showing reception hall at the left and bed closet
at the right

Looking into the kitchen proper from the dining alcove



Living room showing bathroom entrance at left and kitchen at the right



Looking into the dining alcove or compartment from the kitchen

the bungalow breakfast nook, for these dining rooms are large enough to accommodate one of the many "breakfast-room" suits.

Mr. Erickson believes these apartments represent the last word in the one-room-kitchenette line. It is obvious something

like the same arrangement could be utilized if this plan were for one wing of a U-shaped building, or a multi-court building.

Tentative Minimum Requirements for Small House Construction

Part II—Overloads on Timber Construction and Protection of Lumber During Construction

MR. IRA H. WOOLSON, chairman of the Building Code Committee of the Department of Commerce, informs NATIONAL BUILDER that the tentative requirements issued by the committee and partly outlined in the June issue, has resulted in many practical criticisms and suggestions. The committee has begun revision of the report in the light of these suggestions but has adjourned work until the middle of July. As soon as the revision of the report is completed, the report will be sent to the public printer to put in pamphlet form for general distribution.

Removal of Overloads on Timber Construction

The load that a wood member such as a floor joist or a rafter will sustain is dependent to a considerable extent upon the time the load remains on the timber. If the load remains on ten times as long, then the amount of load required to break the timber will be reduced about 10 per cent; for example, if a given load will break a timber in 40 days, a load about one-third greater will break the same timber in one hour. From the above it will be seen that it is important to remove the load from any overloaded wood floor or roof as soon as

possible since it is not certain that the floor or roof will not fail merely because it does not fail at once—in a few hours or a few days.

Protect Your Lumber During Construction

The care of lumber prior to use for building purposes and its condition at the time of use often determine to a large extent the value of the building or the rate at which depreciation will take place. Green or partially dry lumber when not properly piled will twist and warp in drying and retain this twisted and warped condition after being taken from the pile. Green lumber, when closely piled, or stored without ample provision for the circulation of air, is very likely to stain and become infected with decay. This is especially true in warm, damp weather. Decay, once started in a timber, will quite frequently continue after the timber has been placed in the building, even though it is used in a relatively dry location, where a perfectly sound, dry timber would never be attacked by decay.

Timbers used in a building in a fairly green condition and so inclosed as to partially cut off circulation of the air, are very likely to be attacked by decay. In this re-

spect sapwood is much worse than heartwood (although in the strength of the sound material there is no difference).

When rough lumber is delivered to the building site, but little attention is generally paid to the piling or to the protection of the lumber from rain and sunshine. It is common practice to use some of the building material for concrete forms. This material when removed is not infrequently thrown around in a rather promiscuous pile. The effect on lumber of such treatment and the ensuing wetting and drying are often quite disastrous, due to the development of checks, shakes, warping, twisting and cupping. Joist material, for instance, may have been in the very best condition when received and practically fall to pieces between rings under such treatment.

Grade Marking Lumber

GRADE marking lumber for the protection of buyers has not only been strongly endorsed by the Department of Commerce, but also all associations of lumber manufacturers are being urged by the government to undertake the work as has been suggested by the Southern Pine Association.

A Dallas Builder—His Wife and His Work

A. R. Eckert Believes Good Work is the Best Advertisement

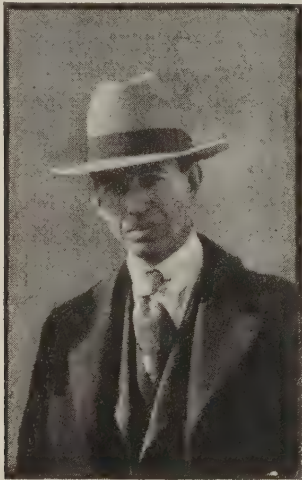
A. R. ECKERT, Dallas, Texas, is a type of builder who builds because he loves building, and one who believes a satisfied owner is a bigger asset than a bank roll. Whenever he has built houses

sources, with the help of material dealers, through the regular channels of mortgage brokers and bankers. His profits to a considerable extent are in second and third mortgages or liens.

His home is his office and his wife is his right-hand assistant and helpmate, in every meaning of the term. Mrs. Eckert has become an expert in the designing of home interiors; she plans and purchases the lighting fixtures, kitchen equipment, wall paper and looks after a host of construction details. Together they have built up an enviable reputation as home builders.

Mr. Eckert's preparation and education in house building came through his acquaintance with art and design. Originally he was draftsman for a lithographic concern. He went to Dallas, recognized its growing possibilities, and began the house-building business by designing and supervising the construction of his own home. His name and fame spread in the neighborhood and locality and he has always had enough new work to keep him busy.

on Dumas street, which is in the block and parallel to Dumont street. The lots are 50x143 ft., except the corner lots, which are 60 ft. front. The houses are all set back 25 ft. from the property line and were



A. R. Eckert



Mrs. Eckert



View of brick bungalows on Dumas street. Typical plan for the corner house is shown in floor plan No. 2, page 24

to sell he has built them conscientiously rather than to make a fortune all at once.

Like the majority of house-building contractors, he has no elaborate office organization and no established scheme of financing his work. Most of his work is for clients who own their own lots and have some money to start with. His working capital he has to raise from his own re-

He does not undertake more than he can personally plan and supervise.

Some Examples of His Work

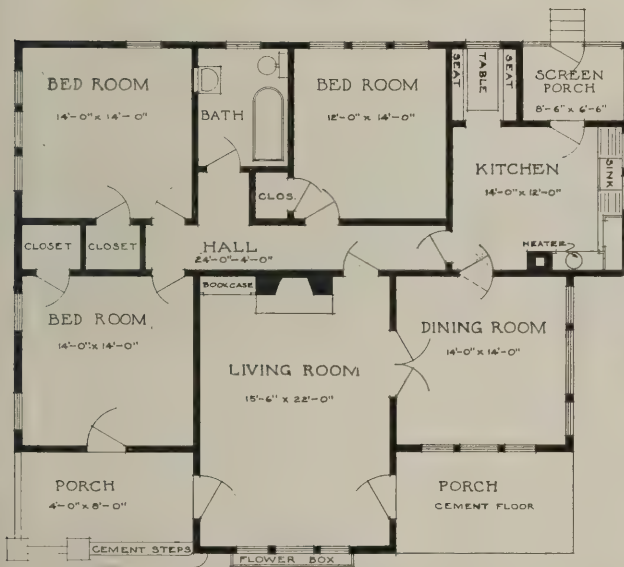
One of Mr. Eckert's largest undertakings was the development of 19 lots in Munger Place, which is one of the city of Dallas' highest class residence additions. Twelve of these lots were on Dumont street and six

built two at a time, one on each side of the street.

The houses on Dumas street are brick bungalows, designed to have individuality. On Dumont street frame bungalows of considerably less cost were built, but the same effort was made to give them distinctive exteriors. The plans for all 19 were made by Mr. and Mrs. Eckert.



View of houses on Dumont street. See floor plan of corner house below



Typical room on Dumas street



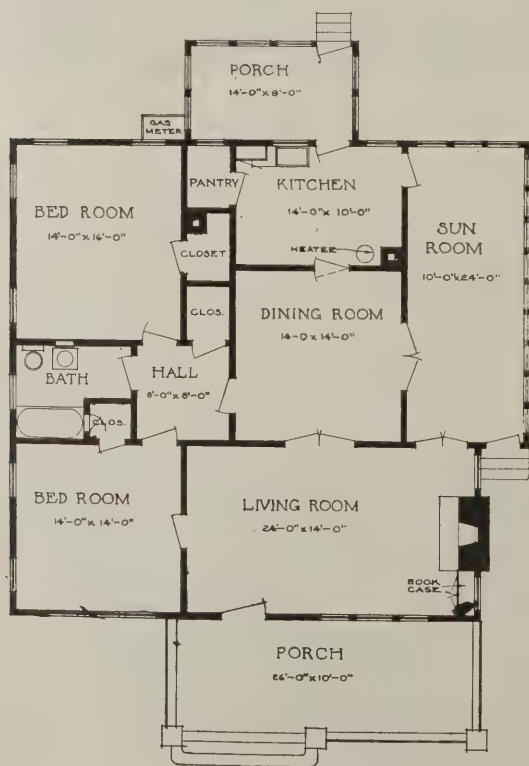
Another view of Eckert houses on Dumont street



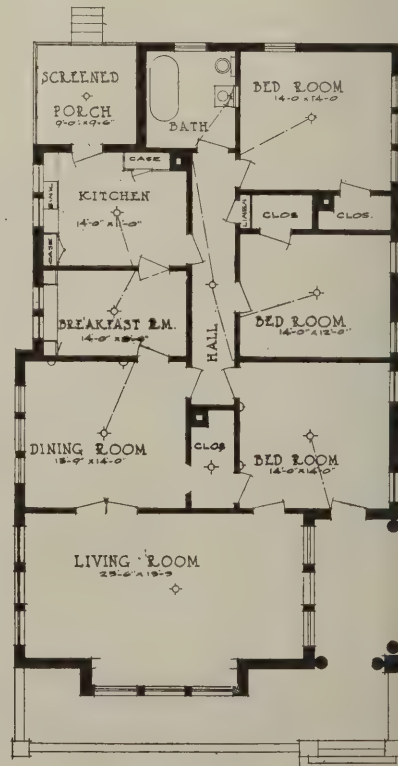
Views of House No. 1. See floor plans below



Two different elevations with the same floor plan. See plan No. 2 below



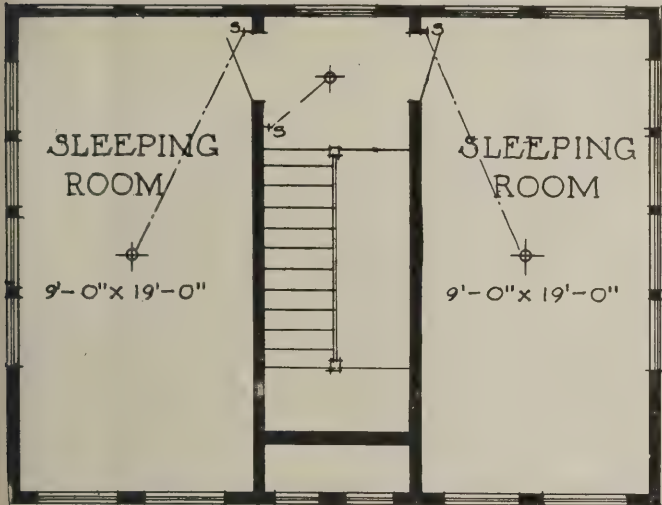
Plan No. 1



Plan No. 2



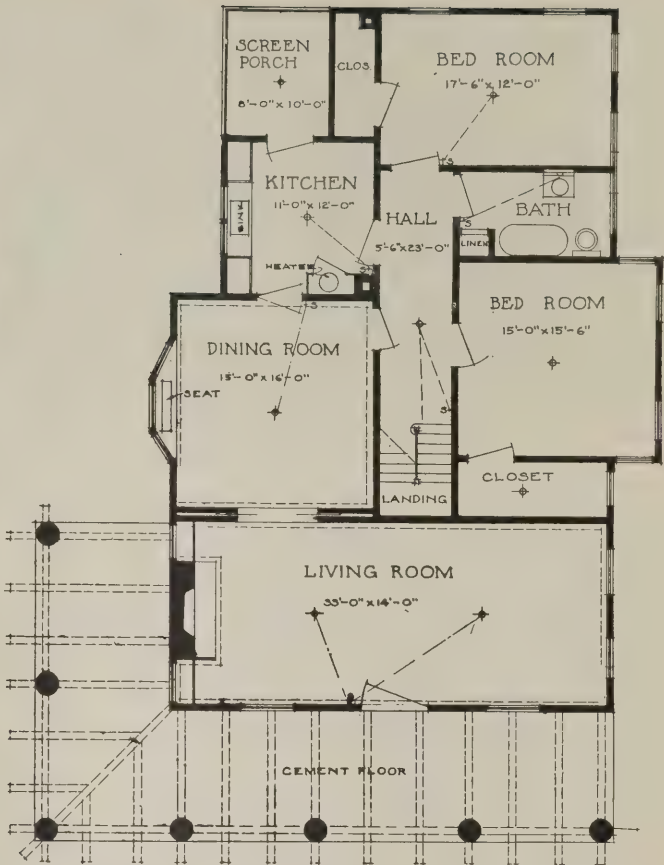
An "aeroplane" bungalow, House No. 3. See page 33 also



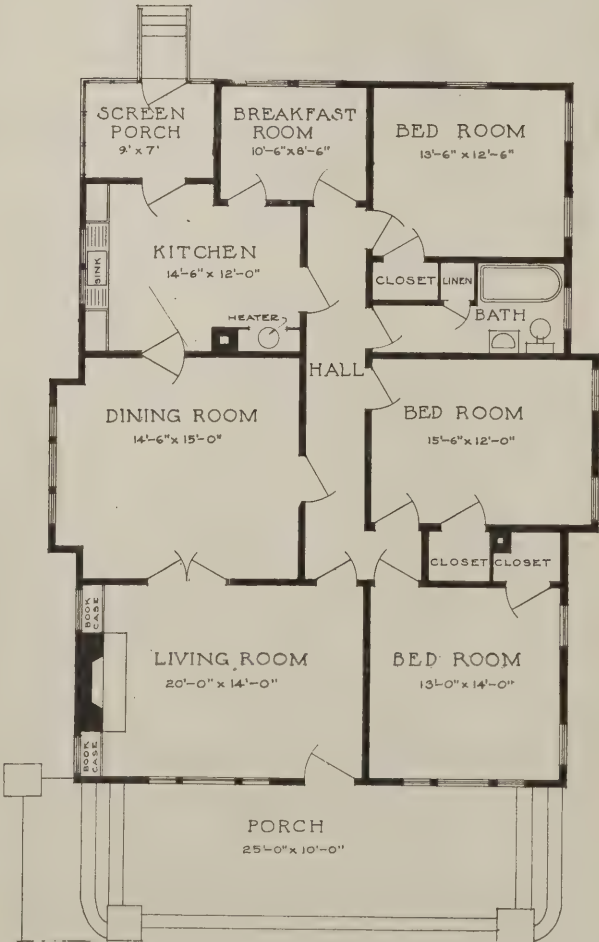
Plan of sleeping porch. House No. 3



Two different elevations with the same plan. See plan No. 4



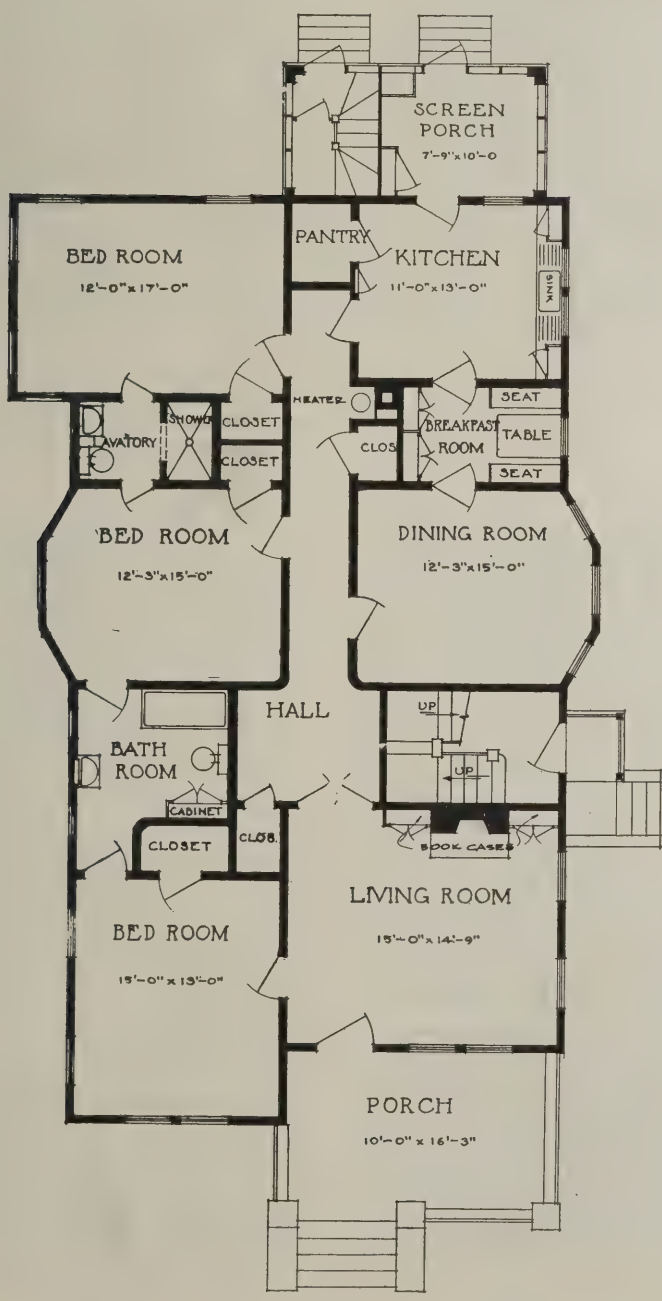
Plan of House No. 3



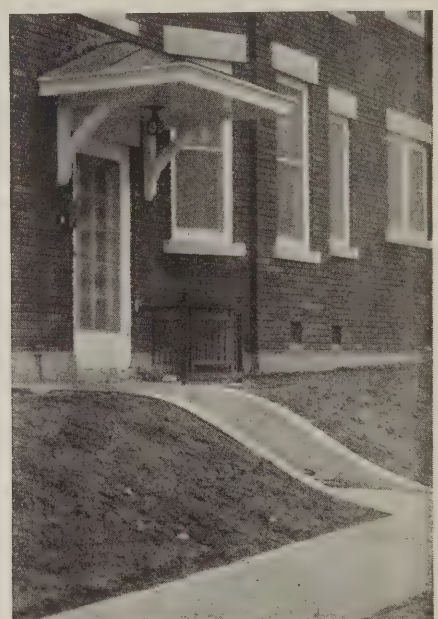
Plan No. 4



Two views of two-family apartment building. Plan No. 7



Floor plan of two-family apartment building, No. 7. The second floor plan is the same as the first floor plan

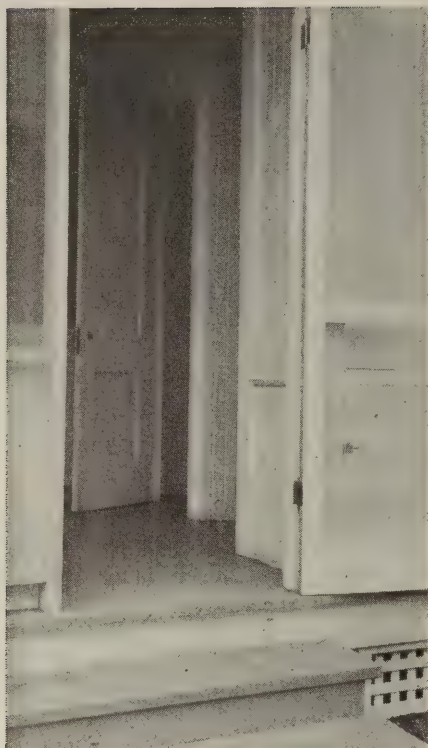


Entrance to second floor of two-family apartment building

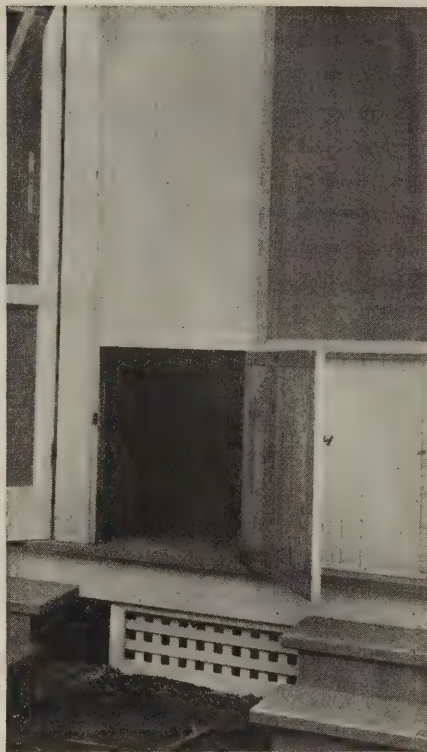
Munger Place Development

The frame houses are built on concrete pier foundations, the walls are covered with building paper and bevel siding, using 6-in. on some and 8-in. on others. Inside, the walls are shiplapped, covered with "canvas" and papered. Special and individual attention was given by Mrs. Eckert to the selection of all wall paper. The floors are hardwood in the living and dining rooms and edge grain pine in the balance of the rooms, except the bath, which is tiled.

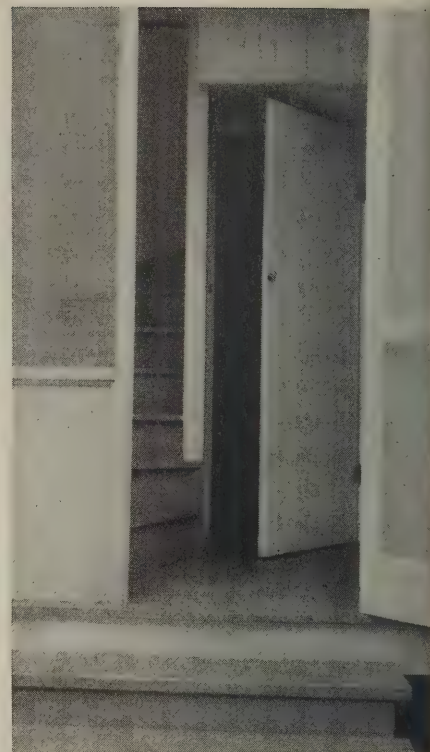
The plumbing fixtures consist of a 5½-ft. tub on base, a pedestal lavatory, a closet with white seat. In the kitchen a water heater is installed in a closet to hide it from view. The sink is placed under the kitchen windows and the drain-board is built the full width of the kitchen and the top of the drain is covered with zinc. Under the sink, on each side, are built-in bins and drawers and over the drain-board are built-in cabinets. Some of the floor plans have breakfast rooms and some have



Veranda closet for meters for lower apartment



Grocery elevator to upstairs apartment. Note separate rear entrances



Closet for second apartment meters under stairs leading to second floor apartment

breakfast alcoves. A feature well worthy of note is the large closets which have mirror doors.

The roofs are covered with asphalt slate shingles. A red roof is used and then a

green one, alternating the colors. The houses are all painted white, which gives the street a most harmonious and pleasing appearance.

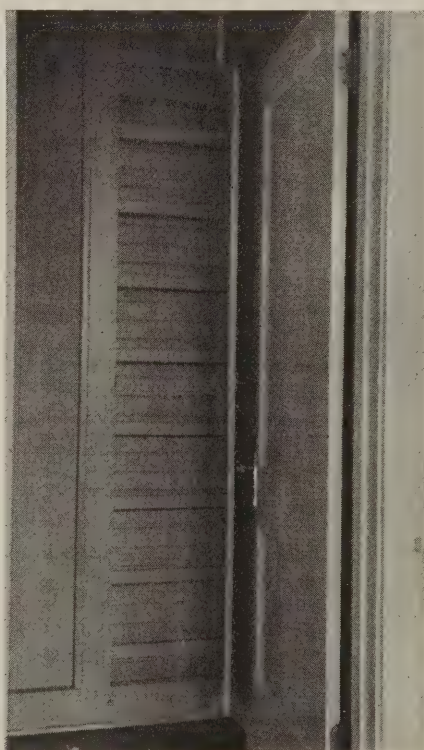
The ceiling heights are 10-ft. and all the

rooms are of generous size, as can be noted on the plans. The woodwork is done in old ivory throughout, except the kitchen and bath, which are done in white.

Each house has a garage and concrete



Ironing board recess



Built-in stairs leading to attic over second apartment

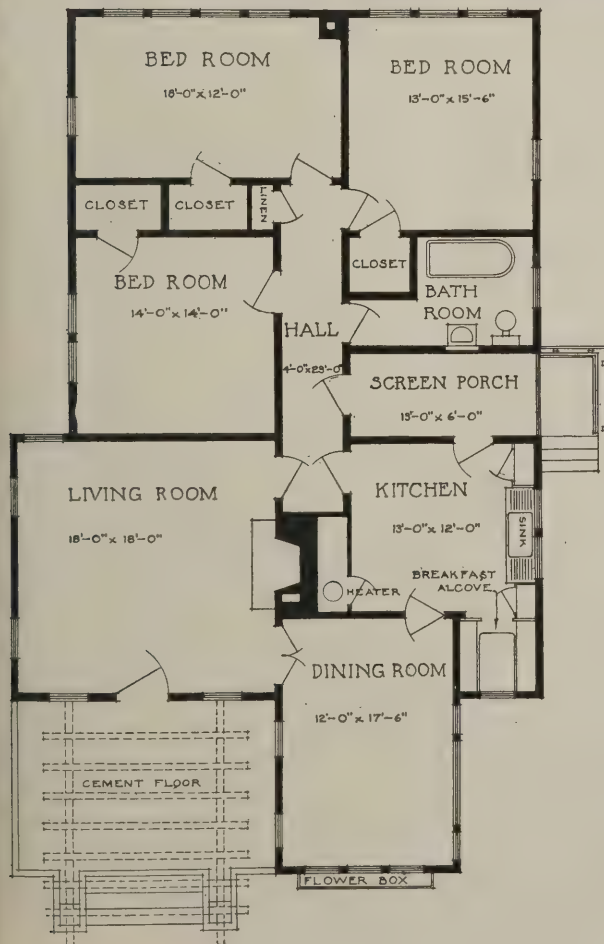


Breakfast nook

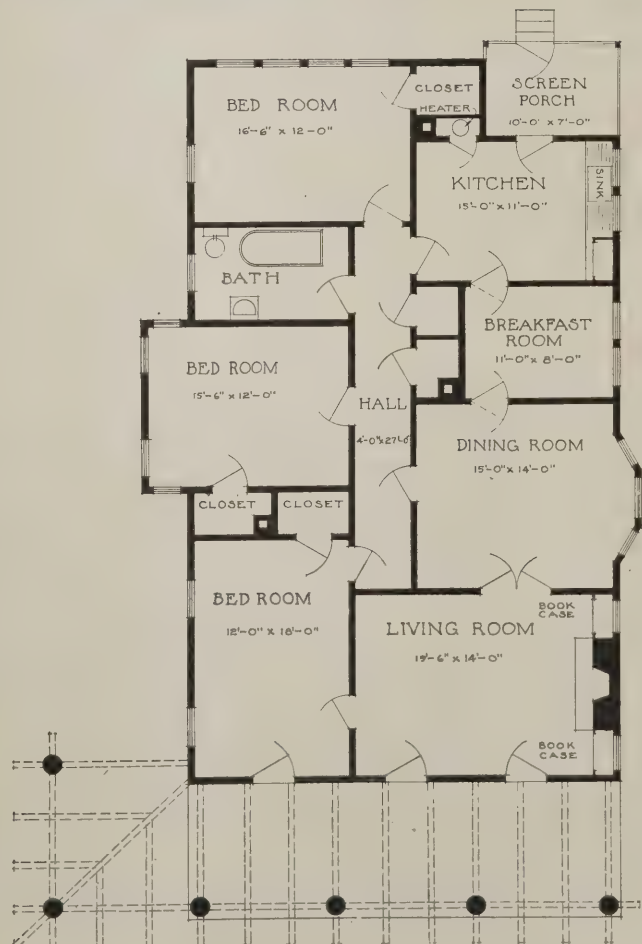
DETAILS OF TWO-FAMILY APARTMENT PLANNED AND BUILT BY A. R. ECKERT, DALLAS, TEXAS



Bungalow on Dumont street. See floor plan No. 8 below



Floor plan No. 8



Floor plan No. 9. See page 30



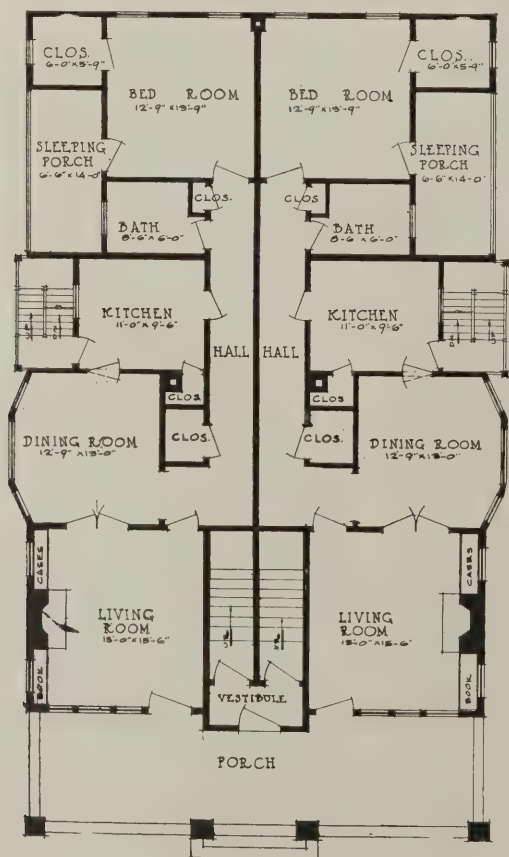
House No. 9. See floor plan on page 29



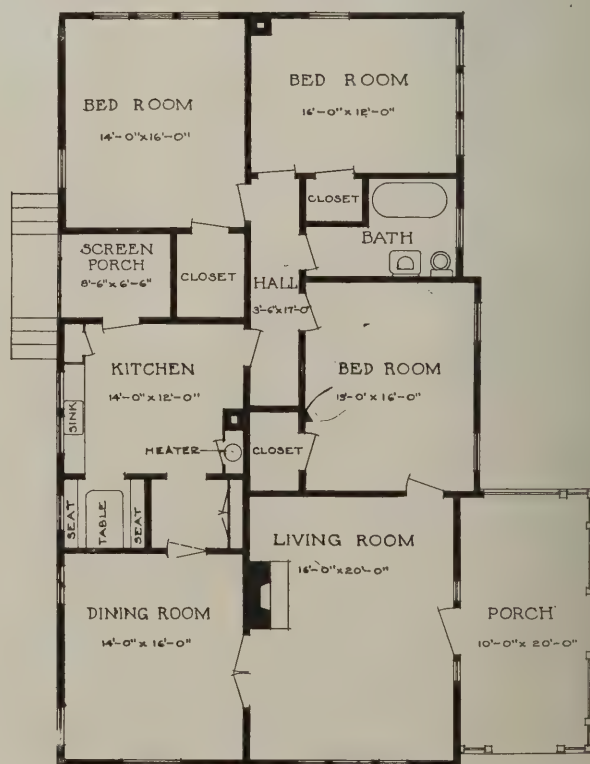
Typical bungalow in Munger place



House No. 10—"The Southern." See floor plan below



Floor plan of No. 10. The second floor is the same as the first



Plan 11. See elevation on page 31



Bungalow on Dumont street. See plan 11, page 30

drive, and the back yards are enclosed with a fence of 1x6-in. boards spaced 2 in. apart, one board being 4½ ft. high and the next one 5 ft. high, alternating. The fences and garages are also painted white.

On Dumas street the six brick bungalows were built and the same floor plan was used for all of them except the house on the corner. Light and dark brick are used, and the elevations are worked out with a gable facing the street on every other house. All of the houses are built on

solid concrete foundations and are lathed with cypress lath and plastered. Before plastering, the corners were all lined with metal lath to avoid cracking of the plaster in the corners. The other houses have the same interior finish as the frame bungalows.

The kitchens and bathrooms are wainscoted with Keene's cement. Sub-floors were laid throughout, and on these 13/16-in. oak is laid. The walls were sized and two coats of oil paint was used. The

woodwork is done in old ivory. The roofs are covered with the same material as on the frame houses.

Each of these houses has a servant's room, garage, concrete drive, and the back yards were fenced the same as in the case of the frame houses. All of these houses were finished complete, with all services run into the building and all window shades were furnished.

These 18 bungalows representing an investment of \$185,000 were built and sold in



Living room in House No. 11



Living room in Dallas bungalow, page 35

16 months. The frame houses on Dumont street sold for \$7000 to \$8500 and the brick houses on Dumas street sold for from \$12,500 to \$15,000.

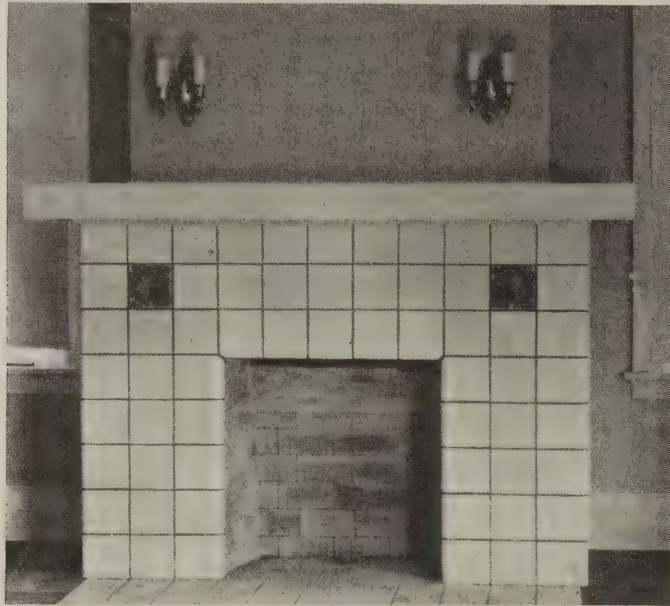
Two-Family House

Plan No. 7 and the accompanying views, page 27, show a modern two-family house

rooms, each of which is provided with a bay window.

His Own Apartment House

Some of Mr. Eckert's profits are invested in a four-family apartment house, one apartment of which serves as his own home. Two views and a floor plan of this



Typical fireplace in A. R. Eckert's buildings

which Mr. Eckert has recently completed. This building has a number of very interesting features. The main entrances are entirely separate. The first-floor apartment is entered from the front, which has a large and attractive porch. The second-floor apartment is entered from the side street as one of the views shows, through a private hall. The rear entrances are also separate. Each rear entrance has a downstairs screened porch. The downstairs porch of the upstairs apartment gives plenty of room for a commodious stairway. Between the two downstairs porches is a dumb waiter or grocery elevator for the upstairs apartment.

Each downstairs porch is provided with a meter closet, mainly for gas and electric meters, but obviously useful for a broom and mop closet as well.

The kitchens have the most modern equipment, including recessed ironing boards and a breakfast alcove, or nook, between the kitchen and the dining room. One side of the breakfast nook is provided with a cupboard and drawers to serve as a pantry. To provide access to the attic, which is unfinished, a ladder is built into the wall, as one of the views shows. The enameled door of this recess gives the appearance of a closet. Hot water heaters are placed in closets off the main hall.

The floor plans and the exterior views show the trouble and expense involved in providing cross ventilation in the bed-

rooms, each of which is provided with a bay window. It is quite different from the ordinary city apartment building and has proved a good advertisement of his work, as well as a popular place for desirable tenants.

Particular attention is called to the individual entrance to each apartment. This seems to be a feature especially demanded in Dallas apartment houses and is something that would add sales or rental value to many city apartment houses. Mr. and Mrs. Eckert are also very proud of the grounds about this apartment. It is seldom that so much shrubbery is found about a city apartment.

Finishing Hard Maple Porch Floor

IT is true that oil should not be applied to a maple floor if darkening the wood is not desired, but where a porch floor is made of hard maple it is necessary to get a good wearing job. Therefore use cold raw linseed oil and rub it in well. A mixture of two quarts of raw oil and two quarts of turpentine in which is melted one pound of beeswax makes a good coating, but it must be renewed at least once a year, says Ashmun Kelly, the paint expert.

The suggestion is made that with the number of new stains on the market porch floors can be stained and finished to better effect than obtained by painting. Steps

and porch floors stained and oiled would not be so easily marked as painted surfaces and would be more easily kept in condition. The renewing of the wax and oil would not require expert workmen as a renewal of the painted surface requires.

Waterproofing Concrete

H. N., a Denver subscriber, asks "What ingredients and what proportion must be mixed with concrete to make it waterproof? Will any of these ingredients tend to weaken the concrete or cause it to deteriorate?" Portland Cement Association replies: "Concrete made from properly selected aggregates combined with portland cement in suitable proportions, when thoroughly mixed to the right consistency, carefully placed and adequately protected during early hardening, will be watertight under all ordinary conditions. Investigations by the Bureau of Standards, Department of Commerce, indicate that integral waterproofing compounds will not entirely compensate for lean mixtures nor for poor materials, nor for poor workmanship, and that if the same care be taken with the concrete alone as is ordinarily taken when such compounds are added, a watertight concrete can usually be obtained.

"Ordinarily a 1:2½:4 mix will be watertight, but where water pressure may be encountered we recommend either a 1:2:3 mixture or a 1:1½:3 mixture. The sand should be clean and well graded, as should also be the coarse aggregates. The materials should be thoroughly mixed for at least one and one-half minutes in a batch mixer and the quantity of mixing water should be reduced to the lowest amount that will give a workable, plastic mix. For 1:2:3 concrete, 5½ to 6 gallons of water per sack of cement will usually be sufficient. Although excess mixing water seriously decreases the strength of concrete and may cause a porous, permeable concrete, yet after concrete has been placed it is essential that the water contained therein be retained in the concrete because the hardening of concrete is due to chemical action between cement and water, which requires considerable time and the presence of moisture. If the water contained in the concrete is allowed to evaporate, the concrete will not attain its full strength and may be porous. Therefore, as soon as the concrete has hardened sufficiently to permit, say the day after it is placed, it should be covered with damp sand (in the case of a floor) and kept damp by frequent sprinkling for ten days or two weeks. An excellent method is to build a small clay dam around a horizontal surface and flood it with water. In the case of vertical surfaces such as walls, frequent wetting of the forms or hanging damp burlap or canvas around the freshly placed concrete and keeping it damp by frequent sprinkling will accomplish the same results."

National Builder Style Sheet



Bungalow in Munger Place. A. R. Eckert, designer and builder, Dallas, Texas



Bungalow on Dumont street, Dallas, Texas. A. R. Eckert, builder. See Plan No. 3, and an "aeroplane" elevation, page 25



Bungalow on Dumont street, Dallas, Texas. A. R. Eckert, builder



Another type of bungalow built by A. R. Eckert, Dallas, Texas



Simplest of plain rectangular bungalows has distinction and style when the lot is appropriately developed



A Dallas, Texas, bungalow built by A. R. Eckert. See floor plan on page 41



A brick and plaster cottage in Los Angeles. See floor plan on page 41



A cottage bungalow, Dallas, Texas. A contrast in design



A home in Evanston., Ill, showing interesting horizontal lines in the treatment of the roof and the shingled sides. The shingles on the sides are laid in courses of two different widths



A square bungalow tastefully treated. Note the divided-light casements and the contrast of the white trim against the dark stained shingled walls. Shrubs conceal the less attractive foundation



A study in roof proportions and harmonious lines in both house and garage. The combination of gable and hip is well effected



Green blinds against a pure white stucco background, and the simple treatment of the wide overhanging roof, distinguish this house in Glencoe, Ill.



One reason why so many of us long to go to California—to see and perhaps live in little Spanish bungalows like this one. Note the mottled roof. The floor plan is shown on page 41



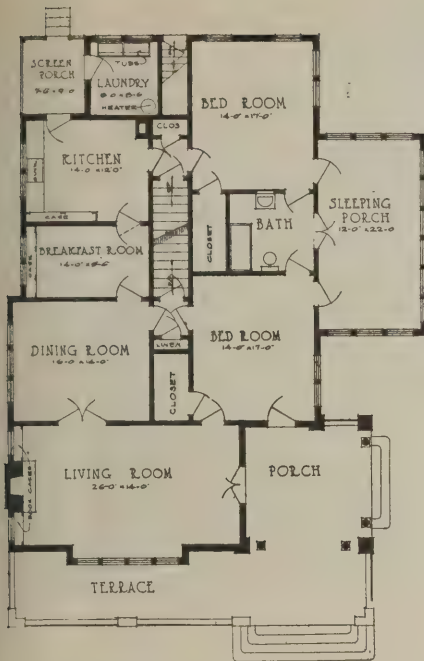
Another California house. Architecturally it is not so good as the one above, but is noteworthy for its perfect symmetry and its low foundation. Floor plan on page 41



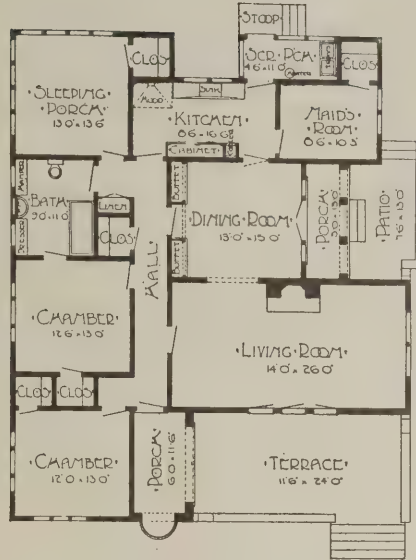
An unusual location and treatment of the chimney—matters that should be handled with care. A distinct suggestion of the colonial is seen in this bungalow



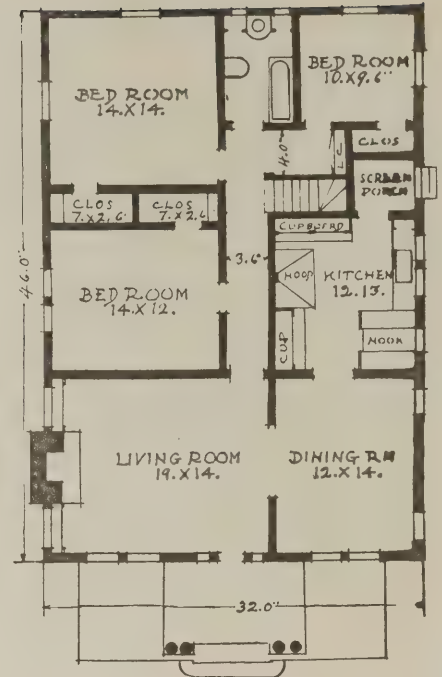
The hip roof and wide overhang on this little house help it to seem a part of its setting. The small panes in the sash are correctly accentuated by painting the muntins white



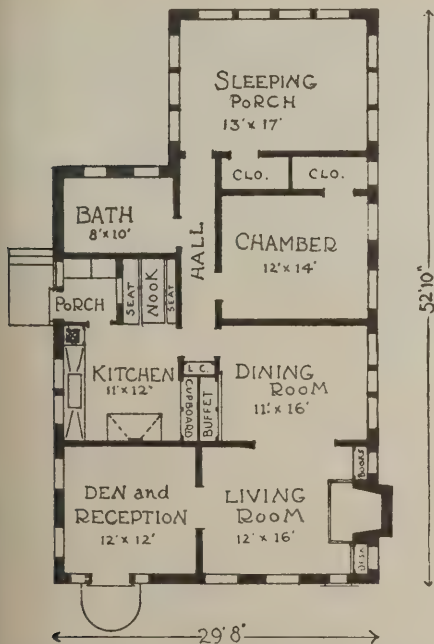
Floor plan of Dallas bungalow. See page 35 of Style Sheet



Spanish type of bungalow. See elevation, page 39 of Style Sheet



Floor plan of California bungalow. See page 39 of Style Sheet



Floor plan of brick and plaster cottage in Los Angeles, Calif. See page 36 of Style Sheet

Shortage of Building Trades Apprentices

A REPORT of the Wisconsin Industrial Commission shows that there are only three indentured carpenter apprentices in the state, two at La Crosse and one at Prairie du Chien. Madison had only two apprentices January 1, one bricklayer and one plasterer. The report showed that the lack of apprentices in the building trades is notable throughout the country! What is the remedy?

How to Use National Builder "Style Sheet"

If You Want to Build Houses Like Those Shown There Are Ways to Accomplish It

FREQUENT requests come to the editors of NATIONAL BUILDER for the working plans of houses shown in the "Style Sheet," or pictorial section of the paper. NATIONAL BUILDER can not supply these plans directly, but it can tell its readers how to get them legitimately.

There are publishers who go about the country and take photographs and dimensions of houses, and from these prepare plans and specifications which they sell as their own creations. This may or may not be good business; but NATIONAL BUILDER does not consider it in keeping with the ethics of the architectural profession, nor in the best interests of the construction industry, which alone this journal is designed to serve.

A great many of NATIONAL BUILDER's readers are capable of making their own working plans. Others do and should employ architects and architectural service bureaus, of which there are many. (A list of these are on file in the editors' office and will be supplied upon request.)

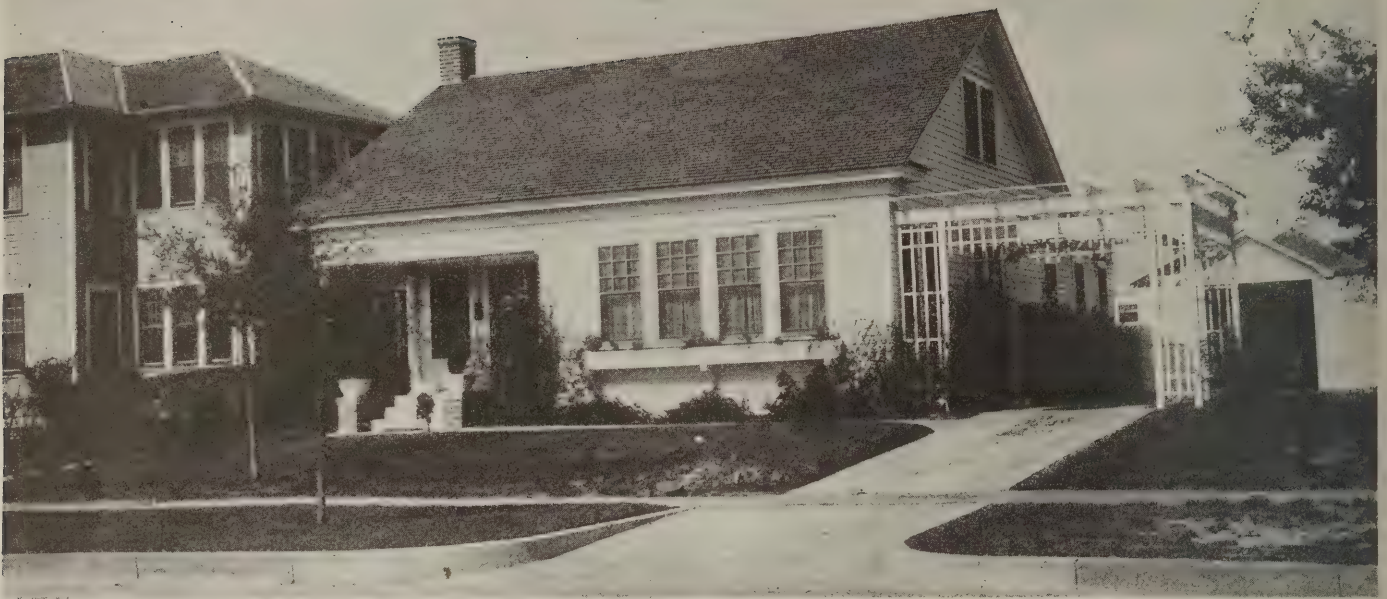
In publishing pictures of houses where possible, NATIONAL BUILDER makes it a

point to give credit to the architect, or builder for his design. But this is not always possible. Where such information is given a proper course to pursue, if one wishes to obtain the plans, is to take the matter up with the designer direct.

However, some architects will not furnish plans and specifications for houses the construction of which they can not supervise. Also some take the attitude that a house designed for a certain client should not be duplicated without the clients' consent. Sometimes, too, we suspect, architects are too busy or not enough interested to reply to such letters requesting plans.

If the plans can not be obtained thus another course is open to the builder or contractor, and possibly it is the best course in the long run, because many a building contractor has found that the working drawings and specifications of a house in Texas or California are entirely unsuited to a building in New York or Illinois.

It is very seldom indeed that any two houses are ever built identically alike; and it is almost as seldom that a house, as actually built, ever follows exactly the



This house was shown in the Style Sheet of the April issue. From this photograph Architect Erickson prepared the plans shown herewith under the conditions described in the text

original plans. Therefore it is far better for the local builder or contractor to start with a picture of a house, his own floor plan and construction details and have a local architectural designer make the working plans than to attempt to adapt unfamiliar construction to his local conditions.

He can take the picture of the house he wants to duplicate to a local architect (or to some city architect NATIONAL BUILDER can put him in touch with), together with a suitable floor plan that he wants to use and such other suggestions as his own experience tells him would especially adapt the house to his own work or his own community.

Any experienced architect can take a good clear picture, such as we show in the NATIONAL BUILDER "Style Sheet," and the suggestions for floor plans, and work these up into detail plans and elevations which a contracting builder can build from. The house may not be an exact duplicate of the one shown in the picture, but it will have all the lines that make it appeal to the builder or contractor or his client. As a matter of fact there is every reason to believe it will be a better house for the purpose intended than if built from the original plans.

There is always some detail in the picture—a door or window, a step or something from which the approximate dimensions of the building may be determined. (In an issue of NATIONAL BUILDER a few months back was a picture of a house designed by an Indianapolis builder as a duplicate of a picture from which he had actually determined the number of brick on the principal dimensions in order to duplicate almost exactly every detail.) The house thus selected to be duplicated may be larger or smaller as local conditions demand or require; but a good architect can

easily preserve such proportions that the pleasing appearance of the completed building will remain the same.

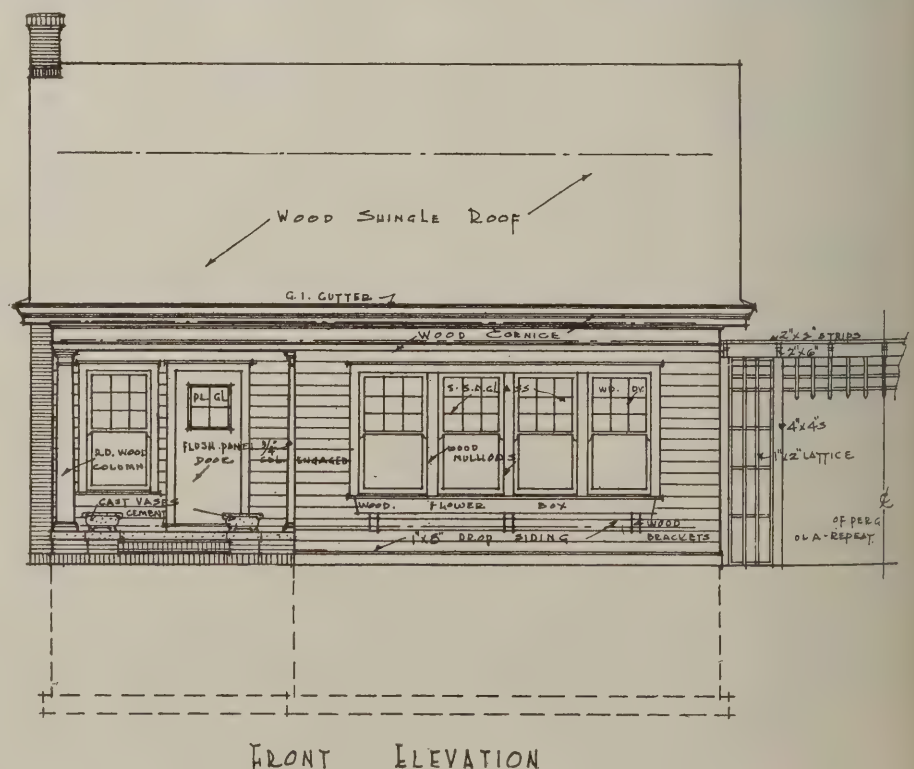
House Plans Herewith an Example

In order to demonstrate how easily this can be done the editors of NATIONAL BUILDER called in Allen E. Erickson, a Chicago architect, and gave him merely the first picture in the first style sheet (April number of NATIONAL BUILDER). The editors simply said to Mr. Erickson: "We are building contractors. We have a client who is 'sold' on this house. We want the

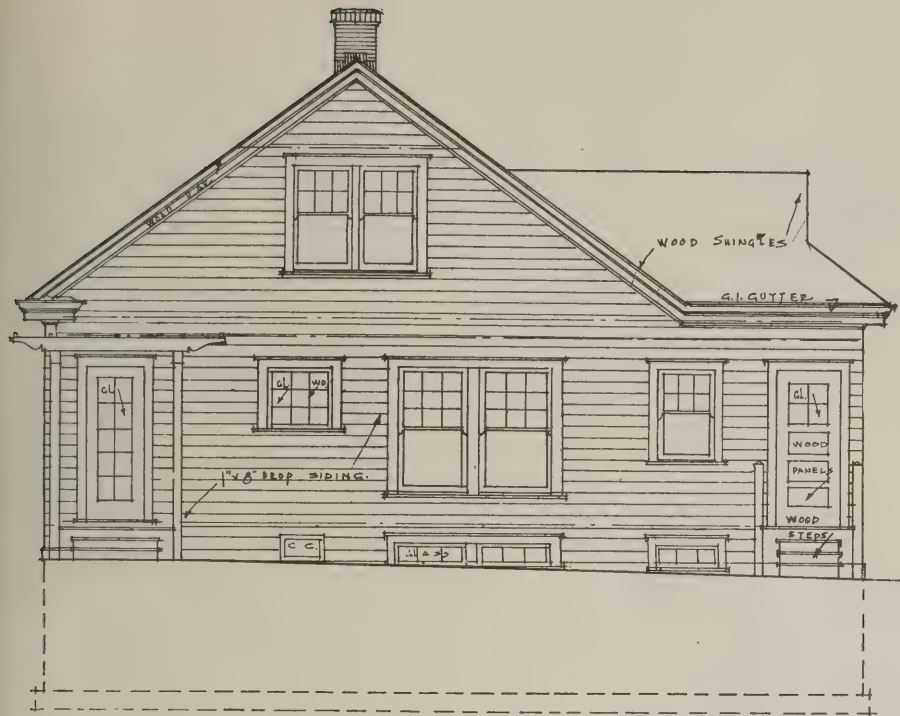
working plans of a house like this suitable for our Illinois climate and with such a floor plan and conveniences as you know people here want and expect."

Within a short time Mr. Erickson submitted the plans herewith, which the reader will see carry out the main design in the house illustrated, but this house has a floor plan probably better adapted to Chicago than the original Houston (Texas) floor plan would have been.

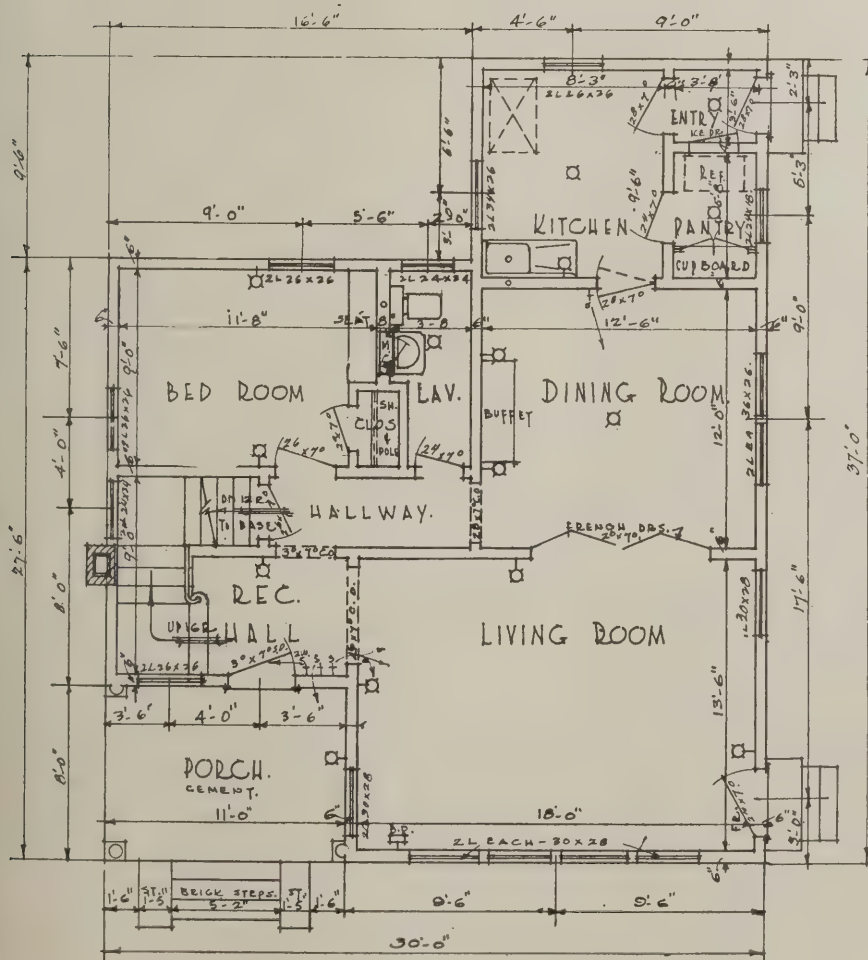
Had the editors actually been building contractors they would probably have had many other suggestions to offer, such as



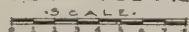
Reduced from suggested plans by Architect Erickson



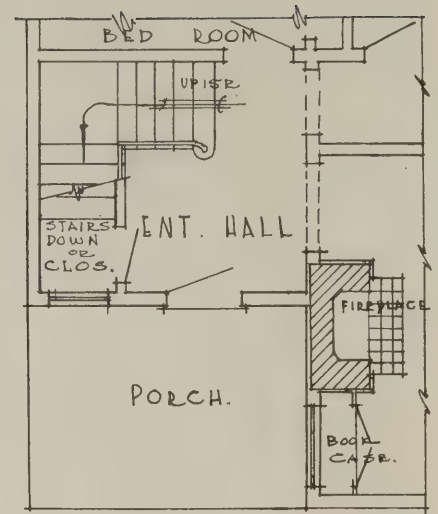
Side elevation



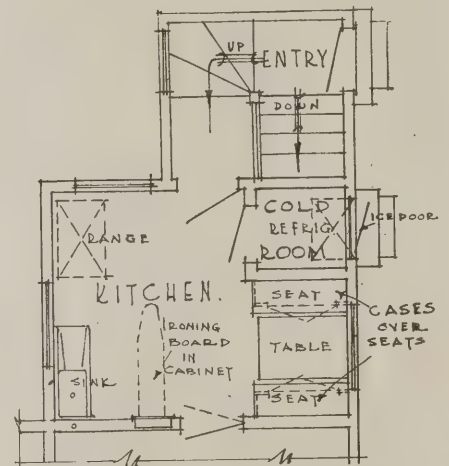
FIRST FLOOR PLAN.



From suggested plans by Architect Erickson



Alternate arrangement, No. 1, of Stair Hall: Stairway reversed so as to give a roomy entrance hall with a coat closet, or stairway to basement. In Northern States the fireplace may be added where shown, with a bookcase on one side

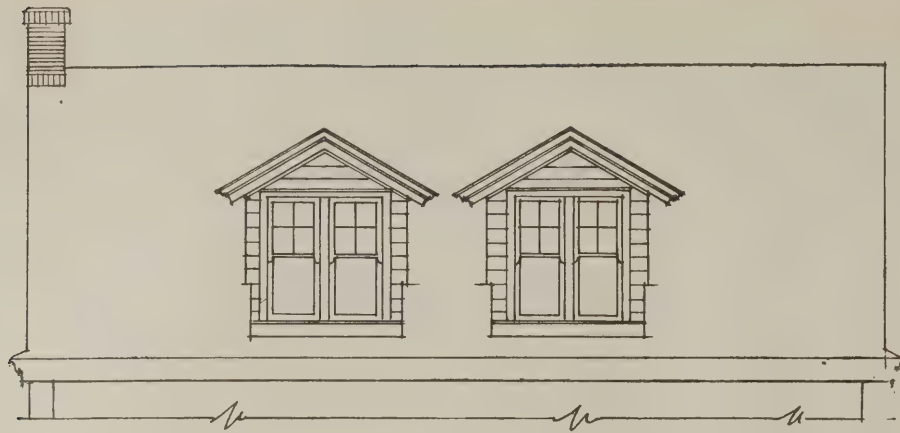


Alternate arrangement, No. 2, of kitchen: Breakfast nook in place of pantry, and use of small cold room or refrigerating room, with cases over seats in nook. Showing also suitable place for installation of a cabinet ironing board. Sink turned to accommodate it

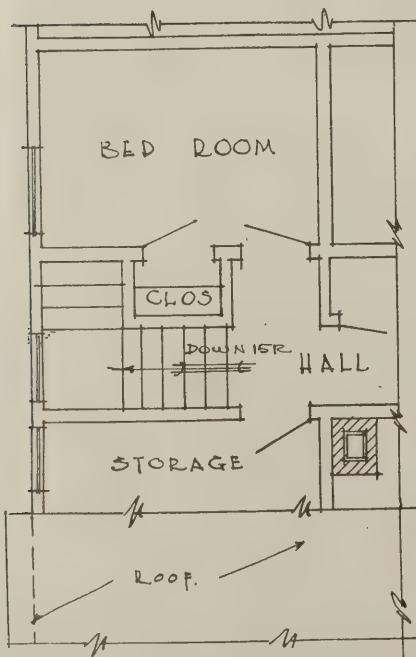
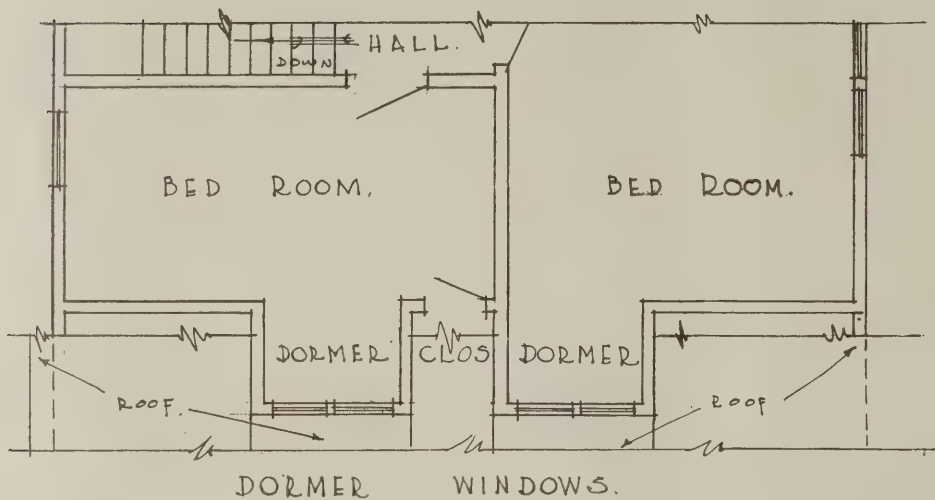
the governing dimensions to give various parts so as to standardize and simplify construction, or make them conform to their particular scheme of operation. Mr. Erickson could then have incorporated these ideas in the plans and yet preserved the proportion and detail which distinguish this particular house.

Cost of Architectural Service

Until recently most architects have considered their professional services only in the light of what a layman demands of them. The ordinary layman—the client who is going to pay for the building—usually expects of his architect five kinds of professional service: (1) Plans and design; (2) detail drawings of various parts; (3) specifications; (4) a quantity survey,



ELEVATION.

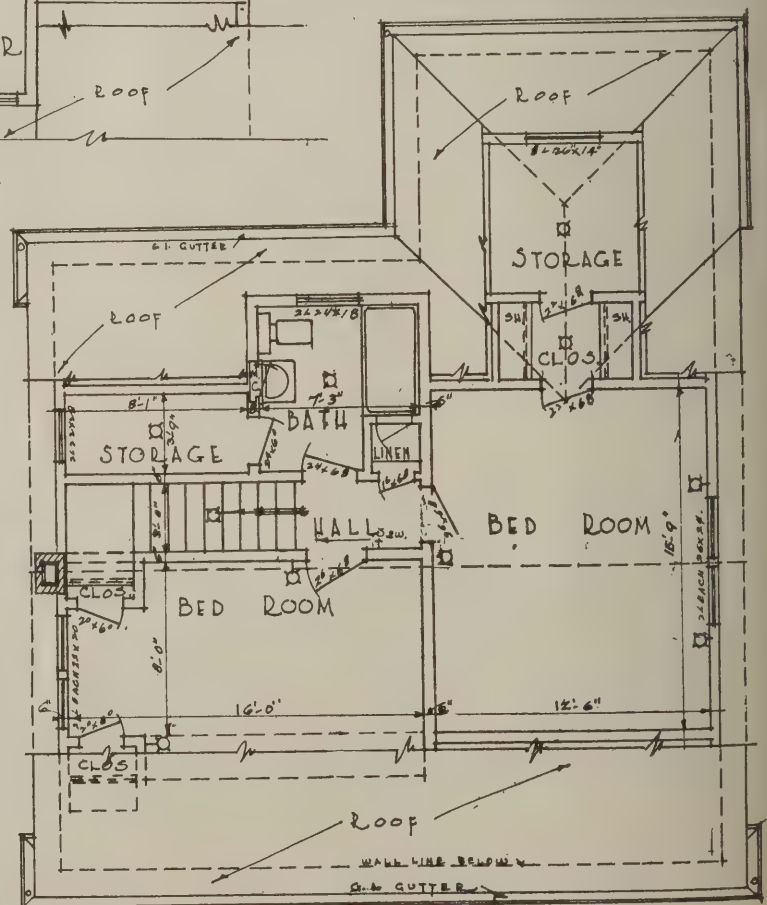


Dormers in the front would be a most attractive addition to the elevation, and give the much needed light and cross-ventilation for the bedrooms

or estimate; (5) supervision or inspection of the construction work. The usual fee for such a commission is 6 per cent of the cost of the building.

Mr. Erickson tells the editors that he would consider the service thus rendered fairly divided as follows: 1 per cent of the cost for plans and design, 1 per cent for the detail plans and sections, 1 per cent for the specifications, 1 per cent for the estimate and 2 per cent for supervision of the work. These are approximately the various elements of cost in the professional service that go to make up the total of 6 per cent of the cost of the building.

NATIONAL BUILDER readers are professional builders — architects, contractors, speculative builders, engineers, and realtors. It can be safely assumed that they are capable of supervising their own work; that in most cases, especially in the case of small houses, they are fully competent to make their own structural detail plans if these are required, draw their own specifications and make their own estimates. The professional services they require of an architect, or expert architectural designer, are not the same as the professional services demanded and expected by the layman. The professional builder wants chiefly *plans and design*—art—the thing that his own ex-



SECOND FLOOR PLAN.

SCALE.
0 1 2 3 4 5 6 7

perience and knowledge of building seldom can supply.

If architects, generally, will get this point of view and render the same kind of professional service to other principles in the construction industry that a lawyer expert renders another lawyer, or a consulting engineer renders another engineer, he will scale his charge accordingly. For example in the case of a \$5000 bungalow, or house, an architect might charge, according to Mr. Erickson's estimate, \$50 for the floor plans and elevations, \$50 for the detail plans, \$50 for the specifications, \$50 for the estimate, and \$100 for the supervision of the work.

The professional builder may want only the plans and design and for this service he should pay according to its cost. He must keep in mind also that he is here getting an individual service and not copies of a stock plan. He is paying for the professional advice of an expert on that element in the make-up of a house of the most importance to its marketability or salability. Were the builder to make a practice of referring all his prospective work, or getting all his designs, from one architect or firm of architects, he could doubtless obtain these services on even more favorable terms.

One well-known architectural or plan service bureau the editors are acquainted with explains how it is possible to render builders a service of this kind at much lower rates than it would have to obtain if the architect were dealing with a layman as a client. The average layman who is going to build a house costing less than \$10,000 expects as much time and attention from a busy architect as the owner of a \$100,000 commercial building. The architect is continually pestered with new ideas, suggestions and changes in the plans as the work progresses. Consequently there is little or no profit in handling house work on a 6 per cent basis on jobs of less than \$10,000. Plan service, such as outlined, exclusively for professional builders is an entirely different business proposition.

Architectural Service Pays

Since the establishment of the Architectural Small House Service Bureau of Minnesota under the auspices of the American Institute of Architects, and of various other architectural service bureaus, architects generally are paying more and more attention to the problems of the small house builder. They are beginning to realize more keenly their ultimate responsibility as a profession, for American home architecture. They are beginning to appreciate the many ways in which they can improve home architecture other than by trying to dictate construction in every case in every detail.

In this new work the architectural profession should, and doubtless will, have the earnest and loyal support of the entire building construction industry. Self-interest alone will eventually bring the specula-

tive builder and the building contractor to make use of the architects' services, because, even now, there is a very marked improvement taking place in small house architecture, on account of this recent interest of the architectural profession; and more and more will the house that has received no architectural treatment stand out from its neighbors as a blot on the landscape.

The sales value of a well designed, well

proportioned house is becoming so marked that as time goes on even such great advantages as systematic construction, superior working organization, salesmanship, and cheapness of construction will probably be discounted in favor of the construction of houses which have good lines and proportions and permanent beauty. Even the sum of \$100 spent for a good design for a \$5000 house may add \$500 to its value as a merchandizable article.

Style in Architecture*

Don't Conflict Style with 'Fashion'; Style is Permanent; Fashion is Ephemeral; Style is an Investment; Fashion is a Fad

WHEN National Builder's editors instituted the "Style Sheet" of the paper, after long and thorough consideration, they had a very definite object in view and the word "Style" was selected for a particular purpose. A house with "style" or a "stylish house" means something quite definite. Too many people confuse "style" with "fashion." In a chapter on "Style in Architecture," Russell F. Whitehead, architect, New York City, in his booklet on "Good Houses" has explained what was in the minds of the editors, possibly better than they could have explained it themselves.

STYLE is a quality, not a principle of design. When a house is expressive of a definite conception—as of dignity, elegance, picturesqueness, simplicity or homeliness, it has character; and character is style. An historic style is the particular phase, the characteristic manner of design, which prevails at a given time and place; and is an expression of the housing needs and taste and wealth of a community; it is not the result of accident or caprice, but of intellectual, moral, social, and even political conditions.

Style is synthetic. The taking of rooms, halls and staircases, and arranging them in sequence according to their use and importance; the erecting of walls, floors and roofs; the relating of planes, solids, voids, lights, shadows, textures and colors, so that each gives to each a meaning and expression—that is style in architecture.

The site—its geographical and topographical location—the relative importance of the house to its surroundings and even the individuality of its occupants, are potent factors in the determination of its style.

Whatever the style, the essential qualities of good house design are proportion, scale, color, texture, rhythm and repose. The execution of a structure devoid of these

qualities is mere building—a trade and not an art.

What Proper Proportion Means

Sometimes there is confusion between "proportion" and "scale." A house can be in good proportion and yet the elements that compose it be "out of scale;" or a house can be in bad proportion and its elements in perfect scale. "Proportion" is the relation between the several dimensions of an object, and "scale" is the relation between the different parts of an object. A door or window may be in good proportion, but be "out of scale" with a house, because it looks so small as to seem to be for the use of a child, or so large as to be for the use of a giant. When the details of a house look as if different sized people used its various parts the "scale" is poor. When the "proportion" of a house pleases the eye, it is good.

In all architecture the walls, the column, the lintel and the arch form the basis of construction. Architectural styles are identified by the various treatment of these elements, each style the expression of the life of the people that created it. The variety of construction has been great. The Egyptians, the Greeks, the Romans, the French, the Spaniards and the English have each manipulated these fundamentals to meet their own needs and tastes. They perfected, each their own style as facilities permitted, and these perfected styles have been given definite historic names.

As travel and learning spread, ideas were carried from one country to another. Those who settled in foreign lands took with them their building traditions which in time were absorbed by, and gave color and form to, the architecture of the country of their adoption. From this amalgamation came the styles known as the Renaissance. Italy and France were the two main arteries through which the Renaissance flowed, and nearly all phases of its development can be traced to these countries. There never was an absolute break from tradition, nor a resurrection of principles which had been entirely abandoned because of their faultiness.

*Reprinted by special permission of the Weyerhaeuser Forest Products, Merchants National Bank Building, St. Paul, Minn., publishers of "Good Houses."

Don't Follow Precedent Blindly

It is acknowledged that tradition is the greatest factor that contributes to our making. The difficulty lies in its interpretation. There will always be an intense craving to create something new for ourselves, so upon tradition alone we cannot

accounts for their endless charm and interest.

American Designs Express American Ideals

These styles not only express American ideals, but, as a practical matter, are easy

pitable, open character throughout are all typically American.

Every fact that influences the choice of a style points to the use of our own tradition, and since no style of art is sound that does not express the life of the people who use it, our native tradition is the only one that is sincere in the typical American house. It is certain that the elemental life of the American family and the society which was based on it, have changed but little. We are wealthier, demand greater comfort and have more mechanical conveniences, that is all. We need not wait for a new "nationalism" to achieve a new style.

Whereas in Colonial days people were satisfied to build their houses in the prevailing style of their locality, the development and growing independence of the individual in America now call for a more diversified expression than is found in any one regional type. But no matter how creative a man may be, he can only make his house successful by acquiring an accurate vocabulary of forms and details of the style that appeals to him, and by entering thoroughly into the spirit of its tradition.

Increased culture develops the aesthetic sense, and through a better understanding of architectural styles the desire for beautiful houses will be strengthened. When better houses are wanted by a people, better houses will be built.



The "House of the Seven Gables," immortalized by Hawthorne. Built about 1669. From a snapshot in Old Salem by a National Builder editor

advance in home-building. If we make the past a crutch and ourselves cripples, we are exponents of intellectual stagnation. Yet the notion of absolute originality is an absurdity. No less preposterous than raising dead styles is the invention of entirely new ones. Art in domestic architecture

ones in which to design. Their forms are simple, suited to present-day methods of construction in contrast with the forms of other styles, which are less direct and therefore more costly. They are ingrained in us, among all ranks, as thoroughly as any part of American culture, and it is



Note the peculiar form of the gambrel roof on this old house



An old double house. The front is covered with wide, matched boards

must be at once retrospective and progressive, its very progress a reflection returned from the mirror of the past.

The early American traditions hold great possibilities — artistically, architecturally and nationally. They were developed to fit American conditions, life and manners at a time when people had plenty of leisure to study how to express the ideal of the American family and hearth in the household arts. Our ancestors all over the Colonies, from Maine to Florida, worked nearly two hundred years on this task, and they carried it to complete success. Our native styles are true vernacular, which

absurd to think that fifty years of Victorian ugliness could have broken the tradition. Their spirit remains as vigorous as ever.

It is an error to think that the old American styles mean only prim, balanced, classic design. A thorough knowledge of them discloses an extraordinary amount of the freest sort of architectural expression in massing, grouping, roofs, gables and details. Their picturesque vernacular fits our natural conditions. The horizontal proportions of the house, porches, sheds and outbuildings; the simple, direct lines and construction; the large, cheerful windows; the sunlit details; the livable, hos-

American Architect Honored

THOMAS HASTINGS, a member of the firm of Carrere & Hastings, architects, New York, designers of the Arlington Cemetery amphitheater, the New York public library and the Cleveland courthouse, has received the gold medal of the Royal Institute of British Architects. In the past 60 years the gold medal has been awarded only twice to Americans. The award is considered in London as recognition of the development of distinctive American architecture.

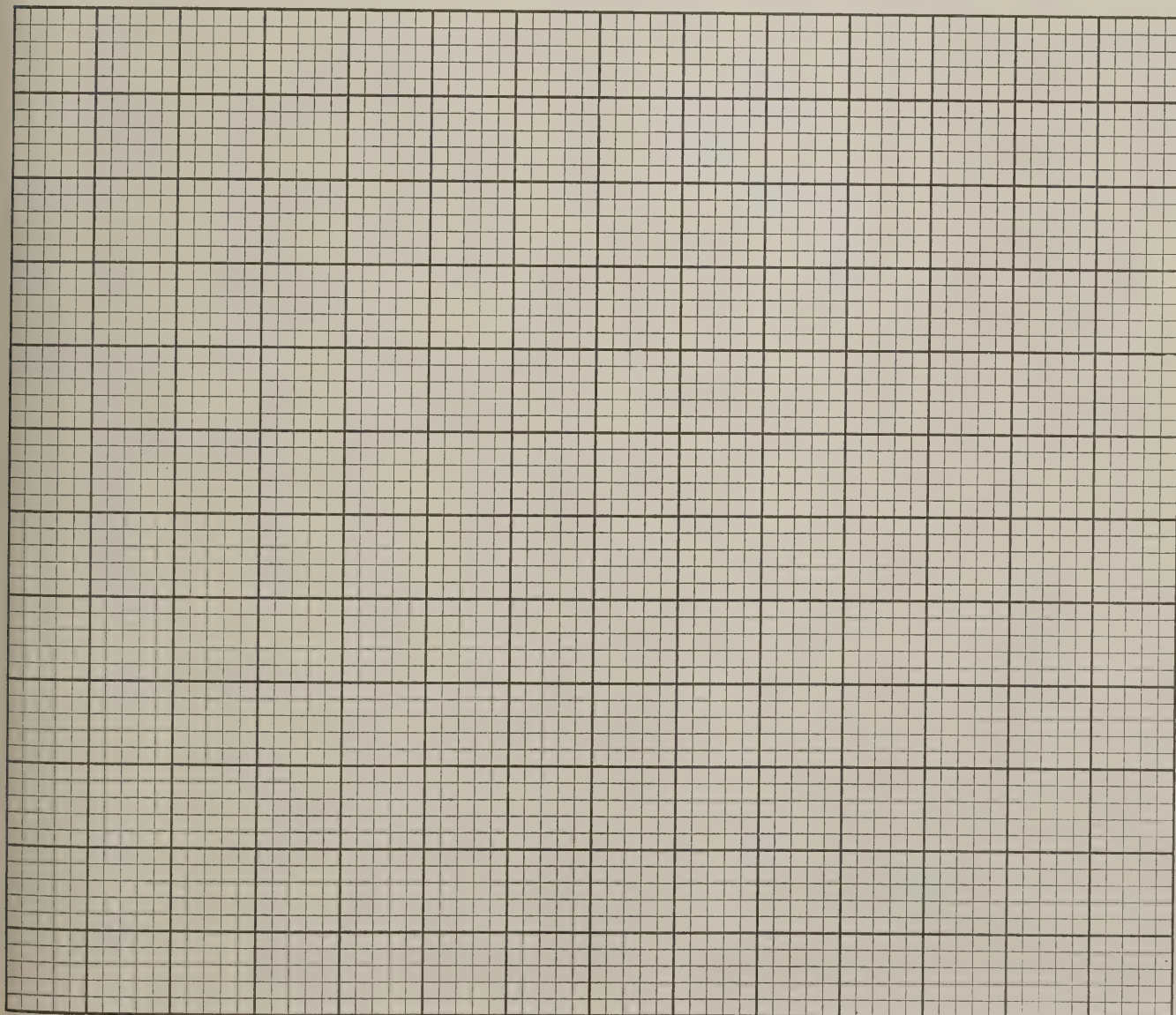
Data Sheet for Use of Architects in Rendering Special Plan Service to Contractors and Builders

Name.....Date.....
Address.....

Give following data and enclose a photograph of the building site:

Size of lot.....
Direction of lot lines (front faces north, east, etc.).....
Wooded or open.....
Number of rooms desired.....
Bungalow or in two stories.....
Approximate size desired of living room.....
Approximate size desired of dining room.....
Approximate size desired of kitchen.....
Approximate size desired of bedrooms.....
SPECIAL FEATURES wanted: Bathroom cabinets.....linen closets.....pantry or kitchen cabinets.....
broom closets.....ironing board recess.....breakfast nook.....outside-icing refrigerator.....
fireplace.....kind of heating equipment if any.....roofing.....exterior (brick, stucco, wood).....

Make rough pencil sketch below of suggested or preferred arrangement of rooms



Short Cuts in Building Estimating

By Theodore F. Laist

This Is the First of a Series of Articles on Various Methods Employed in Rapid Estimating. No. 1—Approximate Estimating

CONTRACTORS and those engaged in the sale of lumber are often called upon to give a rough or approximate estimate of the cost of a building from sketch plans and a perspective sometimes clipped from a magazine and brought to them by a prospective customer. If the contractor or builder who is thus approached can in a few minutes, before the prospect leaves, give a fairly close figure he impresses the inquirer favorably and may by his intelligent response lay the foundation for a future sale. If on the other hand, as is so often done, he irritates the prospect by a flat refusal and places him in a position of one who has made a ridiculous request he loses a customer.

While it is apparent that it is impossible to quote an accurate figure without a complete bill of material to which the prices of the day must be applied and modified to suit local conditions, there are shorter methods by which a figure, correct within certain limits, may be obtained.

The contractor or lumberman is generally in a position in which he need have no hesitancy of giving an estimate. The very fact that he is not supplied with exact information, excepting as to general size and arrangement, places him in an advantageous position since he is not tied down by rigid specifications and comprehensive details. He thus finds himself in a strategic position and can, therefore, so modify these, if need be, to meet his approximation of cost.

This is what architects sometimes do when called upon to meet a cost based on a cubic foot calculation made in the early stages of the project for if they understand costs they can always establish an intelligent upset figure within which they can keep the ultimate cost by adjusting minor details and more or less inconsequential specification requirements. It is the common practice among architects and others to use as a unit for such computations the cubic or the square foot. Unfortunately, however, the determination of the cubical contents or even the floor areas of a structure permits of so many variations that one must be very cautious in using published costs of this nature without being familiar with the exact basis used in their determination. It is almost necessary, therefore, for everyone to work up his own costs. These articles have for their purpose the explanation of how this may be accomplished rather than the establishing of costs which have universal application.

For example, the variations in unit costs of similar structures as obtained by several persons may be due to the manner in which heights are figured—some figuring from the top of the floor construction or to the bottom, and others adding an arbitrary amount for the footings. There may be a divergence in the manner in which the total cubical contents are assembled. It is often doubtful whether the porches, dormers, chimneys, and other accessories are included. Many such items may be cited, the inclusion or omission of which may result in slight variations in the final cost estimate.

Uniform Rules for Determining the Cubage

General Heights and Basements

Figure the actual cubic contents by taking the floor area of each part and multiplying this figure by its height. The heights shall be figured from the bottom of the floor construction. In a one-story building with no basement, resting on walls or posts, this would mean from the bottom of the floor joists. In the case of a building with basement and concrete basement floor, the measurement would be taken from the bottom of the concrete floor.

Roofs and Appendages

In the case of a building with a sloping, flat roof the height would be measured to half way between the lowest and highest part of the roof. In the case of a half-pitched roof it would be halfway between the rise and the peak. In the case of a quarter-pitched roof, one-quarter of the distance between the rise and the peak.

Accessories, Appendages, Etc.

Dormers, bay windows, etc., of the same construction as the main body of the structure should be included in the cubical contents. Porches, if these are open, should be kept separated and take a different unit price. If buildings are without foundations, the underpinning generally being of a variable nature, should be excluded from the cubage.

Subdividing Buildings Into Sections of the Same General Character

Where a building is divided into two or more parts, in which the construction of each part is distinctly of a different type, it is desirable not to combine the parts.

For example, a garage in which the front portion is devoted to store rooms and offices

and of which generally the roof construction and other features are of a totally different type than found in the main part of the garage, it would manifestly lead to inaccuracies if the cubage of the two sections were combined, particularly as the ratio between the area of the store part and the garage proper is a variable quantity. To apply the same unit price to each section would be decidedly wrong. In this case, therefore, the front part should be treated as a distinct quantity and the garage part likewise.

Similarly in hotel buildings, it is advisable to keep the room portion separated from the lower stories on which are located the lobbies and rooms of entertainment, upon which lavish sums are generally expended for decorations and architectural embellishment. In such structures it is very proper and more expedient to use the square foot cost unit. The square foot unit will give a much more accurate result for the reason that the cost of the individual floors vary greatly. This rule would, also, apply to similar types of buildings. For example, take a loft building with a story height of nine feet in which the figure is twenty-one cents a cubic foot, this amount would not be increased to twenty-eight cents with a story height one-third more or twelve feet, in fact there would be very little difference in the cost.

The Importance of the Elimination of Constants Has Already Been Pointed Out.

In order to reduce the cubic foot to a reliable basis certain items must be eliminated which would, in buildings of a certain type within certain limits, be constant. For instance, in a six-room house the plumbing would be the same as for one of eight rooms. The heating would not vary in the same proportion as the area or cubical contents of the building. Probably the porch would remain quite constant in its size. It is obvious that by including these figures the price per cubic foot will not show the true variation which may be represented by the curved lines as shown in Diagram No. 1. (Compare this with diagram 2.)

Practical Value of Unit Costs

Is it possible to evolve a cubic or square foot cost which will fit a number of designs of dwellings of the same general construction but with interior arrangements somewhat different and variable in size?

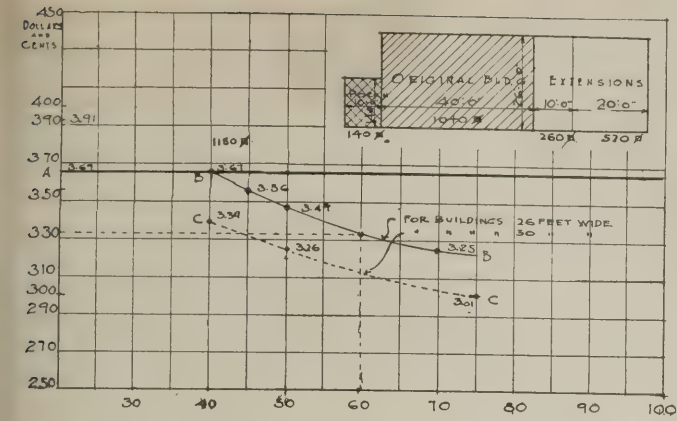


Diagram 1—Curves A and BB in this diagram are intended to show the square foot prices for variations in length. For a building of constant width (26'), both lines represent the entire cost of the building including the porch and constants. A shows the flat, square foot cost, as usually figured and is inaccurate. BB shows the reduction in the square foot cost as the size increases. The figures read off this curve are more accurate. CC shows the same as BB excepting for a building 28' in width instead of 26' and also takes into account the decrease, due to increase in size, of the square foot price. To obtain the cost of any size structure read off the square foot price from the diagram and multiply by the area of the building

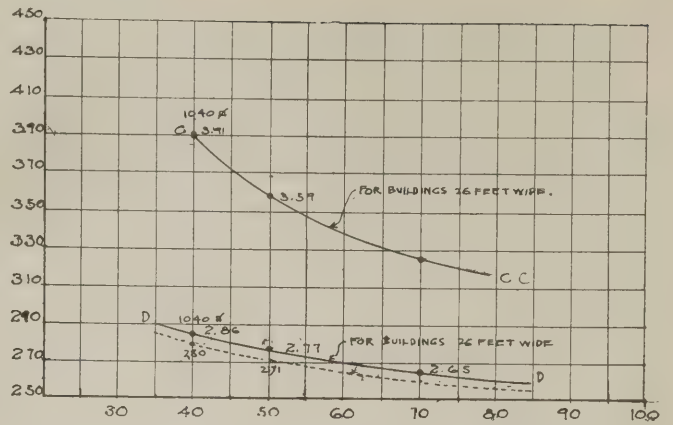


Diagram 2—This diagram indicates the varying square foot price as indicated by the sketch plan diagram 1 but instead of being based on the entire cost of a building is merely based on the variable quantities; therefore, to obtain the total cost it will be necessary to add the constants, such as the porch, plumbing, heating, etc. To obtain the cost of any size structure read off the square foot price from the diagram and multiply by the area of the building and then add the fixed amounts for the constants

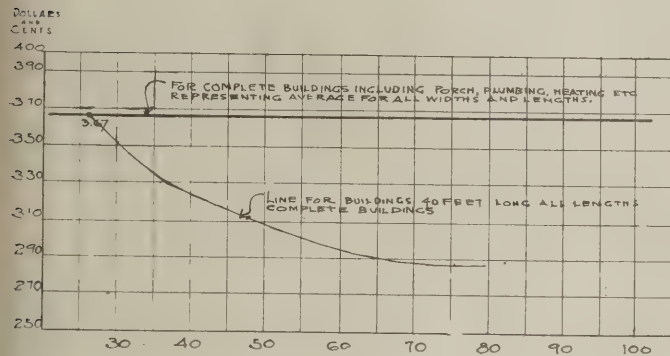


Diagram 3—This diagram, as well as diagram 4 which follows, represents the square foot price for the building extended in width instead of length as shown in diagrams 1 and 2

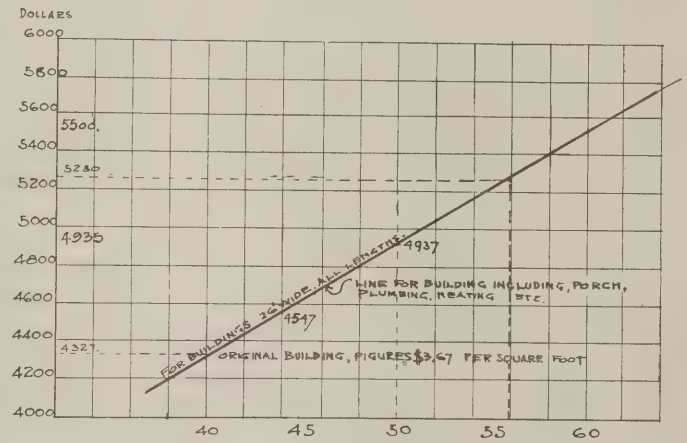


Diagram 5

Diagrams 5 and 6—These figures are compiled from the same data; that is, used for diagrams 3 and 4, but instead of reducing the cost of the various buildings to a square foot unit the total dollars are recorded and may be read off from the diagrams, the vertical line giving the dollars and the horizontal lines one dimension. It is necessary to draw a separate line for each width

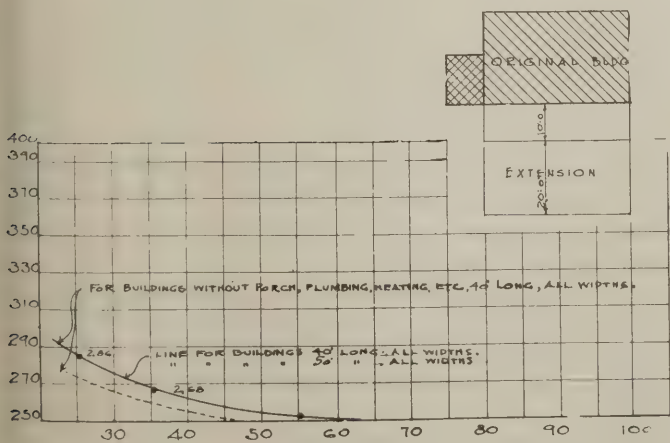


Diagram 4

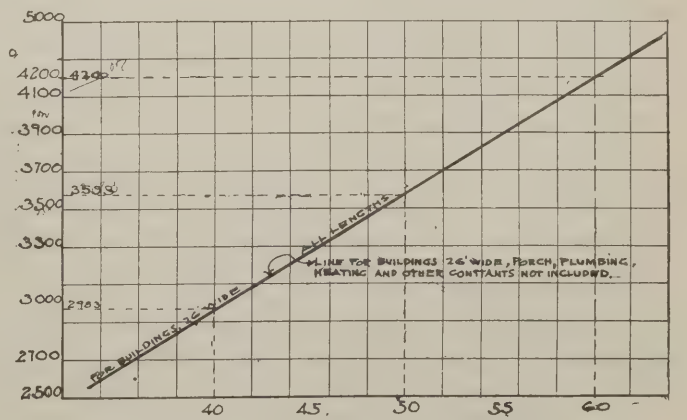


Diagram 6

The practicability of the determination of such costs is not a matter of mere theoretical interest but is a very practical one, particularly in these days when the country is flooded with house designs appearing in the daily press, magazines, and the plan books of Service Bureaus, of which there are a great many. The retail lumber dealer or the contractor finds himself confronted with the problem of giving, without a moment's notice and in a very brief time, a close approximate estimate of several plans that are brought to him.

A prospective customer will perhaps have reduced his selection to two or three designs, his final choice largely depending on cost. He submits his problem to the retailer, who must either make a detailed calculation, make a guess, or give a close figure based on a cubic or square foot cost.

Oftentimes the contractor or lumber dealer subscribes to a plan service and distributes many books in his neighborhood. The cost of these books and expense of distribution will be large and unless he is in a position to readily furnish costs which, of course, may fluctuate from week to week he loses many good prospects. The question then comes—how shall he adjust these costs? This is where the cubic foot method may be used to save a great deal of labor because comparative costs may readily be set up.

In order to meet present day competition, more especially in smaller communities where there are no architects, the retail lumber dealers or contractors have been forced to furnish "plan service," which they obtain from a bureau making its business the distribution of plans. The subscriber is furnished with a number of books, illustrated with sketch plans and perspectives of buildings. These he distributes. For an additional amount, very nominal compared with the fee of an architect, the central or Service Bureau will furnish blue prints and specifications, either from stock or modified to suit the individual.

What methods can the lumber dealer adopt to enable him to furnish approximate estimates? First, he can prepare costs from detailed bills of material in each case. Generally plan service bureaus will furnish bills of material with the working sets of blue prints but not with the plan book.

After once having determined the cost of a structure the contractor can, without much trouble, adjust the price to meet fluctuations that occur from time to time.

The next method that he can employ is to figure at least three structures of each type and plot a curve from which he can read the costs of other but similar structures. This curve can easily be made to fit fluctuating costs by changing the scale. The difference in cost as affected from time to time by variations in unit costs may be obtained by applying a percentage to the basic figure.

Diagrams

These diagrams show how widening or lengthening a building changes the square foot price. Diagram No. 1 is based on actual figures of present day costs and indicates how extending the length of a building will affect the cubic foot price, providing the general area and number of rooms are not changed. In this diagram the entire cost of the building is used. That is to say, such constants as heating, plumbing, etc., are not deducted.

In Diagram No. 2 these constants are deducted and the difference in cost between the various sizes is indicated by the curve and refers only to the structural part of the building.

Diagram No. 3 shows the variation in the cubic foot price due to widening the structure in this, as in Diagram No. 1, the entire cost of the complete structure is used.

Diagram No. 4 shows the variation of the cubic foot price due to the widening of the structure but in which the constants are deducted, the curve being based only on the main structure.

Another Method of Arriving at the Same Results

The sizes which were used for the points on the curve were determined from bills of materials. Another and perhaps an easier way of getting at these differences due to change in size, is as follows:

Assuming (A)—in size—to be the basic structure. If we expand this structure in a longitudinal or in a horizontal direction, figuring the cost for each section a foot in width and extending through the entire building, we may readily determine by a simple arithmetical operation the cost of a number of sizes, either larger or smaller. This change in value may be set down diagrammatically as shown in Diagrams No. 5 and No. 6.

In these costs we are dealing, not with unit costs such as cubic foot or square foot costs, but with total costs.

The Square Foot Cost

The square foot unit has many advantages over the cubic foot cost—first, it is a unit that is expressed in larger figures, consequently, may be used with greater accuracy. It is very difficult to think of costs in cents and fractions of a cent. The larger unit is not open to the same objection.

The mental process in fixing a cubic foot or square foot cost for a particular structure is by comparison. We start with a building of known cost and then compare this with the structure that we are estimating, increasing or reducing the basic figure accordingly.

The great advantage of the larger unit is obvious for in short, we start with a fixed price for a fixed thing and then endeavor to adjust the cost of some other thing to the basic figure; the greater the dollars per unit, the greater the ease with which the mind can adjust the differences.

Another great advantage of the square foot cost is the fact that increasing the story height of a building (even after such constants as plumbing, heating, etc., have been eliminated), does not increase the cost of the building in the same proportion as its cubic contents.

Practical Application of the Diagrams

After we follow the above trend of thought to its logical conclusion it seems perfectly reasonable to adopt the following methods for the determination of structures variable in size but of the same general type.

All that is necessary to determine the range of prices for a certain locality for a great number of structures of similar construction but of different sizes is to determine the cost of three basic structures, then plot a curve. Other sizes may be read off. These figures, it is clear, are not rough guesses but are based on actual figures.

Other Short-Cut Methods

A method in which the building is divided into composite sections of wall, roof, and partition construction instead of into smaller parts will be discussed in the next article.

Practical Application of the Basic Principles Above Described

For the purposes of study a one-story bungalow was figured and the costs, for different sizes, plotted, as shown in the attached diagrams.

The figures are based on a one-story bungalow of frame with a part basement. The cost of the structure as erected in a Middle West city in May, 1922, is as follows:

Masonry, foundation, excavating, cement floor, etc.....	\$ 605.00
Lumber and millwork, hardwood floors, nails, hardware and glass....	1464.00
Carpenter labor	710.00
Plumbing	440.00
Plastering	220.00
Heating	160.00
Tiling	67.00
Painting and papering.....	247.00
Light fixtures, shades, refrigerator, kitchen cabinets	255.00
Brick chimney	115.00
Tinning	44.00
Total.....	\$4327.00

The above figures are based on a building 26x40 ft., with a porch 10x14 ft. in size.

For a building of the same general construction but different in size, within certain limits, the variables are as follows:

(By way of explanation it may be stated that "variables" are those branches such as carpentry, painting, etc., which vary considerably with the size of the building. Branches of the work such as plumbing, tiling, brickwork in chimney, etc., are uniform, and therefore designated as "constants.")

Variables

Excavating, foundation and cement floor	\$ 710.00
Lumber and millwork, hardwood floors, nails, hardware and glass....	2069.00
Plastering	220.00
Painting	247.00
Total.....	\$3246.00

It will be seen that all the above items vary directly as the size.

The following items are constants; that is, they do not vary with the changed dimensions of the building:

Plumbing	\$ 440.00
Heating	160.00
Light fixtures, refrigerator, cabinet and shades	255.00
Brick chimney	115.00
Tinning and tiling.....	111.00
Total.....	\$1081.00

Figuring the porch at one-half the cost per square foot of the main structure, we get as the cost of the porch \$263, which deducted, together with the \$1081, from the total cost of \$4327, leaves a balance for the variable part of the structure of \$2983.

Referring to the diagrams, in all of which the vertical line represents the dollars and the horizontal line one dimension, we find by referring to Fig. No. 1 that line AA drawn horizontally would represent the square foot price as usually figured for all sizes of a completed building; (that is, the building plus the porch and constants, such as plumbing, heating, etc.), as usually figured.

The square foot unit has been used instead of the cubic foot for convenience of figuring in these illustrations.

This horizontal line would represent the cost per square foot as obtained in the ordinary way which on the face of it is incorrect. Line BB, however, shows a constantly diminishing price per square foot, as the size increases, which is as it should be.

To use this diagram, we will say for a building 26x60 ft., find the point 60 on the horizontal line and follow the vertical line where it intersects the curve B; then carry the horizontal line over to the vertical line to the left and read off the amount in dollars, \$3.32, which will give the correct square foot price. To find the total, multiply the width, 26 ft., by the length, 60 ft., giving a floor area of 1560 sq. ft., to which add one-half the porch, 70 sq. ft., giving a total of 1630 sq. ft., which is to be multiplied by the \$3.32. It will be noted that the result thus obtained is less than that which would be obtained by applying the flat price.

By turning to diagram No. 2 we note two curves—one, CC, and the other DD—the former representing the square foot price for the building less the porch, and the latter representing the price of only the variable parts of the building as enumerated in the table, totaling \$2983. If the square foot

price is obtained from this curve and the constants added, the result obtained will give a more accurate figure than can be realized by using the line BB in the first diagram or CC in the second.

Diag. No. 3 shows the same process as



Perspective of the bungalow. Five rooms and bath

Diag. 1 only giving a curve for expanding the building in width; that is, leaving the 40-ft. dimension the same and stretching out the 26-ft. dimension. Diag. No. 4 represents the building increase in width to correspond to Diag. No. 2 in which all constants are deducted.

Diag. No. 5, instead of indicating the square foot price, shows the totals in dollars; that is, the total figure may be read from the left-hand vertical line for the size indicated on the base line. It will be seen that in one set each curve is suitable only for one width and for increasing the length of the building but leaving the width the same, and in the other set of diagrams for increasing the width but leaving the length the same.

In Diags. 1, 2, and 4 parallel lines have been plotted to be used for buildings of different width. These lines will not actually be parallel, but for ordinary purposes may be regarded so, as the difference is not very great.

In the building under consideration it was found that for each foot in length \$61 had to be added to the original cost, and for each foot increase in the width \$88 represented the additional cost. The cost for the floor area in either case was \$1.80 per square foot, which does not include the outside walls.

The above are not practical working diagrams, and they are merely intended to indicate the comparative difference in costs as obtained by various methods with a view to obtaining the most accurate method. Nevertheless the figures are actual present day costs.

How these diagrams may be combined and a system of figuring evolved which may be applied to an indefinite number of similar structures of varying size will be shown in the next article.

Has Contract to Move Entire Town

E. W. LaPLANT of Cedar Rapids, Iowa, has taken a contract to move the whole town of Osborne, Iowa, with a

population of 1050, out of the Miami river bottoms back a mile and a half into the hills, in safety from floods, for \$250,000, or, if new foundations are laid for building, for \$350,000. The work started June 1 and will take two years.

There are approximately 300 dwellings, garages, barns and sheds in Osborne in addition to 21 business houses, school houses and several churches.

The signed contract specifies that at least 249 of these buildings are to be moved to the new site which is adjacent to Fairfield, though Osborneites are determined they will not incorporate in the other town. They intend to maintain their town organization while moving to a new location.

LaPlant has with him Harry Sheller & Sons of Chicago. The firms will have their own road from the present site to the new location and the contract specifies that for two years no other companies will be permitted to move a building over the road.

Seven gangs of eight men each working the entire time for two years will be necessary to complete the mammoth job. Mr. LaPlant will bring eight Cedar Rapids men to act as foremen, but the entire work will be under the direct supervision of himself and his Chicago partner. All the machinery used in moving the buildings will be manufactured in the Cedar Rapids plant of the LaPlant-Choate Company.—*Improvement Bulletin*.

NATIONAL BUILDER presents in this issue a story of what is being done in England by the Guilds to meet conditions and a report of the organization of the American Construction Council out of which much is expected. What are your ideas on how the construction industry can obtain peace and progress? Send them in.

Method and Organization in Construction Plans

The Bigger the Job the Bigger the Profits from Forethought and Planning, but no Job is too Small for Systematic Handling

A GOOD contractor would make a good general. He knows where to plant his batteries of concrete mixers as a general knows where to place his batteries of artillery, he has strategic locations for his ammunition dumps (cement, lime, sand,

wise that a big job is not necessary to demonstrate good contracting methods. Many small contractors have more system and efficiency through their close personal supervision of the work than some elaborate organizations under a staff of efficiency

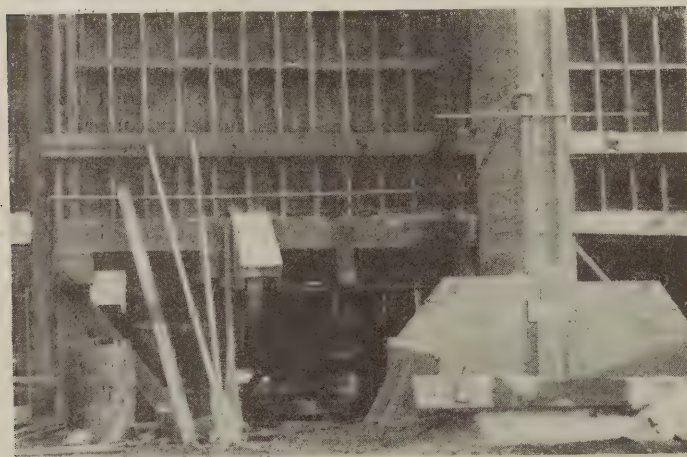
A good example of a well-planned construction plant and scheme of operation is illustrated in the accompanying views of the Masonic Temple, Topeka, Kan. The T. W. Williamson & Co., associated architects with Frank C. Squires, of Topeka, and



Receiving bin for sand and gravel aggregates



Type of car used to charge concrete mixer



Rear view of receiving hopper of bins, also shows spray pipe for dust elimination



Another view of receiving hopper for aggregates showing pump for drainage of elevator boot. Cement stock house at the left

gravel, etc.), just as does the military chief-tain, and he knows how to organize and direct his workmen to accomplish a certain objective. History proves that it does not require a large army to develop and show good generalship, and it follows like-

engineers. The same principles apply to the erection of a \$5000 bungalow as to a \$500,000 factory. The fundamental principle is that the saving effected in labor, material and time shall more than pay for the extra equipment, plant and overhead.

the contractor, F. M. Spencer & Son, whose planning is featured, also of Topeka.

The building is a six-story steel frame building, with the steel members encased in concrete. It was intended to be a reinforced-concrete building but the failure of



Sidewalk side of aggregate bins showing tracks leading to mixer hopper



Hopper at street level over concrete mixer in the building basement. Elevator shaft in the background



Top of concrete elevator shaft and lower hoppers for receiving the skipload of mix

even at that. The concrete plant represents an investment of about \$10,000, which will probably not all be charged against this one job.

Concreting Plant

One important thing about the plant was that it occupied very little of the public street; it was compact. A substantial bin, erected at the curb line, was designed to hold approximately 100 tons of sand and 175 tons of crushed stone. Truck loads of these materials were dumped into a hopper at street level and were elevated from this hopper and discharged to their respective bins by a bucket elevator operated by a 10 hp. electric motor under the bin.

From these bins the sand and gravel were drawn through gates in the bottom of the bins into two steel dump cars, in the correct proportions for a batch of concrete. These cars were pushed on rails across the sidewalk into the building and dumped from either side into a hopper, which was erected over a batch concrete mixer in the basement of the building.

The concrete mixer discharged directly into a boot or hopper feeding the elevator car. The elevator car, or skip, carried a batch of concrete to the top of the elevator shaft, where the skip dumped automatically into a hopper from which wheel barrows could be filled, or to a higher hopper which fed the gravity chutes.

A study of this scheme will show that there is absolutely no rehandling of materials and that the whole operation is as near automatic as it would seem possible to attain. The placing of the concrete in the forms around the steel members in this case was of course more complicated than it would be in a simple reinforced-concrete structure.

Form construction was much facilitated by the use of a power saw and other wood-working machinery in a shop alongside the material bins. The construction plant also included a stock house for cement and tools, which is shown in one of the views.

All of the plant, as the views show, could be readily dismantled and re-used on other



Near view of hopper for feeding the wheelbarrows

the Salina, Kan., concrete Masonic Temple while under construction, about that time, caused a change in original plans. These changes reduced the amount of concrete originally estimated on, but the plant for placing the concrete proved economical



Gasoline engine driven saw mill for building form sections



Near view of saw and setting



Stair wells and stairs for insuring safety and efficiency of workmen

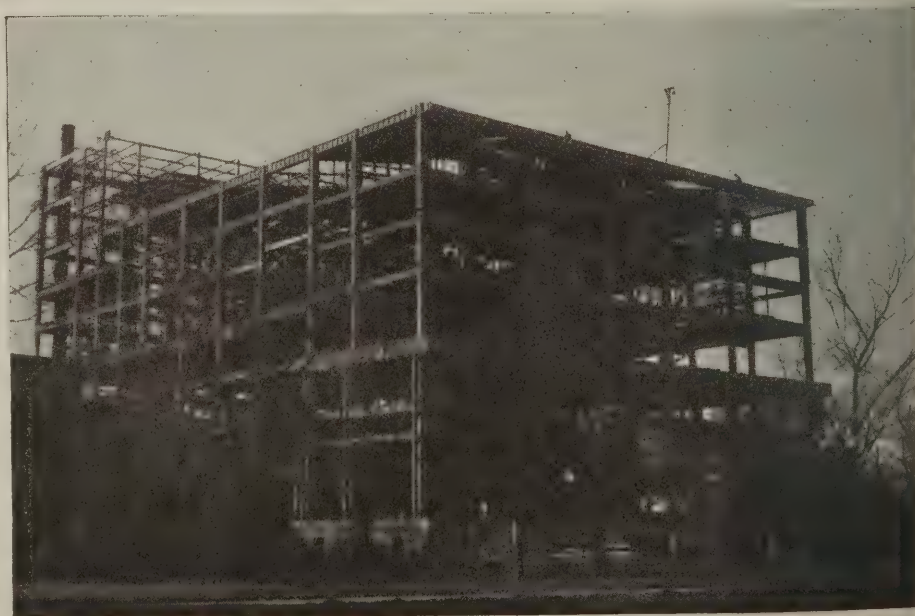
jobs. The elevator shaft was of structural steel shapes bolted together, while the aggregates bin was made in large panels which could be readily knocked down and re-erected. The beauty of this plant is that it can be made to fit any building with very little change in the layout.

Another feature brought out in these pictures is the substantial stairways provided by the contractor for use of his workmen during construction. The stair wells are all railed off and the stairs themselves provided with easy risers and substantial treads as well as hand rails. The avoidance of accidents and the provision for easy and safe passage from floor to floor of a building under construction are often over-looked measures which make for both safety and economy.

The job was equipped with electric power for operating all contractors' machinery.

"Materials of Construction," by Adelbert P. Miller, now in its second edition

will be welcomed by those who are familiar with the original book. This work was an outgrowth of lectures and notes used in the author's classes in the College of Civil Engineering at Cornell University, and was compiled to meet the need felt for a general text-book covering the manufacture, properties and uses of the more common materials of engineering construction. The more or less detailed treatment of certain parts of it make the book valuable as a reference book as well. In the new edition there has been no attempt to change fundamentally the original work. Some chapters have been condensed, parts of others have been rewritten, some new ones have been added. The book has also been divided into sections as follows: I, Plaster, Lime, Natural Cement; II, Portland Cement and Concrete; III, Stone; IV, Bricks and Other Clay Products; V, The Ferrous Metals; VI, The Non-Ferrous Metals and Alloys; VII, Timber; VIII, Rope; IX, Fabrics. Published by John Wiley & Sons, Inc., 432 Fourth Ave., New York City, \$4 net.



Steel frame concrete enclosed

payments applicable to periods subsequent to any particular period.

LIABILITY ACCOUNTS comprehend:

- 1—For Corporations:
 - (A) Liabilities to outsiders.
 - (B) The liability (proprietary) of the corporation to the stockholders, at time of dissolution, for the following:
 - 1—Outstanding capital stock.
 - 2—Surplus earnings not declared in dividends.
 - 3—Unapplied reserves.
- 2—For Sole Proprietorships or Co-Partnerships:
 - (A) Liabilities to outsiders.
 - (B) Proprietorships accounts, comprised of:
 - 1—Investment accounts.
 - 2—Unapplied profits.
 - 3—All other credit accounts not represented by liabilities to outsiders.

Classification of General Ledger Accounts

While it is evident that the General Ledger is simple enough from a mechanical standpoint, it being necessary only to provide sheets and a binder (whether loose-leaf or otherwise), it should be observed that the matter of arrangement of the various accounts is of real importance.

Classification is, by and large, the most important feature of bookkeeping. If an individual knows what accounts to employ in order to assemble bookkeeping results to the best advantage, and knows the functions of these accounts, he lacks only a knowledge of bookkeeping routine and the arrangement and use of the different forms to complete his working knowledge of the science.

We have seen that any General Ledger account will fall into one of the three broad classifications; viz., asset accounts, liability accounts and proprietary accounts, and it is this primary classification which offers a suggestion as to the proper arrangement of accounts in the General Ledger.

The science of classification will be developed in subsequent articles of this series by defining the functions and features of all ledger accounts common to the contracting and building industry, as set forth by the following chart. This chart shows the accounts in the order in which they should appear upon the Ledger—an arrangement which conforms to the sequence of accounts as they appear upon the Balance Sheet, and Profit and Loss Statement.

Thus, all asset accounts should appear first, followed by liability accounts, and finally by proprietary accounts. Within these broad classifications, however, the various accounts should appear in the order of their liquidity or realizability, as shown. Following the asset and liability groups will

be found the income and expense group, which consists of sales, cost of sales, expense controlling accounts, other income and other deductions. Postings to the accounts falling in this income and expense group will be made on "Income and Expense" ledger sheets, as illustrated by Fig. 24.

Chart of Accounts—Modern Building Construction Company

ASSETS

CURRENT:

CASH—

- On Hand.
- In Bank.

NOTES RECEIVABLE—

- Sundry Notes.
- Less: Notes Receivable Discounted.

ACCOUNTS RECEIVABLE—

- Customers' Accounts.
- Less: Uncompleted Contracts.
- Personal Accounts.
- Less: Allowance for Bad Debts.

INVESTMENTS—

- U. S. Liberty Bonds (an account with each issue).
- Industrial Stocks and Bonds (an account with each class).

INVENTORIES—

- Material.
- Investment in Buildings Under Construction.
- Less: Completed Work Charged Out.

PERMANENT:

- Land.
- Buildings.
- Less: Allowance for Depreciation.
- Equipment.
- Less: Allowance for Depreciation.
- Autos and Motor Trucks.
- Less: Allowance for Depreciation.
- Horses, Wagons and Harness.
- Less: Allowance for Depreciation.
- Office Furniture and Fixtures.
- Less: Allowance for Depreciation.

OTHER ASSETS:

- Leaseholds.
- Goodwill.

DEFERRED CHARGES:

- Insurance Prepaid.
- Liability Insurance Deposit.
- Interest Prepaid.
- Prepaid Rent.

LIABILITIES

CURRENT:

NOTES PAYABLE—

- For Borrowed Money.
- For Material.

ACCEPTANCES PAYABLE—

- For Material.

ACCOUNTS PAYABLE—

- For Material.
- Subcontractors' Accounts.
- Less: Subcontractors' Uncompleted Contracts.
- Personal.

DIVIDENDS PAYABLE—

- Dividends Declared on Preferred Stock.

Dividends Declared on Common Stock.

ACCRUED ACCOUNTS—

- Salaries and Wages.
- Commissions.
- Interest.
- Taxes.
- Compensation Insurance.

RESERVES:

- For Federal Taxes.
- For Contingencies.

NOMINAL (PROPRIETARY):

CAPITAL STOCK—

- Capital Stock Authorized.
- Less: Unissued Capital Stock.

SURPLUS—

- Surplus.
- Profit and Loss—Current.

INCOME AND DEDUCTIONS

SALES:

- Completed Contracts.
- Jobbing.
- Material.
- Miscellaneous.

COST OF SALES:

- Completed Contracts.
- Jobbing.
- Material.
- Miscellaneous.

ACCRUING OPERATING EXPENSES:

- Operating Expense Controlling Account.
- Administrative and General Expense Controlling Account.

OTHER INCOME:

- Interest Earned.
- Discount Earned.

OTHER DEDUCTIONS:

- Interest Paid.
- Discount Allowed.

In the case of a Sole Proprietorship or Co-partnership the only change in the above chart would be with respect to the Nominal or Proprietary Accounts, under the "Liabilities" classification. These would show as follows:

NOMINAL (PROPRIETARY):

- John Doe Investment Account.
- Less: John Doe Drawing Account.
- Richard Roe Investment Account.
- Less: Richard Roe Drawing Account.
- Profit and Loss—Current.

No Surplus Account is required, for the reason that the current profit for the year is credited in total to the Proprietor's Investment Account, in the case of a Sole Proprietorship; or in the case of a Co-partnership, it is credited to the Investment Accounts of each of the partners, on a basis of the ratio the investment of each bears to the total investment, or upon some other equitable basis called for by the Articles of Co-partnership.

Information Furnished by General Ledger

We now have the physical lay-out of the General Ledger. But this is merely a means to an end—it has no significance, or at least not much, unless the proper entries are

made therein; and upon this alone, in the last analysis, depends the accuracy or inaccuracy of the information which the General Ledger furnishes.

Reduced to fundamentals, this information is comprised of:

- 1—Amount of cash on hand and on deposit.
- 2—How much is due you from others—amount of receivables.
- 3—Amount of investment in various jobs.
- 4—Amount tied up in permanent plant and equipment.
- 5—Amount you owe to others—payables.
- 6—Value of your contracts.
- 7—Cost of the work done on contracts.
- 8—Amount of monthly profit earned.
- 9—Amount of your expenses.
- 10—What makes up your expenses.

From almost any bookkeeping arrangement it is possible to determine items 1, 2, 4, 5, 6; but if this much only is known, the complete story is not told; in other words your General Ledger does not tell the whole truth.

How Business Facts Are Furnished

Now, all these figures in the General Ledger are meaningless unless they lead somewhere—unless they furnish the contractor and builder with the facts of his business situation. Finally, then, you should get a Balance Sheet, and a Profit and Loss Statement, at least monthly from the figures contained in your General Ledger. And the value of this to you lies in the ease with which you can determine the following questions:

- 1—What is the relation of Accounts Receivable to Accounts Payable?
- 2—Is the Notes Payable item too large in proportion to Capital?
- 3—Is Capital being impaired by losses?
- 4—Is the amount of work on hand too large or too small?
- 5—Are my jobs moving fast enough?
- 6—What is the amount of my expenses and how are they made up?
- 7—How much profit am I earning?
- 8—Is this a true statement of the condition of my business?

There is not much danger from other sources if, having these two monthly statements, you study them intelligently; for knowing the real truth about your financial condition, you can trim your sails according to the gale.

(To be continued)

Small Builders' Accounts

IF there is one man in trade who should be particularly anxious to have a reliable system of bookkeeping it is the man who is in a small way of business as a builder, writes "A. M." in the *Illustrated Carpenter and Builder*, of London, England, and what he has to say is just as applicable to the American small builder as the British one. In this connection the articles on builders' accounting now running in NATIONAL BUILDER give practical aid to those who aim to understand their business as a business as well as a trade.

"It would not be too much to say that in the past fifty per cent of those who failed did so because they had no proper system of accounts. As a rule the type of man I refer to was hard-working, honest, and obliging, he did his best to give his customers satisfaction, and looked after his men; he had no extravagant tastes, and did not waste his money; yet he failed. It was a settled matter with him that he could not afford to engage a clerk, yet his mistaken economy cost him his reputation. It is obvious that he requires more care in his accounts than many another trade, for he draws his supplies from such a variety of sources; they are so various in their character, so many of them are hid from view and memory in very many men is so unreliable, yet, strange to say, he relied so much on his memory instead of his books. Had you stopped him in the street one day and told him he was losing five pounds a week he would not have believed you, yet in many cases it was only too true. He thought he knew where every man had worked for a month past, and when a customer asked for his bill in a hurry he made it out. He charged for three men, but there had been four part of the time. He ordered ten loads of bricks, but the man on the job wanted another, and told the carter to bring it. A bag of cement, a dozen firebricks, a Norfolk handle, 5 ft. of floor board, etc., all "missed." Again, profit does not fall down from heaven like the manna of old; it has to be carefully calculated; but without a proper system this cannot be done. The writer will never forget being at a creditors' meeting, where the debtor explained he was at a loss to understand why he was unable to pay his debts, "because," said he, "I was always busy, always plenty of work on hand, and everybody paid me; I had no bad debts." Of course, an accountant soon found it out, but it was too late then.

"When a man commences in the building trade on his own account his first thought should be his books and his office. It will be to his business what his heart is to his body. If things go wrong there the con-

sequences will be fatal to him as a business man, and the less he knows of book and account keeping the more anxious he should be about them. But, alas! how often the reverse is the case."

Plans for a Gambrel Hipped Roof

AN Indiana subscriber writes: "I have a large brick barn, 36 ft. x 140 ft. to build. My customer would like to have a gambrel roof, which is to be hipped. I have never seen one built this way, nor have I seen plans or even a picture of such a one. . . . Am just in receipt of a copy of your *Details of Building Construction*, with which I am well pleased, but I find nothing in it on this subject."

E. W. Lehmann, professor of farm mechanics, Agricultural Experiment Station at Urbana, Ill., answers: "It is my personal opinion that it would not be practical to attempt to build a barn of this type. It seems to me that it would merely complicate the construction and limit the mow space for hay storage. I would certainly recommend the straight gambrel type in preference to it."

Uses of Basswood

H. S. Clyde, N. Y., writes: "I would like to know what basswood is good for, and if it is good for floor joists and cross beams. Also, if you have a book which tells the strength of the timber, from 2x4 to 14x16 in., in different spans and lumber."

The Forest Products Laboratory, Madison, Wis., reply: "Basswood, on account of its white color, softness and ease with which it works, is used extensively for planing mill products, general millwork, box and crating material, hidden parts of furniture, woodenware, novelties, dairymen's and poultryer's supplies and for trunk construction. It is also used in many other industries, information on which is contained in United States Department of Agriculture Bulletin 605, entitled "Lumber Used in the Manufacture of Wooden Products." Copies of this bulletin may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 cents (stamps or personal checks not accepted). Our circular entitled 'Standard Terms for Describing Wood' includes a table of the physical and mechanical properties expressed in comparative terms for many species of our native woods, including basswood. Basswood is one of our lightest woods and is also low in its mechanical properties. It therefore would not be a very desirable wood for structural purposes where strength is the controlling factor."

A "Time Out" Record on Concrete Mixer—A "time out" of use of one hour and fifty-seven minutes in the work of laying 13,108 cubic yards of concrete, representing 663 carloads of material, is the record reported by John L. Baird, engineer, of Cannonsburg, Pa., for an 8-E Koehring paver, and made the subject of a special circular "One Hour and Fifty-seven Minutes," issued by the Koehring Company, Milwaukee, Wis.

Equipment for Tourist Camping Grounds

Suggestions for Architects and Contractors
on What to Provide at Permanent Campsites

CITIES and towns, large and small, from one end of the country to the other, are rapidly providing camping grounds for cross-country auto tourists. Not only summer vacations by motor but tourists traveling back and forth as late as heavy frost in

far as possible of weather resistant, fire-proof construction and sturdy enough to withstand the hard usage to which it is likely to be subjected. Up to the present very little in the way of suggestions or directions for building such equipment has been available, although the demand for this information has been very great.

Cook stoves.

Refuse and garbage burners and boxes.

Outdoor shower bath.

Auto washing or repairing platform.

Designs for constructing this equipment of concrete are shown in accompanying illustrations which have been made up after an opportunity to inspect many such con-

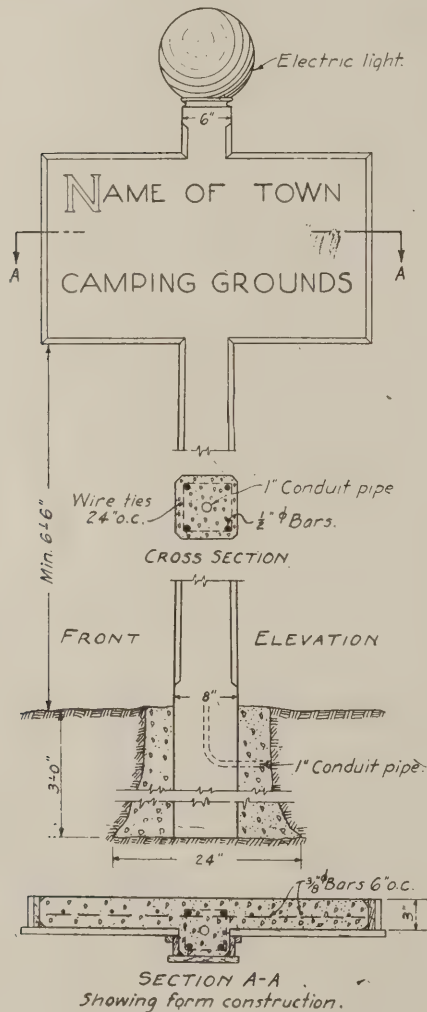


Fig. 1—A good post at the entrance to the auto camping grounds invites motorists to stop

the fall use these conveniences extensively. In southern California and other places where the winter is mild, camping grounds have year 'round patronage. The better the grounds are equipped the more tourists are naturally attracted.

If the camping ground is to be a permanent affair equipment placed should be so

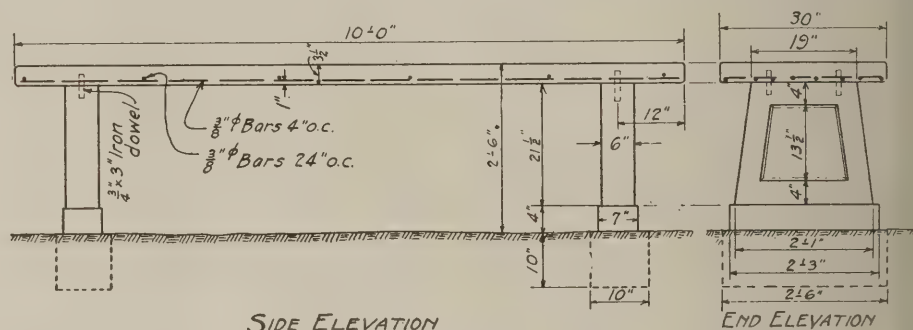
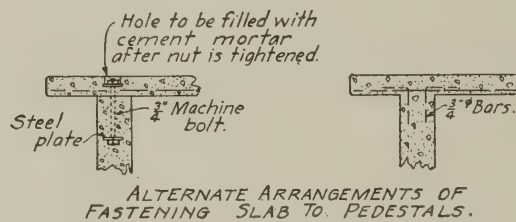


Fig. 2—Concrete lunch tables and benches are a great convenience to the tourists.



ALTERNATE ARRANGEMENTS OF FASTENING SLAB TO PEDESTALS.

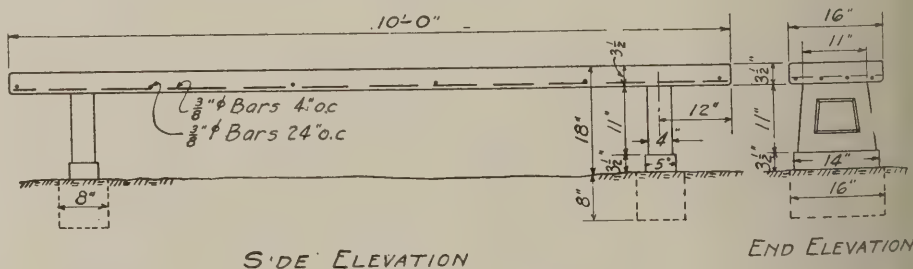


Fig. 2—Concrete lunch tables and benches are a great convenience to the tourists.

They should be of permanent construction to avoid maintenance expense

The average camp ground, to be considered well equipped so far as permanent pieces are concerned, should have all of the following:

Sign and light posts.

Tables and benches.

Drinking fountain and provision for water.

Outdoor toilets with sanitary vaults.

veniences in use. Several of the pieces are reproduced exactly as they have been found in successful use. Others have been redesigned to overcome certain small and obvious objections.

An Attractive Sign Post

Fig. 1 gives design for an attractive sign

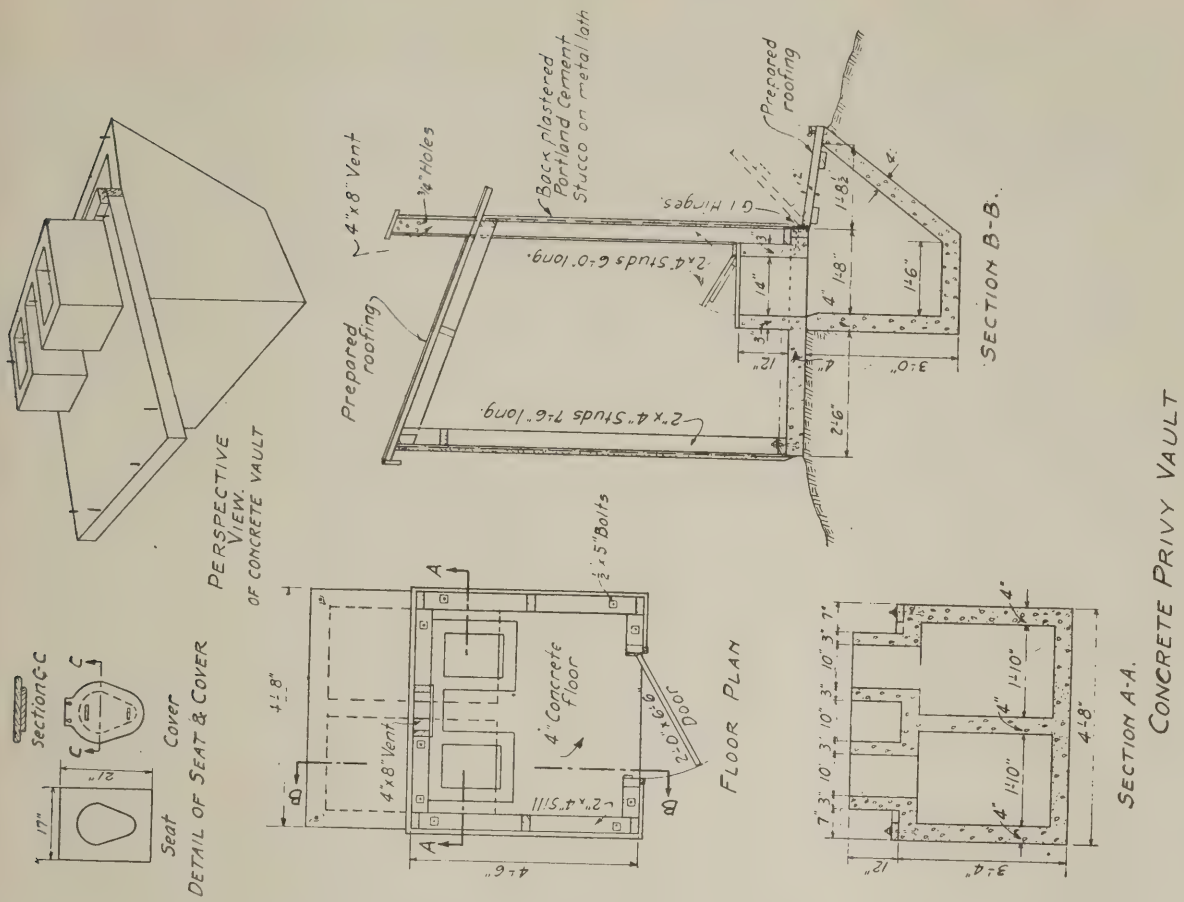
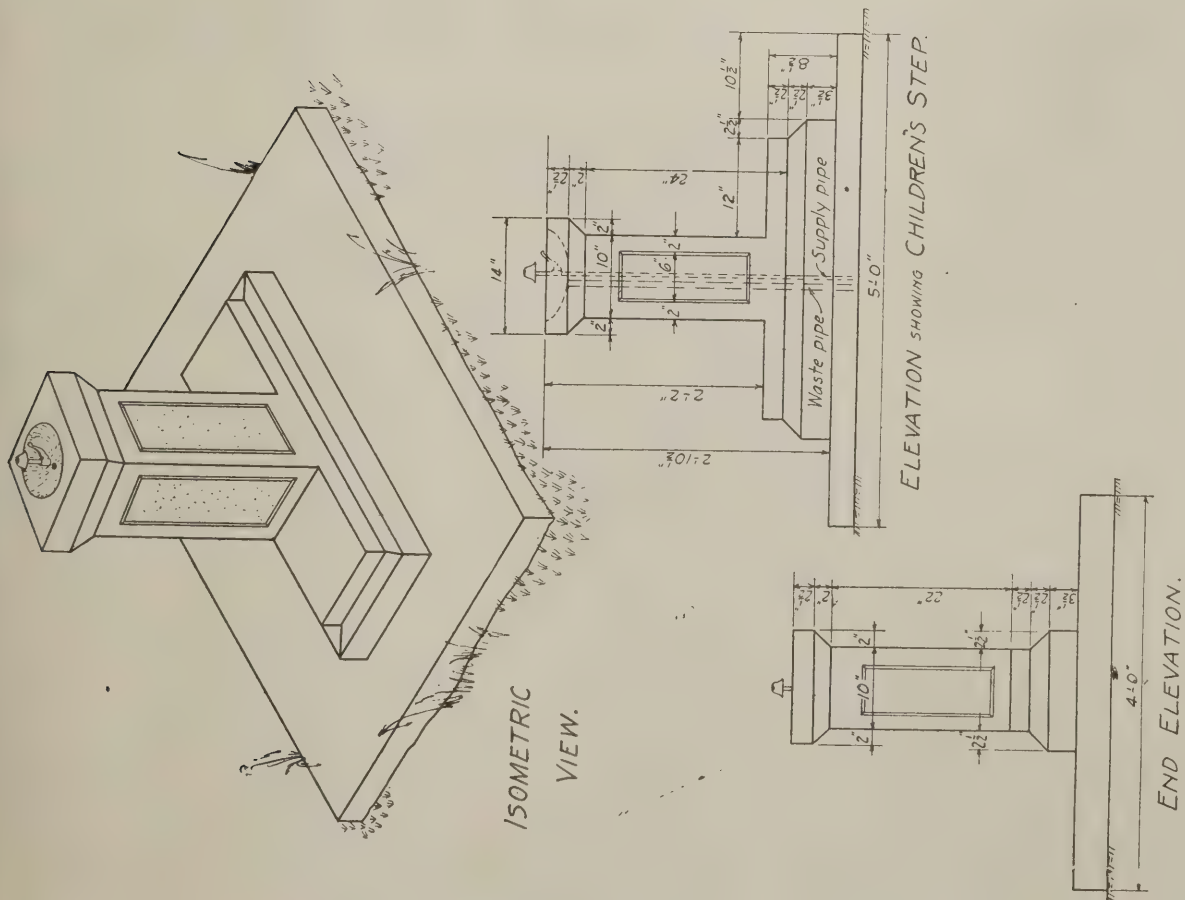
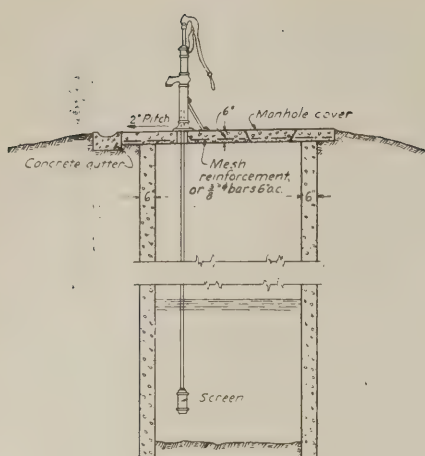
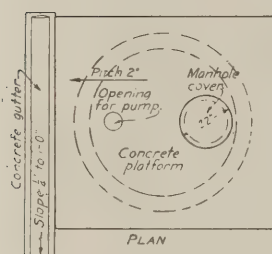


Fig. 3—The drinking fountain designed so as to be accessible to children as well as grown-ups is indispensable. The design shown above is inexpensive and easy to build

Fig. 5—Sanitary toilet facilities are essential for the tourist camp. This design follows very closely vaults installed by the U. S. Public Health Service



CROSS SECTION



CONCRETE WELL CURB

Fig. 4—Concrete well curb and pump base protect the water supply and never need to be replaced

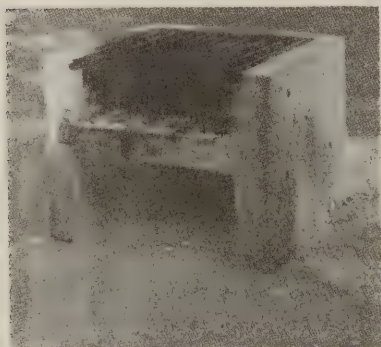


Fig. 7—Type of concrete camp stove in common use

and light post to be placed at the entrance of the grounds. The post proper is eight inches square at the base, tapering to six inches square at the top. It is designed to carry a 10-inch or 12-inch circular light globe. The sign board is preferably made in one piece with the post. The board has a thickness of three inches, a height of from 24 to 30 inches and a width perhaps twice the height, or great enough to provide space for the desired words to appear.

The bottom of Fig. 1 shows a sectional view of the simple wooden form for making the sign post. The form should be made of tongue-and-grooved lumber well oiled to prevent the concrete from sticking. The corners of the form are filleted in order to produce diagonal corners on post and sign

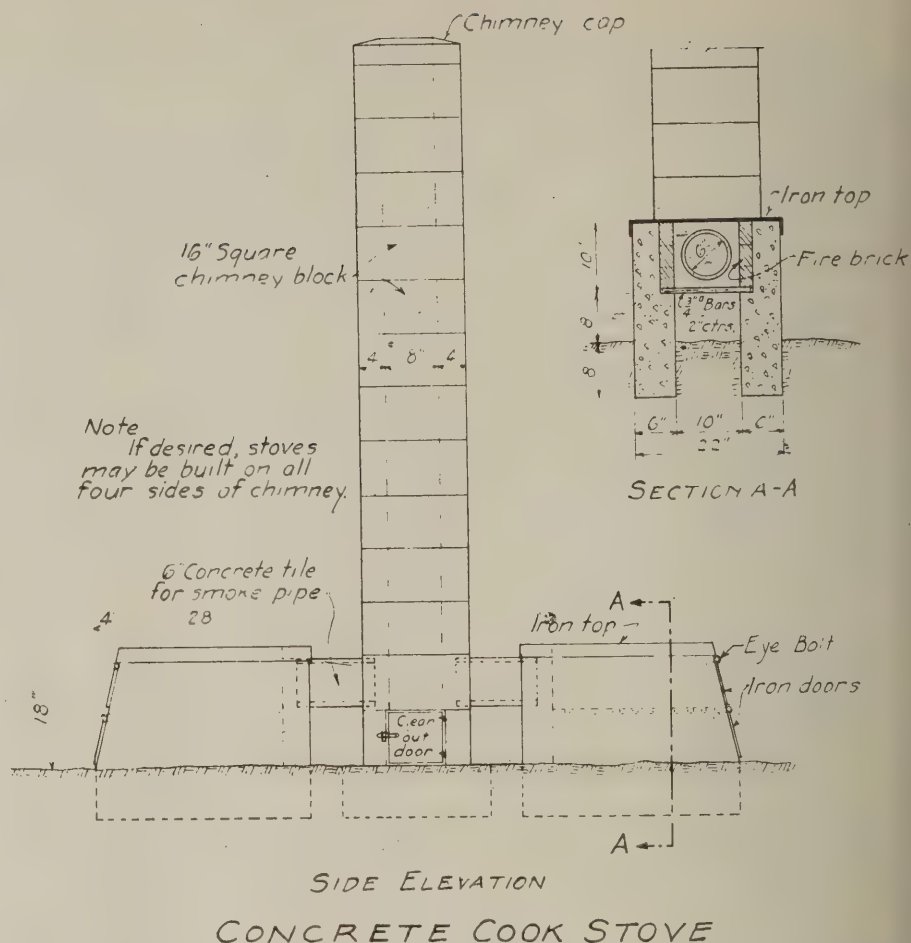
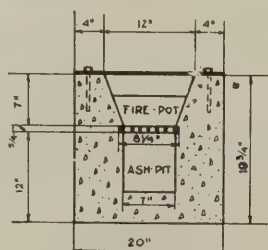
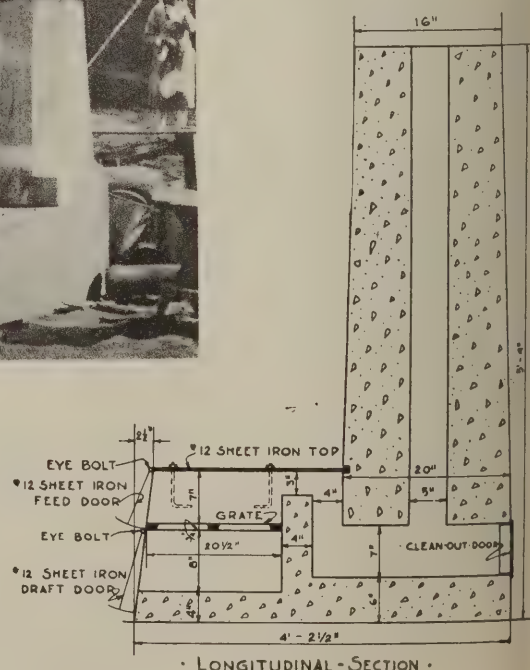


Fig. 6—Small concrete cook stoves arranged around a concrete chimney afford convenient means for preparing meals. Concrete block may be substituted for poured concrete in the construction of these stoves, if desired

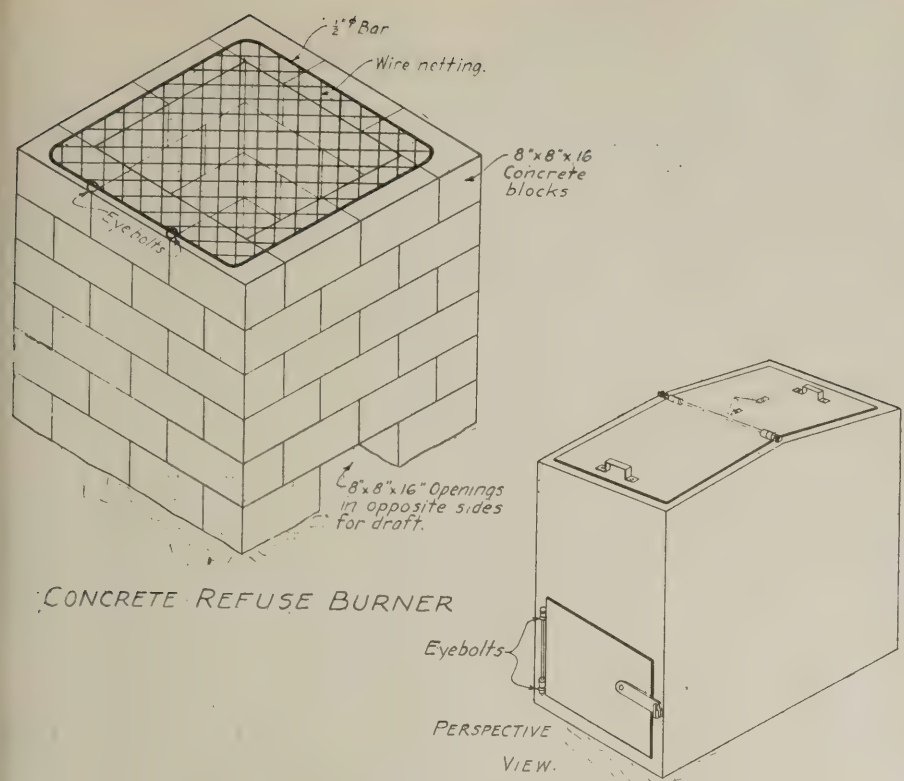


CROSS-SECTION



LONGITUDINAL-SECTION

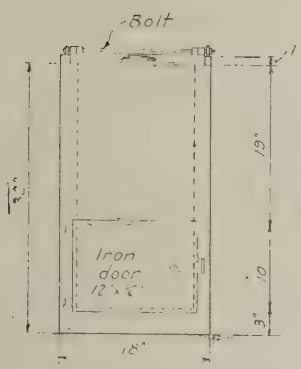
Concrete "kitchen" in the Sioux City, Iowa, parks



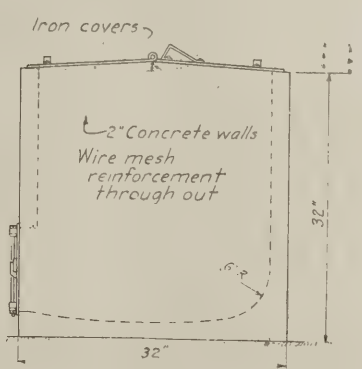
CONCRETE REFUSE BURNER

Eyebolts

PERSPECTIVE VIEW.



FRONT ELEVATION



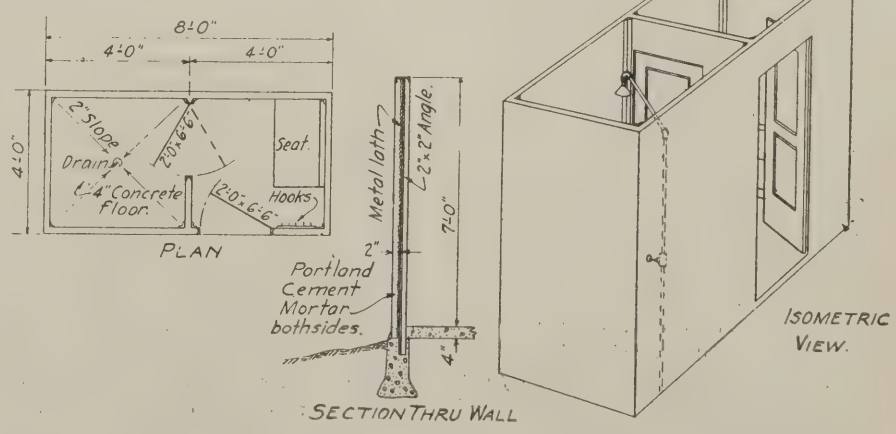
SIDE ELEVATION

CONCRETE GARBAGE CONTAINER

Fig. 8—Refuse burner and garbage container are necessary pieces of equipment to keep the camp in good order. Rubbish burned in the open is likely to cause fires. Construction of both of these pieces of equipment is explained in the accompanying article

board. Four 1/2-inch round steel bars comprise the vertical reinforcing in the post. They are placed near each corner one inch in from the surfaces and are kept at proper distance apart by means of wire ties placed around every 24 inches. The reinforcing in the sign portion consists of a grid of 3/8-inch round bars six inches center to center in each direction, lightly wired at the intersections, for convenience. A 1:2:3 mixture of cement, sand and pebbles or stone mixed wet enough to slush into the molds, is recommended.

The use of a light on the top of the post is optional. If used, a piece of one-inch conduit pipe is placed in the center of the post and brought out at the bottom as shown. The conduit carries a large bronze collar at the top which serves as a base for the globe.



OPEN AIR SHOWER BATH.

Fig. 9—Individual shower bath which will be appreciated by the motorist. Walls are constructed of portland cement stucco back-plastered on metal lath

The post should be imbedded in the ground a minimum distance of three feet and surrounded with concrete to a width of at least 24 inches in each direction. The letters in the board are either indented by means of metal letters in the mold or simply pointed on the surface. If desired, a wooden sign board may be substituted, although at the expense of considerable additional maintenance.

Tables and Benches

Concrete lunch tables and benches, as shown in Fig. 2, have become quite popular. The benches recommended and shown have a length of 10 feet and a width of 30 inches and a height from ground to table top of 30 inches. The benches are given corresponding dimensions, with a height of 18 inches and a width of 16 inches.

The pedestals for both tables and benches are best made outer ends down in small wooden molds. The panels or designs desired on the pedestals are easily made by inserting a correspondingly shaped piece of wood in the molds, given plenty of taper and with corners rounded to prevent sticking when the molds are removed.

The table and bench tops are preferably cast in plain flat wood molds and are reinforced with grids of 3/8-inch round bars as indicated. The top of these pieces should be up in the mold and smoothly finished in the same manner as a sidewalk. Although the illustration shows the use of dowel pins to hold pedestals and top together, these are only necessary to prevent tourists from taking them apart, as their weight is sufficient to hold them in place unless deliberately moved by several persons. The benches and tables should rest on small concrete footings as shown to prevent them from settling in the soil. If desired, these pieces may be cast in place, but usually with considerably more labor and expense in forms.

Drinking Fountain and Well Curbing

If running water is available, one or more sanitary drinking fountains should be installed as shown in Fig. 3. The base is a simple concrete slab five feet by four feet, four inches thick, made in the same manner as for a sidewalk. The extensions to the pedestal on two sides are made to provide children's steps. They have a combined height of $8\frac{1}{2}$ inches and are made with simple box forms. The forms for the shaft are supported on the box forms just mentioned so that concrete can be placed in both forms at one operation. Piping should be properly placed within the forms and, if desired, a hollow left within the pedestal

carefully withdrawn in an upright direction; $1:2\frac{1}{2}:4$ concrete is used and does not need reinforcing.

The pump base or platform is made in the same manner as a sidewalk slab, resting on a light board form. It has opening for the pump and usually bolts imbedded in the surface with which to fasten the pump. A circular hole 22 inches in diameter is provided and properly edged to receive an iron or concrete manhole cover. Proper drain board and gutter should always be provided.

Outdoor Toilets with Sanitary Vaults

Most tourist camps have abominable toilet facilities, endangering health and driving

capacity are quickly made of ordinary concrete block, covered with an open wire screen as shown in the upper illustration, Fig. 8. The garbage containers shown below can be purchased commercially in many cities or made up specially, as desired. The curved portion of the inner form is of sheet iron on a wooden support. Heavy chicken wire or similar mesh is used as reinforcement and a $1:2:3$ mixture of cement, sand and small, clean gravel, or a $1:3$ mixture of cement and sand is suggested. The walls are 2 to $2\frac{1}{2}$ inches thick. Door hinges are imbedded in the concrete. Sheet iron or cast iron doors are used.

Shower Bath

The hot and dusty motorist will appreciate the spirit of hospitality suggested by this shower bath, unless the camp is situated where natural bathing facilities are available. Fig. 9 offers a suggestion for a private shower bath. Of course a roof would be of no value on such a building.

Washing and Repairing Platform

A large proportion of the motorists who indulge in camping trips maintain their own cars and every camp should have a platform where, regardless of weather or the condition of the ground, repairs can be conveniently made.

The platform is constructed in the same manner as a sidewalk or light roadway with a shallow gutter along one or more sides. Sometimes a low curb, as shown in the right hand illustration, is placed around the floor to help run off the water. A roof may be placed over the floor if desired.

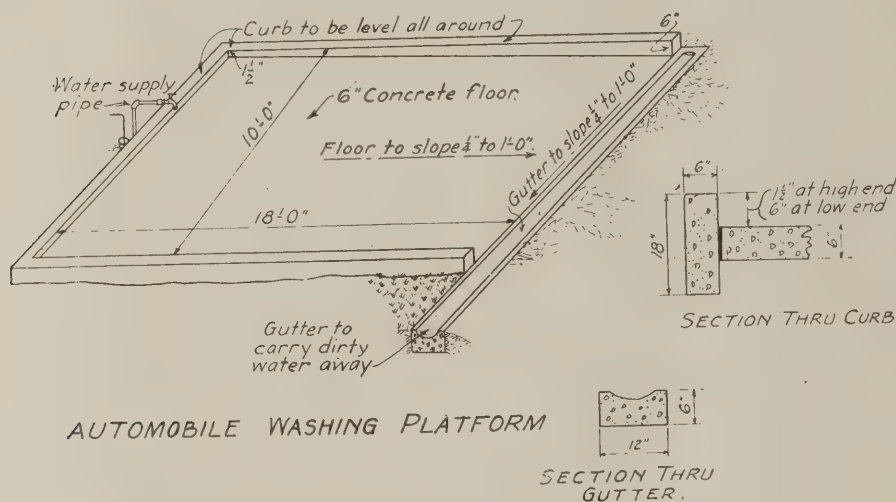


Fig. 10—Automobile washing and repairing platform is built like the floor or light roadway with gutter on one side and low curbs on the remaining sides, directing the water to the gutter

for metal valve or turn-off box. In places where the equipment is subjected to freezing weather there must be a cut-off and drain to empty the pipes below the frost line. The water bowl at the top of the fountain is made by means of a circular galvanized iron template and a small trowel, or slick.

Where the water is obtained from wells or springs great care should be taken to protect the supply. The most convenient method of concreting the lining of a well is by sinking concrete pipe. The sides of the well are carefully trimmed to the outer diameter of the pipe and the latter, held by hooks and rope from a support above, is carefully lowered in an absolutely vertical position. Successive pieces of pipe are placed one above the other until the required depth is reached. The hooks are then detached and removed and the joints mortared. Forms for casting a concrete well lining in place are usually made of long, thin, narrow boards, attached to wooden discs resembling barrel heads. These discs are commonly 24 inches apart, each disc having a diameter one-half less than the one above to prevent binding when the form is removed. The surface of the form must be smooth and well oiled. When the concrete has hardened somewhat the form is

carefully withdrawn in an upright direction; $1:2\frac{1}{2}:4$ concrete is used and does not need reinforcing. The pump base or platform is made in the same manner as a sidewalk slab, resting on a light board form. It has opening for the pump and usually bolts imbedded in the surface with which to fasten the pump. A circular hole 22 inches in diameter is provided and properly edged to receive an iron or concrete manhole cover. Proper drain board and gutter should always be provided.

Handy Camp Cook Stoves

From one to six little concrete cook stoves, such as shown in Fig. 6, can be built around one chimney, which provides draft and carries the smoke away. The stoves are simply little concrete boxes with projecting ledges on the walls to carry metal grate and iron top on which to cook. There is a circular flue outlet at the rear conveniently made by inserting a piece of pipe in the forms. Fire brick lining, shown in the illustration, is optional, not being generally considered necessary. The stack is of concrete chimney block laid in cement mortar.

Refuse Burners and Garbage Containers

Refuse burners of any desired size or ca-

"Problems in Architectural Drawing," by C. V. Bush; 36 pp., $8\frac{3}{4} \times 11\frac{3}{4}$; paper. In presenting this series of related drawings, the author aims to avoid, if possible, the danger of copying without understanding which is present wherever finished drawings are used for instruction. To do this, he has divided his problems into two series, A and B. The plates in A are isometric drawings of the problems, dimensioned and accompanied by explanatory notes. These are to be used as instruction sheets, and afford the student real problems to be interpreted in terms of architectural drawing. The plates in B are finished architectural drawings of the problems presented in the isometric drawings of A, and are for the use of the instructor or student in checking up the student drawings. This correlating of the isometric and architectural interpretations of the same problems affords excellent material for practice and instruction in blueprint reading, the isometric drawings serving as an explanation and elucidation of the architectural. The entire series of plates is based on a typical, two-story frame house of modern construction, thus presenting a practical and consistently related set of problems. The Bruce Publishing Co., 354 Milwaukee St., Milwaukee, Wis., 90 cents a copy.

The Guild System of Building Houses in Great Britain

By John Y. Dunlop, Glasgow, Scotland

A Building Trades Union Co-operative Enterprise of World-Wide Significance

EVERY reader of history knows that the political and industrial institutions of Great Britain have had an enormous influence in developing and shaping the policies of similar institutions in this country. Trade unionism itself originated in England. Woman suffrage agitation in England preceded the agitation in this country, and so on, parallel after parallel might be given to show that Americans come in due course to deal with precisely the same issues as Britishers.

At the present time one of the most significant developments in the British construction industry is the progress of workmen's co-operative building-construction organizations. Such organizations are not entirely new to this country. There are several already established in the Northwest, but their progress in England is striking and should make building contractors in every English speaking country sit up and take notice.

NATIONAL BUILDER readers are fortunate in being able to get the first-hand impressions of a well-known building construction expert; and one of the most interesting phases of his story is the extraordinary enthusiasm he displays, for Britishers are normally very conservative, and it is believed that Mr. Dunlop is no exception to the rule.—Editors.

THE BUILDING GUILD is an entirely new type of industrial organization.

One of its fundamental principles is declared to be the establishment of complete democratic control of the industry. The actual control rests with the people who do the work and not the people who put up the money.

The Guild guarantees continuous pay to its workers during wet weather, sickness, frost and holidays and devotes the whole of its surplus earnings not to dividends but to the improvement of the service.

The idea is to unite all branches of the industry—administrative, technical, clerical and operative—for a common purpose, the service of the community.

The immediate aim is to build as rapidly and economically as possible the houses so urgently needed by the working class. However, it is not intended to dissolve the Guilds or to cease operations when the present housing shortage has been met.

They mean to contract for any kind of building work, churches, theaters, public buildings and even jobbing and repair work.

The Aspiration of the Guilds

The Guild, it is said, will set up a new and better industrial order in which those who work with their head and those who work with their hands will co-operate freely in producing those things which a community needs. Co-operation will take the place of bossism. The team spirit will supersede the instinct of the horde.

No one is to be in the industry just to get what he can out of it for himself. Rivalries will occur in the giving of service not in the getting of it. Labor is not to be a mere commodity to be bought and sold or used or cast aside indifferently.

Guildsmen are to have a new status as freemen working in a democratic comradeship of service; and lastly but not least it is hoped that the modern Guild organization will provide scope for the craftsman which no industrial order has provided since the time of the Mediaeval Guilds.

Now the Guildsmen claim, that apart from theory, experience has thus far proved that the industrial control by Guild workers has been successfully established, and that houses are being built quicker, better and cheaper by the Guild than by private contractors.

Building Operations Visited

It was not possible to visit all the operations so London and Manchester were selected as representative areas. Five Guild housing contracts were inspected and the work thoroughly investigated.

The building operations visited included sites at Walthamstow and Greenwich (London Guild), Walkden (Bolton Guild) and Clayton and Weaste (Manchester Guilds).

These five contracts involved the building of 986 houses with a possibility of additional contracts involving a further

thousand houses, if the work on the existing contracts is carried out expeditiously and economically.

At the time of the inquiry no houses had been completed on either of the operations, but at Walthamstow, Greenwich and Clayton many houses were nearing completion and the work was sufficiently far advanced to provide the basis for a considered opinion as to how far the Guilds are likely to prove a success.

The opinion so far has all been in the favor of these bands of workmen. To back up this opinion one has only to follow the rapid growth of the Guild movement, and to outline the structure of the Guild organization.

There are slight differences in the details of organization and practice in different areas but the principles are the same throughout.

Rapid Growth of Guild Movement

The important thing to remember is that the Guild movement has had a natural growth and is not an artificially created movement. The first building Guild was formed by the operatives in England in 1920 and from that time on the movement has spread with unexpected rapidity all over the country. Today there are hundreds of Guild committees all over Great Britain. A number of those have reached a stage of being able to submit bids and commence work of their own initiative.

At present a scheme for setting up a National Guild is under consideration and it is expected very shortly that all Building Guilds Committees will be affiliated into one National Guild with properly constituted regional councils having full power to enter into and carry out all contracts, leaving to the National Guild the control of supply, credit, finance, insurance and policy.

The Structure of the Guild

The London Guild operates in Greater London which is divided into 11 areas corresponding to the different sections of the building trade operatives. Area committees have been formed of representatives of the building trades in seven of those districts. An area committee consists

of a representative selected by every craft union in the local building industry. Each committee elects a chairman and secretary and agrees to organize the supply of labor for building operations within its own area as when required.

The area committee is not a legal entity for the purpose of entering into contracts. The legal entity is the Guilds of Builders (London) Ltd. which is a society registered under the industrial and Provident Society Act.

The board of directors of this society consists at present of twelve representatives elected by the building trade unions in Great Britain. In addition there are representatives of other functional organizations; i. e., architects, electricians and

looked upon more as the service of a leader.

A man may be a rank-and-file bricklayer and a director at one and the same time, and 10 months' experience has proved that an efficient directorate can be chosen from and selected from the rank and file.

The Guild Contract

The Guild form of contract, as approved by the Ministry of Health for Municipal Housing Schemes, provides that the price paid by the local authorities shall be the prime cost of material and labor at standard rates. To this sum 6 per cent is added to cover head office administration, plant, insurance and, if necessary, interest on borrowed capital. In addition, there

ing approved or prescribed by the local authority. The allowance of £40 per house is paid into a pool, upon which each guild committee engaged in supplying labor is entitled to draw. Two sets of time sheets have to be made out—one for the time actually worked, which counts as cost; the other for rainy days, sickness, etc., which comes out of the "pool." Thus all guilds alike pay into the pool, but draw out only when it is necessary. Any surplus in the pool will go for the betterment of the industry and the creation of a reserve. When this reserve is large enough it is intended that all guildsmen shall be "on the strength."

Continuous Pay

The guild form of contract has been



Three-family house, showing brick ground floor fabric with brick and stucco above



Six-apartment double houses built with brick and stucco. Slate roofs

HOUSES BUILT BY THE GUILDS, WALTHAMSTOW

clerks, each of these groups having one representative.

The Guild of Builders by its rules is competent to become builders, decorators, and general contractors, and may function in all branches of supply whether as merchants, manufacturers or transporters.

The board of directors is responsible for the appointment of a manager, the headquarters staff and for the fixing of their salaries. The general foremen are nominated by the local committee and ratified by the Guild of Builders. Departmental foremen are elected on the job by the different crafts concerned. No one in a managerial position can have a seat on the board of directors. Such persons can offer advice but are not entitled to vote.

The managerial department cannot do anything without the sanction of the directors. The manager is responsible not only to his own staff but to the whole of the organized building trade operatives. This gives him security without weakening the full democratic control by the workers. The term manager does not really appear in the Guild dictionary and the duty is

is an allowance of £40 (approximately \$180) a house to enable the Guild to guarantee continuous pay to its workmen in all contingencies. Thus, with full publicity as to costs, the Guild removes all doubt as to the existence of invisible margins and hidden profits.

Finance

The Co-operative Wholesale Society functions as joint contractors with the Building Guild and the Co-operative Insurance Society acts as guarantor for the due performance the money for plant, etc., and acts as the guild bank. The Guild of Builders (London), Ltd., for instance, has an overdraft of £8000 secured against payments due under contracts. The local authority makes weekly payments to the guild for labor and materials and other authorized charges. Arrangements have been made by the guild whereby a check presented at the local co-operative society enables the secretary of the local guild to draw the wages for the week. The guild undertakes to keep a record of costs in accordance with a system of cost account-

subjected to criticism by building trade employers on the grounds that: (1) the £40 a house is in the nature of a subsidy, and that in this matter the guilds possess an unfair advantage over other employers. Guildsmen reply that there is nothing to prevent other employers paying their workmen continuous wages. The guilds claim that continuous pay, instead of adding to cost, actually reduces it, because the men work better under this system; (2) it has been said that the allowance of 6 per cent is too high for establishment charges. Guildsmen point out that this sum provides not only for head office expenses but for maintenance of plant and insurance.

Guild Membership

A man who wishes to volunteer for guild services fills in a form, which he can obtain at any of the building trades union branches, in which he states the nature of his craft and declares that he is willing to work for the guild when called up. There has been no difficulty in getting men to volunteer. There is always a long waiting list. When a man volunteers, his name is

placed on a list in date order, and he is called up in that order. If he does not respond, his name is not struck out, but is placed at the bottom of the list.

I came across numerous instances of workmen who had left good jobs and good pay to volunteer for the guild. One general foreman I met had left a job where he was getting £2 a week more than the guild pays him. He said, speaking of guilds: "This is the sort of thing I dreamed of when a young man, but could never quite figure out." In another instance a district organizer of the Bricklayers' Union threw up his organizing work to lay bricks for the guild. He felt that he would not be doing his duty unless he placed his skill at the service of the guild. In an-

An instance of different kind came to my notice in Manchester. A workman boasted that during a recent sectional strike in the building trade he had been a black-leg. The matter was reported by his fellow workmen and, after inquiry, it was found to be a fact. He was brought before the works' committee and dismissed from his job, and, later on, he was turned out of his union.

It is not to be expected that all the men who volunteer for the guild work are enthusiasts but these do set the pace, and this is bound to affect all who are engaged on the job. Moreover, lectures and discussions on guild principles take place during the dinner hour.

argic movements which one is accustomed to see on all kinds of building work. Everybody appears to be working with a will as though the job had to be carried through with the utmost possible speed. On one operation where 236 men were employed I took particular care to inspect places where, under normal conditions, workmen might be found "milking," e.g., behind stacks of bricks, timber stores, sheds, etc. In no case did I discover anything of the sort. I watched a group of laborers shoveling earth into carts. It was wonderful how quickly the carts were filled.

This intense activity was not due to the intimidation of a vigilant foreman. The men were on their honor. As a workman



Four four-apartment houses. Lower walls of brick; upper, brick and stucco. Slate roofs



Back view of double stucco houses showing the garden entrance doors, which are wholly framed for glass

HOUSES BUILT BY THE GUILDS, WALTHAMSTOW

other instance a man left the security of employment with the port of London authority to volunteer for the guild. These cases are typical and they suggest that there is something in the scheme of guild organization which evokes spontaneous enthusiasm.

Dismissal of Members

A worker may be dismissed for insubordination or for slacking. If in the opinion of the foreman any man is not "pulling his weight" he may be dismissed. Every man has the right of appeal to the works committee or to his union, and finally to the board of directors. There have been very few cases of dismissal. An instance was brought to my notice of two laborers being reported for "not pulling their weight." These men were spoken to by the foreman, but apparently with little effect. Finally they were brought before the works committee, where they were told that if they did not work better they would be dismissed. The result was an immediate improvement, and there has been no cause of complaint since with regard to them.

The Works Committee

Each craft on the job, in addition to electing departmental foremen, elects a representative on the works committee. This body deals with the accommodation for the workmen, general welfare, demarcation questions, complaints, suggestions and, when necessary, with appeals against dismissal. An interesting demarcation question came before a Manchester works committee. On other jobs a strike had occurred owing to a dispute between the plasterers and bricklayers over the question of breeze slab interior walls. Both crafts claimed this work as their own. But under the guild scheme, the secretary called the works committee into conference. The matter was settled without any trouble. A compromise was arranged whereby the interior walls were left to the last as jobs in reserve for bricklayers on wet days, but otherwise the plasterers were to regard it as their own work. This arrangement is said to have worked admirably without the least friction.

The Influence of Honor

There is a notable absence of the leth-

put it: "It is a question of honor with the men; they want to do their best and they have every incentive to do so; it is in their own interest that they should." Another man remarked: "You won't find any 'swinging' on this job. The work goes on just the same whether the foreman is about or not." I corroborated this for myself. In the joinery shop all the men were working at top speed. I discovered that the shop foreman was "away queer." A laborer engaged in digging trenches said: "Things are very fair on this job. You don't get hunched about." Another one said, "we don't want no dogging on this job."

Increased Output

Work carried on in this spirit does result in an increased output. Much controversy has arisen over the number of bricks bricklayers are supposed to be able to lay in a day. It is obvious that the nature of the work determines, other things being equal, the speed at which a brick can be laid.

For instance, a man engaged in building a straight wall should lay more bricks than

a man building flues or chimney breasts. A bricklayer remarked that in cottage weaving there were a number of corners to be negotiated and the only fair way of determining averages was to wait until the cottage was complete.

On the output question generally after interviewing clerk of works and other people in authority, the consensus of opinion is that the output in Guild schemes is 25 per cent above the average for similar kinds of work by other contractors. Notwithstanding the increased speed the Guilds are putting forth, none of the work is scamped.

The surveyors to many of the district councils have stated in writing that the quality of work is extra good and far superior to that done by many contractors. A high official of the ministry of health declares the work of the guildsmen the best in England.

The Guilds of course could reduce the cost of work much lower by putting in inferior work. But no Guild craftsman would willingly consent to scamp his work.

One of the most hopeful signs of the Guild movement is the revival of the craft spirit. Every guildsman you talk to appears proud of the work the Guild is doing. At Walthamstow, where the men have been insisting in doing all the work on the site, I examined the kitchen dressers. The drawers were made to fit and were dove-tailed not only at the front but at the back.

These men are craftsmen and the first thing with them is their craft. They like doing their work well and there is no pleasure in scamping.

Payment for Lost Time

Guilds reserve the right to pay guildsmen full wages in wet weather or fine, in sickness or on holidays. Continuous pay, it is claimed, does not increase the cost of production but actually reduces it because the workers "pull their weight" under this system. This is corroborated by the resident architect on the Walthamstow operation, who said: "I have never seen a contractor who has been able to get his men to work so well."

Cynics have stated that this provision for continuous pay will tend to encourage operatives working for the Guild to make their job a convalescent home. This prophecy so far as seen has not been fulfilled because the pay sheet of the Guild for one quarter shows that the amount of money paid out in respect of time not actually worked is less than 1 per cent of the total wages paid, notwithstanding the fact that the quarter from which this percentage was taken a considerable amount of bad weather was experienced.

The men work many times in bad weather when many contractors' men would not work, but in the most of cases work is found for all classes of tradesmen under cover whenever possible. In the Guild sys-

tem men are willing to work at any job that can be found when weather conditions make it impossible for them to carry on their own work.

Cost of Building

As to the claim that the Guild can build cheaper than ordinary contractors there are grounds for thinking that when the figures of the actual cost have been ascertained the claims will be supported by facts. With the exception of two non-parlor houses, part of a contract for 77 houses built by Guild labor for Bentley with Arksey Urban District Council, no houses have been completed under Guild contracts.

This contract was undertaken last year and in four months two houses were ready

for occupancy. The cost showed a considerable reduction on the original estimate sent in by the Guild and a saving on the private builder's price of £200 (\$900) per house.

An analysis of the estimates sent in by the seven competitors for the Walthamstow council operation for 400 workmen's houses shows that the accepted estimate of the London Guild was more than £14,000 below the lowest estimate submitted by the private contractors, or an average saving of approximately £36 (\$162) per house.

A great number of other facts could be taken from the report of the building Guild, which goes to show that in many cases the estimated cost of the Guild is below the private contractors' price.

How Warm-Air Furnace Installations Can Be Made Satisfactory

THE average wall in houses heated by furnaces is framed with studs known commercially as 2x4's; they are more often 1½ in. x 3¾ in. and are usually spaced 16 in. centers. Thus the maximum space for a sheet metal flue is 3¾ in. x 14½ in.; therefore, it is hardly practical to figure on a flue being more than 3½ in. deep x 13¾ in. wide and experience shows the standard maximum width to be about 13 in.

A round pipe offering the same friction for the same capacity as a rectangular duct of the above dimensions would be 7½ in. in diameter or it would have an equivalent area of 40 sq. in., whereas it has an actual area of 48.25 sq. in. Many are the instances where an 8 in. or a 9 in. leader is carried from the furnace to a riser of no greater dimensions than above mentioned, which only has the carrying capacity of a 7 in. round pipe. It is no wonder that it is so often difficult to heat rooms in the upper stories of buildings under these circumstances.

The way to overcome this, is to insist that all walls carrying warm-air flues are to be built of studs not less than 2 in. x 6 in. spaced 20 in. centers. If 6-in. studs are used in such partitions or walls, even though the studs are set 16 in. centers, which is unnecessary, then a flue measuring 5½ x 13 in. could be built which is equivalent to 8¾ in. diameter pipe. When the studs are spaced 20 in. centers then a flue 5½ x 17 in. can be built in, which is equivalent to a round pipe 10 in. diameter in carrying capacity.

Owing to the poor success so frequently attending the installation of warm-air furnaces in homes of moderate size the furnace business has gradually gotten down to the stiffest kind of competition and about the only thing that recommends a warm-air furnace to the average man is its low cost in comparison with steam or hot-water

heat. Undoubtedly if it is put on a more scientific basis better installations will be the result and the public will gather confidence and will be willing to pay more money for a properly installed furnace, as it has many attractive features to recommend it. In some classes of buildings it is preferred to the complicated steam or hot-water systems and the expense necessary to install this type of apparatus.—F. R. Still, on "Recent Developments in Warm-Air Furnace Heating," a paper read at the semi-annual convention of the American Society of Heating and Ventilating Engineers, Buffalo, N. Y., June 12.

Testing Apprentices

A REPORT of the methods employed by the Industrial Association of San Francisco to select students for instruction in plastering is described by the first vice-president of the association, Otis R. Johnson, in the monthly bulletin of the Illinois Society of Architects:

"On May 1 an initial class of 25 young men began their training under the supervision of a thoroughly competent and experienced plasterer who will instruct them in ornamental as well as plain plastering.

"In the selection of the young men who compose this class was where psychology came into play. There were some 50 applicants for admission to the school, which is equipped to handle only 25 at a time. All applicants were required to meet certain physical standards as to weight, height, etc., and 50 applicants were given the 'Beta' psychological test. This test takes no concern of knowledge or education, but is based entirely on intelligence.

"The results of the test of the 50 applicants were extremely interesting. One young man scored 107 out of a possible 118 points, and a number scored from 80 to 90."

American Construction Council Organized

One of the Most Hopeful Movements for the Construction Industry,
Calculated to Make Order and Prosperity Out of Present Chaos

TWO hundred representatives of every element in the construction industry attended the organization sessions of the American Construction Council, at the Washington Hotel, Washington, D. C., June 19 and 20, including architects, engineers, general contractors, sub-contractors, labor, manufacturers, dealers, bankers, insurance and bond interests, public utility corporations, state, federal, county and municipal construction departments.

In opening the meeting Secretary of Commerce Hoover, said, "If we would stem the tide tending to refer every little need and complaint to government, action to meet these demands must arise from within industry itself." He declared that in thus bringing all representatives of the construction industry together to see if such a council can be organized the most important step in the history of industry was being taken.

Among the subjects suggested by Secretary Hoover for the consideration of the Council were standardization of grades, inspection of, and simplification of dimensions of construction materials, the collection of statistics, the encouragement of home building, zoning, proper building codes, seasonal and intermittent employment, jurisdictional disputes, apprenticeship, vocational training and in general the elimination of unnecessary speculation and the better functioning of industry in regard to our national needs.

A warning against "an intense stratification of the various economic interests in our national life" which lead to selfish aims and purposes was voiced by Willis H. Booth, vice-president of the Guaranty Trust Company of New York in following Secretary Hoover. If the public confidence is to be gained the aims and purposes of the Council must square and comport itself entirely with the best public judgment, he said. He denied proposing an impractical altruism which was not consistent with actual facts but declared such a basis was "an enlightened kind of selfishness which will take us further because it is more nearly right." Illustrating his point he went on to say, "If we can surround the construction industry with a feeling of stability we immediately add to its ability to secure credit." This feeling of stability, M. T. Bannigan, president of the National Building Supply Dealers Association said: "We

went to war to prove that might did not necessarily make right. We are organizing this Council to establish the principle that the good of any element of the construction industry depends upon the good of every component part of the industry."

Henry H. Kendall, past-president of the American Institute of Architects stated that the architects were happy to be among those who are participating in the organization of the Council. "We see in it potentialities far beyond its present capacity," he said, "and we hope soon to see them realized in actual achievements. We shall gladly give to it our best efforts and co-operation to achieve these so much desired results. "We are to bring together a group of men, vitally interested in different phases of the building industry, an occupation, in which, directly or indirectly, almost every trade and industry is represented, and by our counsel and advice solve the many problems which have arisen and will continue to arise between groups and trades; to fix standards and formulate rules of conduct which shall govern our business relations and promote good will, efficiency and fair play in building and construction."

William McClellan of New York, representing public utilities construction said: "The extreme difficulties encountered in construction as compared with other industrial problems, makes an organization, such as this, an inevitable factor. When a manufacturer gets an order he puts it through a factory with an organized force and system well established. Construction on the other hand necessitates in the very nature of things that those engaging in it have even to clear the ground, create their plant and organize their forces before they can begin to build. And on the next contract, they must do it all over again. The ability to overcome such problems as these is the kind of ability which must be put into handling the problems before such a council as this. The great need is to translate the general ideals here expressed into specific accomplishments. If construction men can't do it, nobody else can. I wish you godspeed and every measure of success."

Ralph F. Proctor, of the Maryland Casualty Company of Baltimore, representing insurance and bonding companies said: "Although the Bible says 'He that is surety

for a stranger shall smart for it, and he that hateth suretyship is sure', we would welcome a better understanding by our clients of our business and its problems. It is with enthusiasm therefore, that we join in the work of the American Construction Council, and you may be assured of our hearty co-operation in co-ordinating and building the construction industry."

The importance of co-ordination was emphasized by Frederick L. Cranford of New York, vice-president of the Associated General Contractors of America who said: "For forty years American business has been passing through a transformation from individualistic to collective and co-operative activity, but the co-operation so far developed in construction has been the effort of the members of a unit of the industry, and they have counted the successful though often antagonistic to the interests of the industry, so that while individually we were important, our co-operative efforts have proved ineffective.

"Our experience of the last few years indicates clearly the road which is the co-operation of all the elements of construction, because collectively our interests are and must be unselfish.

"There can be no more difficult industry to co-ordinate and none with a larger number of its members pure individualists, often to the extreme of piracy, but the co-ordination of no other industry is so important to the well being and prosperity of our people, for we are the agents through whom the nation's natural, material, economic and artistic resources are built and developed. All of our permanent revenue producing activities are either the product of construction, or through construction we develop their values. The railroads and irrigation in our arid districts serve as an illustration of this."

A very significant stand was taken by labor engaged in building trades when the organized building trades endorsed the American Construction Council and voted unanimously to affiliate with the Council at their recent convention in Cincinnati.

"We believe that the Council can be a most potential factor in the stabilization of the industry we serve," said John Donlin, head of the Building Trades department, American Federation of Labor, "and we

hope that all the elements of the industry will affiliate."

He stated that the Council should be a fact-finding agency to determine rights and wrongs, and serve to eliminate wrongs inflicted by a few in each element of the industry. It was his opinion that the Council should establish and maintain local conference committees in all cities, these being necessary for local guidance to hold the confidence of the public, to avoid strikes, lockouts and to protect the industry against uneconomic abuses.

"Some one of the many elements contributing to the industry," said Mr. Donlin, "is at one time or another responsible for some injury. If one member is working with detriment to his group, he should be called to task. Responsibility for any bad condition can be determined and a remedy applied. If the banker, the manufacturer, dealer, or worker is responsible, all others are concerned. We must all be guided by a determination for absolute justice."

John R. Alpine of the Grinnell Company, manufacturers, Providence, R. I., said: "This is the first time that a meeting of this character was ever held. You have all the important threads that make up the important fabric of the construction industry." He stated that present efforts will bring a new balancing to industry as a whole, and a greater contentment to both employers and workers.

James A. Emery, counsel for the National Manufacturers Association, who followed Mr. Hoover in presiding at the meeting said that this was an opportunity to set up in an unusual way, self-government in the construction industry, a self-government which can speak for itself and act with intelligent vision, and accept for one of its important duties, the cleaning up of the industry from the inside when it is in need of this. "It has," he said, "its own function, its own authority, and as I see it can make itself a self-reformative body without any regulatory power of the government. It can be self-governed or it will be governed by the people by their elected officials."

Thomas R. MacDonald, chief of the Bureau of Public Roads emphasized the relationship of the highway industry with the whole construction industry.

In speaking for the engineers, Mr. Calvert Townley of the Westinghouse Electric and Manufacturing Company of New York said:

"The engineers believe in organization and in organization for public service. That was the motive which led them to organize their own organization. They do not feel that organization for public service means a sacrifice of private industry. It means the increased reward for private industry because not only does the organization have a feeling of satisfaction of good, well done, but they reap a large pecuniary reward in the important character of their reputation

among their associates who come to believe in them, which of course results in time in a very great increase in business. A movement to co-ordinate with the object of performing better public service is distinctly a move in the right direction."

Mr. Walter Gordon Merriitt, attorney in

come about because of the selfish aims of the individual organization. The need is to restrain these selfish aims, and to have each group lay down a code of practice which must pass the judgment and be in accord with the rules and principles of the American Construction Council."

In stressing the necessity to work hand in hand with labor, he said that the organized labor movement is big enough to meet with and discuss its own problems with any of its critics.

"If we all meet and reason together," he continued, "we shall think, feel, and act together. The relation at the present time between employers and employees in the building trades, is one of periodic armistice. This Council must work out a plan of common counsel and joint action.

"One of the most important things which the Council must work out is a method of arbitration. All contracts should be subject to arbitration in accord with the rules of the Council laid down by men of practical standards.

"One of the greatest evils in the industry is the bargaining with corruption for fear that any attempt to uncover that corruption will embarrass future relations."

With reference to jurisdictional disputes, he stated that it is not legal to restrict the construction of metal doors, for instance, to metal workers or any particular work to any particular group of workmen. He held that the employer should be free to hire anybody on any job who can do the work for the wage paid, and that the need was for a broader craftsmanship rather than a more highly specialized one.

"This Council," he concluded, "must work out these problems. It must work through common counsel, co-operation and education. Such collective action will not stifle American individualism, but rather such collectivism will further that individualism. We unite to further liberty, not to restrict it."

Mr. Robert D. Kohn, architect from New York City, in speaking on the necessity of serving the public and industry through local action stated that the greatest cause of labor problems is the uncertainty of the job of the workman. He described local activities to eliminate such uncertainty in Boston, New York and Seattle, and emphasized that local effort was necessary to bring about the best man to man relationships in the building trades.

M. C. Rorty, of the American Telephone and Telegraph Company of New York, spoke on how construction costs can be determined, recorded, and made useful, and stressed the necessity for accurate statistics and publication of figures on all factors entering into such costs.

In urging the necessity of building a standard of responsibility in the industry, John B. Larner, of the Washington Loan and Trust Company, Washington, D. C., stated that with such standards much litigation

OFFICERS OF THE AMERICAN CONSTRUCTION COUNCIL

President—*Franklin D. Roosevelt, formerly Assistant Secretary of the Navy.*

Treasurer—*John B. Larner, vice-president of the American Bankers' Association and president of the Washington Loan and Trust Company.*

EXECUTIVE COMMITTEE

Architects—*W. Stanley Parker, New York City; D. K. Boyd, Philadelphia; Abram Garfield, Cleveland; Robert D. Kohn, New York; L. P. Wheat, Washington, D. C.*

Engineers—*Charles T. Main, Boston; Bion J. Arnold, Chicago; Peter Junkersfeld, New York; Charles F. Loweth, Chicago.*

General Contractors—*W. O. Winston, Minneapolis; F. L. Cranford, Brooklyn; N. F. Hoggson, New York; H. H. Wilson, Munsey, Pa.*

Sub-Contractors—*A. E. Coleman, Chicago; J. R. Alpine, New York; Benj. Dickinson, Bedford; Oscar Reum, Chicago.*

Labor—*John Donlin, Washington, D. C.; John Coefield, Chicago; John J. Hynes, Chicago; Wm. J. McSorley, Cleveland.*

Material and Equipment Manufacturers—*Wright D. Goss, New York; F. W. Walker, Beaver Falls, Pa.; W. M. Wood, Decatur, Ill.; William Ritter, Columbus, Ohio.*

Material and Equipment Dealers—*W. T. Rossiter, Cleveland; E. L. Jahnce, New Orleans; John E. Doyd, Philadelphia; M. T. Bannigan, Utica.*

Financial Bond, Insurance and Real Estate Organizations—*Willis Booth, New York; Harry A. Wheeler, Chicago; Irving B. Hiett, Toledo; James T. Hoveland, Philadelphia; Charles A. Hennery, New York.*

Public Utility Construction—*Gano Dunn, New York; Francis Blossom, New York; Jos. Alexander, Cleveland; C. H. Markham, Chicago.*

Federal, State, County and Municipal Construction Departments—*Rudolph P. Miller, New York; Chas. Upham, Raleigh, N. C.; J. M. Gries, Washington, D. C.; W. T. Sargent, New York.*

Federated Associations—*Wm. F. Chew, Baltimore; Walter Klie, Cleveland; E. W. Reaugh, Cleveland; G. C. Mills, Webster City, Iowa.*

New York City, in presiding at the meeting of the Council emphasized the need of the co-operative action that the Council will bring about.

"The evils of the construction industry," he said, "are the evils of organizations, not the evils of individuals. Those evils have

tion could be avoided, and the professions and trades could be governed with greater assurance to the public.

D. A. Garber, New York City, a director of the Associated General Contractors of America, stated that a fair deal in the industry was imperative. He decried a "certain kind of broker who adds nothing of a material nature," but who collects a profit for himself. "The parasite who performs no service," he said, "but who exacts compensation is the one responsible for the sharp practices for which the entire industry is blamed."

D. K. Boyd, of Philadelphia, in speaking on the necessity for the elimination of waste, stated that it could be conservatively estimated that the Council, properly functioning through local groups, may be able to save the American people a billion dollars per year through the elimination of preventable waste.

A. E. Coleman, of Chicago, spoke on the necessity for promoting trade harmony and urged the adoption of a universal contract form to be used by all groups as one means of eliminating great cause for dispute and litigation.

John M. Gries, chairman of the Building and Housing Division, of the Department of Commerce, urged the necessity of dependable sources for statistics. These could not be made to order, he stated, but must be from all accurate sources, and disseminated in such manner as to be an accurate guide for business. All the groups will assist in collecting this data.

F. M. Feiker, vice-president of the McGraw Hill Company, New York City, spoke on the vital need for a Code of Ethics in the industry. He stated that business in general is being conducted on a higher plane, than ever before, and that the construction industry could not go forward except on that high basis of honesty to itself, and to the public for which it existed. An adequate code of ethics would necessitate the machinery for their enforcement. This would consist, he said, of a Board of Review. The forces which would make an aggressive policy effective would consist of the industrial press, engineering and professional schools, specialized and trade associations, and the government, especially the Department of Commerce.

The immediate program of action suggested for the new Council as a result of these deliberations include:

The formation of a code of ethics acceptable to the whole industry and to the public;

The gathering of adequate statistics from all sources and resulting interpretation having all the facts;

The reduction of the national shortage of building trades mechanics and the establishment of the necessary apprenticeship system;

Co-operation in establishing uniform

building codes throughout the country;

Co-operation with the railroads in expediting the revision of existing freight rates on construction materials. The establishing and strengthening of local organizations throughout the country to bring about the co-operation of all elements in conformity with the principles of the Council;

The mitigation of the evils of seasonal employment and trade migration of labor;

The encouragement of local building shows;

Simplification, standardization and elimination of waste;

The Plaster Expert on the Job

IT is assured that every plasterer knows how to apply gypsum plaster. You know, for instance, that if the plaster is sagging and sliding it has been mixed too thin—but suppose the water is reduced and the plaster still sags, then what? You know that if the plaster is working too stiff more water is needed—but suppose the water is added and the plaster still pulls? Or, you know how to straighten up a wall so that the plaster will be uniformly strong, but do you know the seven other causes of weak or cracked walls, assuming the plaster to be a perfect quality? More important still, when you have located the cause of the plaster sagging, working too stiff, or cracking, do you know the easiest, quickest, cheapest and most effective way of remedying the trouble?

There are two general classes of plaster troubles: First, troubles with the working qualities of the mortar; second—and by far the greater number of the two—troubles with the completed walls. Records show that if you use a mill-tested plaster, most troubles with working quality and all troubles with set walls are caused by something other than wrong plaster. Let us first consider the three troubles that have to do with the application of the mortar—quick set, slow set, and short working.

Quick Set

Suppose the plaster commences to stiffen before it can be applied. First, see if the mortar box was cleaned after the last batch was mixed, and if the tools were cleaned, because there is hardly anything that will cause plaster to set so fast as set plaster. Next, did the mortar mixer wash the tools in the water barrel that supplied water for the mix? That would cause quick set. Is the water clean? It should not be stagnant, and it better be from a well or hydrant. If water be heavily treated with alum it may be clear and still cause quick set. Examine the sand. If it is too fine, or dirty (more will be said about sand later), it will cause quick set. It's dollars to doughnuts that correcting some one of these conditions will remedy the trouble.

Education of the public to the distribution of its construction and maintenance requirements more even throughout the year;

The promotion of health and safety of workmen;

The reduction of loss of life and waste of construction materials from preventable fires;

The study of old buildings in order to establish superior methods of construction;

The education of the public as to the necessity and economy of properly maintaining existing structures.

But even if you cannot locate the cause, it's easy to make the plaster set slower.

Send to the manufacturer for some retarder and sift this over the top of the plaster and mix thoroughly. If you haven't time to get retarder, make a solution of 2 lbs. of glue to 40 gallons of water (four-fifths of a barrel full), and use an average 12 quart pail of this solution to each 100 lbs. sack of plaster, with plain water in the gauging. A little molasses or glue water will also turn the trick.

Do not confuse dried out mortar with quick set mortar; dried out mortar crumbles between the fingers, whereas quick set mortar feels hard and firm.

You understand, no doubt, that gypsum mortar cannot be re-tempered after it has started to set, and that one gauging should not be mixed with another.

Slow Set

When plaster properly mixed has a tendency to slip from the wall and sag on the ceiling, or to dry out instead of setting, the plaster is apt to be too slow setting. This condition, as in the case of the quick setting plaster, is more than likely to be due to local conditions. One thing that may cause slow set is impure water, such as water that contains sulphur or considerable vegetable matter.

When plaster is slow setting, it is best to send for accelerator, which is put up in convenient packages, on which are printed full directions. As an immediate expedient, scrape the bottom and sides of the mortar box, or pulverize some set plaster and throw it into the mix. The addition of a little hydrated lime, portland cement, or alum water will also quicken the set. About 2 lbs. of alum should be put into forty gallons of water (four-fifths of a barrel full), and a 12 quart pail of this solution used to each 100 pound sack of plaster in the gauging.

It might be said here that none of the ingredients which have been recommended here for slowing or quickening the set of plaster will injure the wall.—*The Plasterer.*

Questions, Answers, Kinks and Discussions

Edited by V. L. Sherman

Herein is a Department of Mutual Help for the Exchange of Experiences and Ideas. It is Not Only Well Worth Your While to Give Your Experiences for What You Get Back from Others, but National Builder Pays You for Doing So in Good Hard Cash

Plans and Elevations from Photographs

In the NATIONAL BUILDER for June of this year a method was shown for getting a perspective drawing from the plans and elevations. This "kink," which is a reversal of that discussed in the June issue, shows a method for securing plans and elevations from a photograph.

There has been a good deal of controversy among the authorities as to the proper use of the photograph in architecture, some holding that there has been much too free use of it among students of architecture and builders, some prescribing a greater use of the photograph. One writer declared that the present study of architecture seemed to be little besides dimensioned sketches and photographs. There is no desire here to venture an opinion on this mat-

sional and artisan in this country is not so distinct as it is in other countries, a fact which tends to improve conditions. Builders and architects should work together and do generally, but in some communities the offices of an architect are rather hard to secure, and this means is suggested for

those builders who wish to aim towards a house as shown in a photograph but are unable to check the work with an architect.

Fig. 1 illustrates the method. The photograph was pasted to a sheet of drawing paper. A line was drawn through the near corner of the house extending well above and below the photograph. Converging lines were drawn to the right and left through the ridge line, eaves, chimney cap, etc. The point at each side where these lines converge is a vanishing point on the horizon. When these points are secured the paper is tacked to a board trued up with the tee square edge on the horizon. See Fig. 2.

At any convenient point above the photograph draw another horizontal line with the tee square. This line marks the vertical plane as shown in Fig. 1. Bring up the lines from the vanishing points until they meet the vertical plane, that is, draw lines from A and B to C and D, Fig. 2. Using

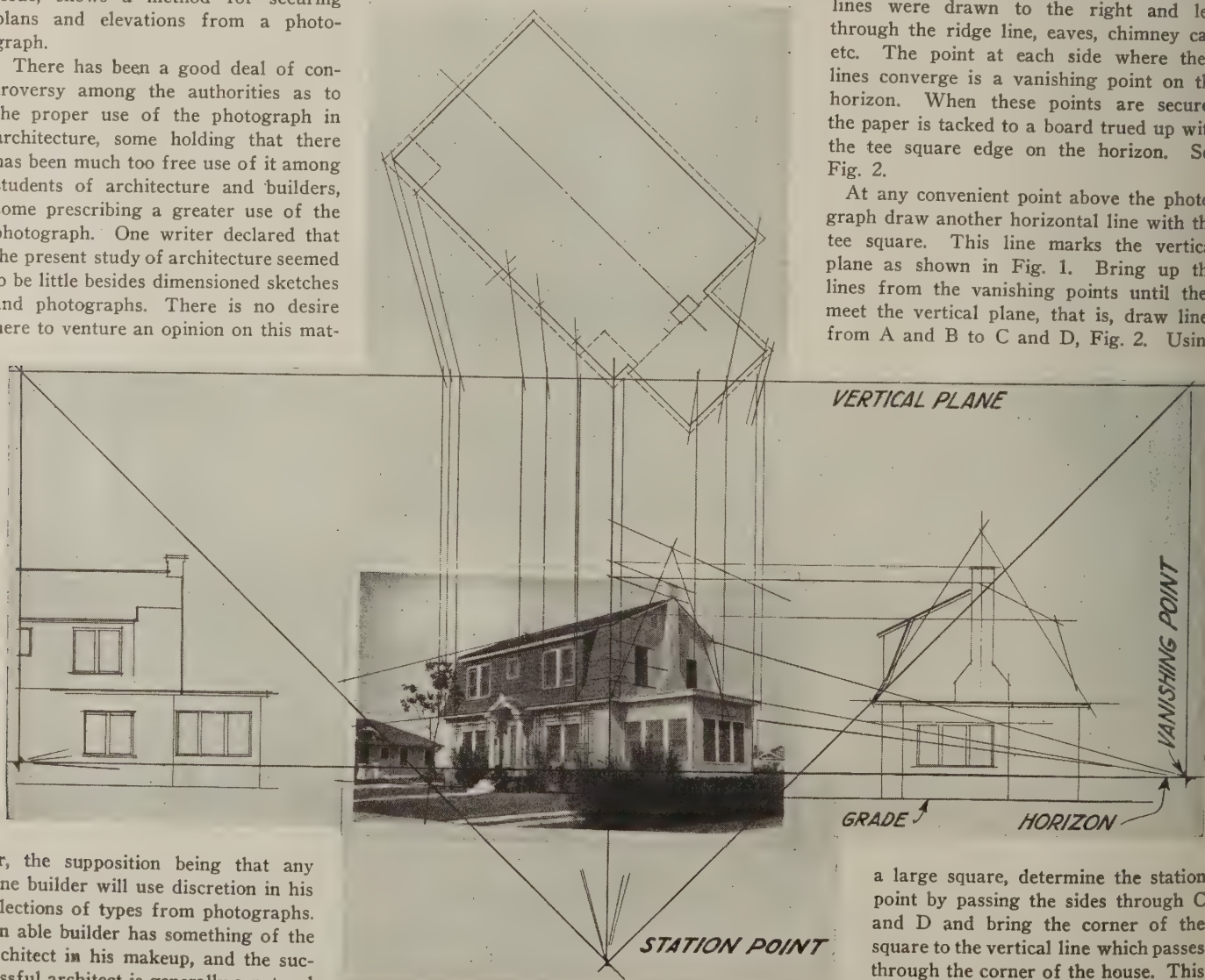


Fig. 1

ter, the supposition being that any sane builder will use discretion in his selections of types from photographs. An able builder has something of the architect in his makeup, and the successful architect is generally a natural builder. The line between profes-

a large square, determine the station point by passing the sides through C and D and bring the corner of the square to the vertical line which passes through the corner of the house. This is the point F on the line EF, Fig. 2. From the point E draw lines up to

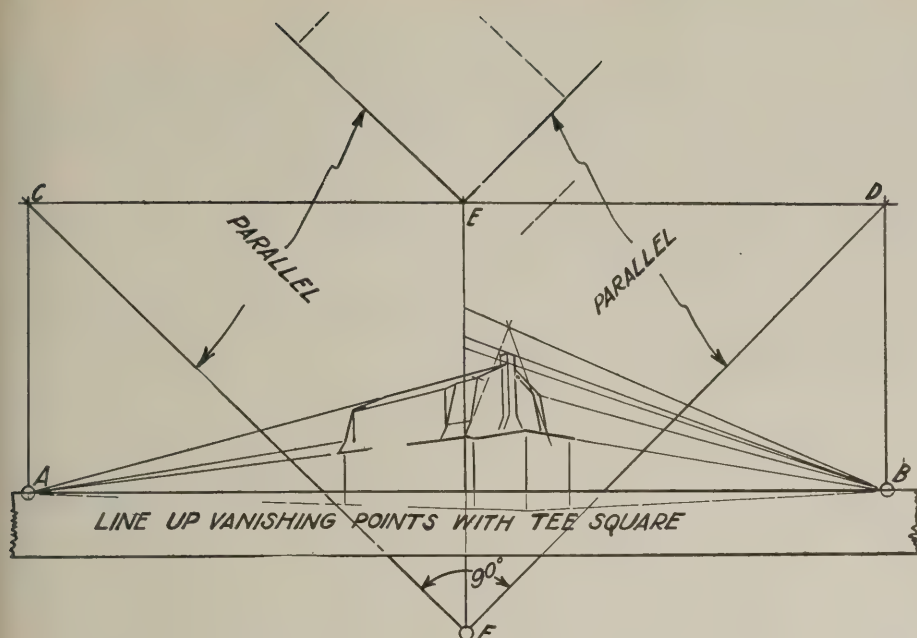


Fig. 2

the right and left parallel to FD and FC.

Before going further the question of converging vertical lines should be settled. In the former problem the statement was made

that while it was proper to say that the vertical lines of a perspective drawing converged in a vanishing point overhead, better results could be had by sticking to strictly vertical lines. You will notice that the vertical lines in the photograph are not actually vertical. In projecting the breadths up to the vertical plane, as shown in Fig. 3, points were taken at the eave line. To be more accurate the points should come from the breadths taken at eye level, that is from the horizon line. However it is only a matter of a few inches.

In Fig. 3 the construction of the roof was completed on the off corner by drawing a vertical center line and completing the roof triangle. The points required in the

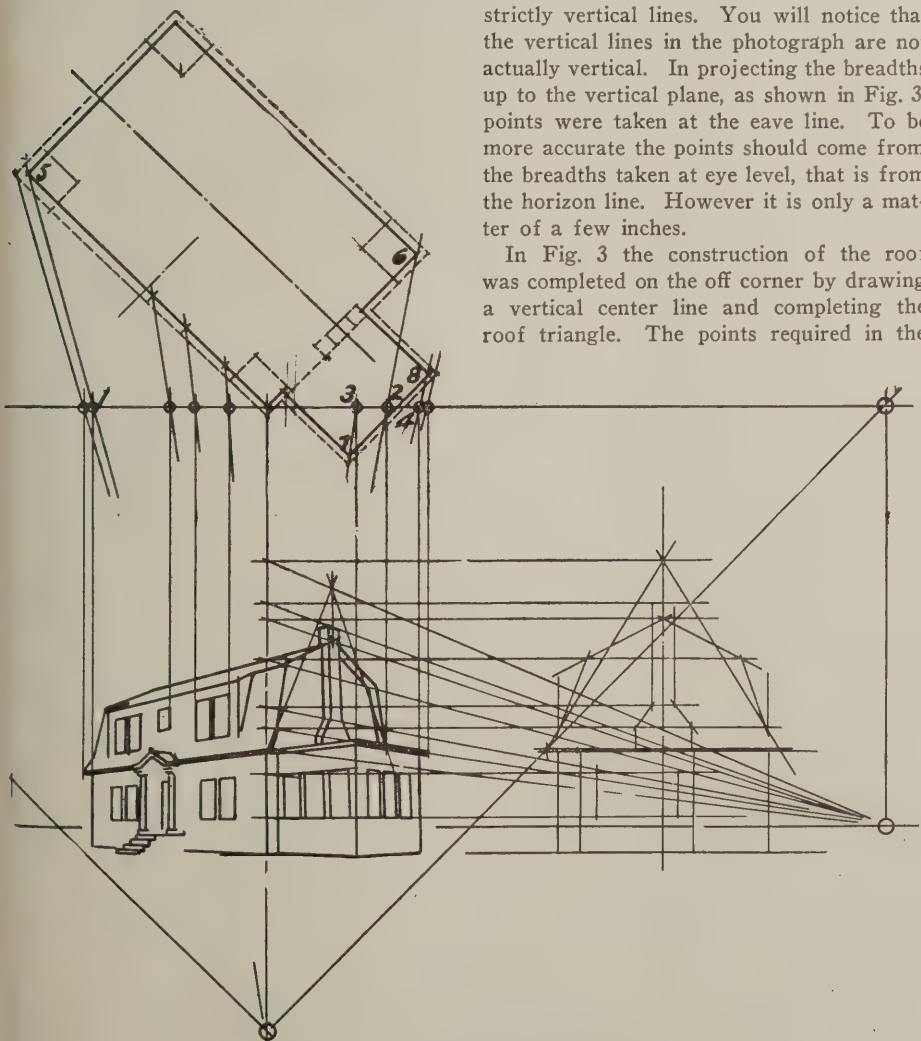


Fig. 3

plan such as corners, chimney lines, windows, and doors were then drawn up to the vertical plane. The ground plan of the building was then determined by running lines through the corner points 1, 2, 3, 4, and from the station point, to the first parallel lines and marking the points 5, 6, 7, 8. The roof edges were found in a similar fashion. The width of the upper slope of the roof was also found and marked in the same way, but the lines are omitted to avoid confusion. The location and sizes of doors, windows, chimneys are found by the same means. This gives the proportions in the plan of the house so far as the visible sides are concerned.

In Figs. 2 and 3 you notice that all lines from the vanishing are brought up to the vertical line. From the vertical line these points are brought over horizontally to the right, see Fig. 3. The proportions for the right side are taken from the plan, which, together with the heights just determined, gives the right side elevation. The left or front elevation, as shown in Fig. 1, was found in the same way. To check results and avoid errors it is better to complete any available geometrical figures before finishing the elevations. Corners count for considerable and should be located with care.

These plans and elevations you will notice are drawn only in proportion, and their size on the drawing paper depends on the size of the photograph from which they are made. There are a number of ways to secure a scale from which larger drawings may be produced. If the house is of brick count the number in the length of the building. The height of a door is a fairly safe way if care is used to build the scale. Window sizes are often used. Perhaps the best way in general is to allow a certain height between the first floor level and the ceiling of the second floor as you would estimate it along the vertical line E F. This might not seem as accurate, but gives a greater length to work from and has the same advantage as counting the brick.

The size of the house may be increased or reduced from the original of the photograph, but great care should be taken not to spoil the general proportions. In this connection there is a place I have in mind which illustrates the point very well. The owner built a very attractive Dutch Colonial of this type, facing a main road and entirely unconcealed by trees or shrubs. Back of it he placed a garage of ordinary two-car size and exactly the same proportions. To cap it a chicken house was put up near the garage and to the same pattern. This sounds absurd, of course, but it is true nevertheless, and shows how ridiculous proportions may become by change.

When the plan of the house is found, or rather the outlines of the plan, the next thing is to get the proper location of rooms. In this you have as guides shadows on the house, soil-stacks, and the tendency of young

trees and the upper branches of large ones to lean towards the northeast. Floor plans do not have to be reproduced exactly. You will find advertised drawings for houses with precisely the same exteriors having different layouts. Floor plans now are far more reasonable than in the past. Rooms are located for convenience and comfort. The position of the house on the lot is determined in regard to the whole of the ground lay-out. Porches are being eliminated as they seem to be heat gatherers instead of shade producers. In fact when you once have the outline of the plan and a reasonable gage as to its size the best floor plans are those which make for the greatest comfort and convenience of the family both in the house and on the lot. Draw up a number of plan outlines and then with a few of the general rules in mind lay out several arrangements. Try to keep the dining room toward the east, the kitchen entry accessible but separate, take care in the swing of doors, and make provision for the placing of furniture. These old time rules as well as the more modern ones make for comfortable homes.

To sum up with a repetition in brief: Make up from the photograph one floor outline. Enlarge this to a suitable size and scale. Make perhaps a dozen of these. Then draw in complete floor plans on each with due regard to the directions of the compass, but make each one without any reference to the others. Use the elevations freely when it comes to placing stairs. The first one may be very good, but the last one is always worth the effort.

Down Spouts

L. J. S. writes that he has noticed many houses recently built in which the lines of the house were thrown out of plumb by the careless placing of down spouts. "In olden times gutters and down spouts were built with great care and with regard to the rest of the building. They are so built nowadays on the more expensive places. But on many of the smaller houses of the present time carelessness is shown. The slight cant of a down spout or an excessive gutter drop apparently throws the whole place out of plumb."

A Measuring Rod

L. L. M., Seattle, Wash., gives us his idea for measuring rods:

"I carry in my tool box a small clamp of the type here shown (Fig. 4). This, with two pieces of parting bead, base shoe, or some similar strips—which can always be found on the job—makes an excellent measure. The strips may be changed at any time for other lengths at no particular bother, and when the job is done all that needs to be carried to the next one is the clamp, which takes up but a very small

space in the box. Another place where I find the clamp very useful. I drilled a hole in the center of the large face which I threaded for a short machine screw. I then cut a circular piece of tin about three inches in diameter with a hole in the center, and painted half red and half white. This

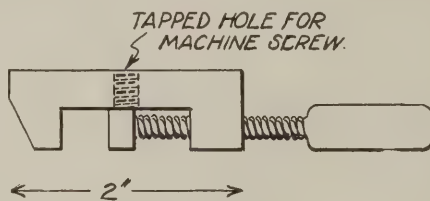


Fig. 4

when fastened to the clamp by the machine screw, and the clamp in turn used with a piece of blind-stop, or any such strip, makes an excellent rod and target for getting grades on small work."

"Time and Material Saver"

F. O. M., Edenton, N. C., sends us another kink, which he says he has found to be a time and lumber-saver: "I get the lengths of all of the different spaces for weatherboards and keep this list before me, then I cut the weatherboard left end square one-half inch longer than space. In this way the weatherboard lengths are cut to an advantage and I do not have any waste. I find the set-up it requires in the distance and gauge the weatherboards as I cut them, then all the carpenter has to do is to set up the weatherboard, scribe and cut right end and nail on."

Oak Flooring Lengths

CLEAR oak flooring can be purchased for less than the price of clear oak lumber. Clear oak lumber is being spoken of—a better grade than firsts and seconds. F. & S. will admit small defects not admissible in clear oak flooring or a clear grade of oak lumber.

What is the explanation of this apparent anomaly? How can an industry subsist that apparently charges less for a completely manufactured article than the raw product from which it is made? An article, too, that requires more men per thousand feet to make than any other article in the dealer's shed. The answer is "lengths."

The fact that oak flooring is accepted in lengths of one foot and up makes possible the profitable manufacture from common oak lumber.

And yet the builder contests the reasonable plea for existence by specifying long lengths of oak flooring. The manufacturer must get clear oak flooring out of common

lumber and in the cutting necessary to produce it, long lengths are not possible.

It may be safely predicted that as the years pass, the lengths of oak flooring will become shorter than they are today. The supply of large timber is diminishing. A less and less percentage of uppers is produced and with this a sharper inspection of the lower grades.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUG. 24, 1912,

Of National Builder, published monthly at Chicago, Ill., for April 1, 1922.

State of Illinois, County of Cook, ss.
Before me, a Notary Public, in and for the state and county aforesaid, personally appeared Geo. P. Miller, who, having been duly sworn according to law, deposes and says that he is the Manager of the National Builder, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse side of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers, are: Publisher, Trade Press Publishing Corporation; Editors, N. C. Rockwood and A. H. McQuilkin; Managing Editor, N. C. Rockwood; Business Manager, Geo. P. Miller, all at 542 South Dearborn Street, Chicago, Ill.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) Trade Press Publishing Corporation, individual stockholders: W. D. Callender, T. J. Sullivan, Geo. P. Miller, N. C. Rockwood, W. B. Mayor, D. R. Hicks, A. H. McQuilkin, H. P. Sessions, C. O. Nelson, Forrest O. Poor, all at postoffice address, 542 South Dearborn Street, Chicago, Ill., and C. H. Fuller, at 101 West 41st Street, New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) There are none.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is—(This information is required from daily publications only.)

(Signed) GEO. P. MILLER.

Sworn to and subscribed before me this 25th day of March, 1922.

FRANK L. CHENEY, Notary Public.
(My commission expires Dec. 21, 1925.)
Form 3526.—Ed. 1916.

Notice

IN order to make room for the report of the organization of the National Construction Council at Washington, D. C., June 19 and 20, the departments of new goods and announcements of publications are held over to the August issue. This issue will be devoted to the main to Homes and Housing, and will be unusually rich in practical and suggestive matter.

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Volume 65

August, 1922

Number 8

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THE Building Industry represents creations based on Ideas and Facts. "I wonder," says the critic, "what the Idea was in building that house that way." He wonders because he does not know the Facts.

* * *

The Builder who has collected by his own experience or from the written experiences of other Builders a wide assortment of Facts, has a sound basis on which to adapt Ideas.

* * *

An Idea is worth only as much as the Facts will prove to be true—and fitting the two together is the secret of success or failure in Building, and in many other activities.

* * *

Sometimes the Facts inspire the Idea, and sometimes the Idea starts hunting for the Facts. The Designer may lay out an interesting exterior: that is his Idea. Then come the Facts that have to square the Idea to Practical Use. Will the Idea fit the desired floor plan, or the material, or structural requirements? How far may compromise be applied on either side to get a satisfactory result? Experience helps to the solution.

* * *

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* * *

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NATIONAL BUILDER

Volume 65

CHICAGO, AUGUST, 1922

Number 8

The Situation

BUILDING COSTS refuse to "stay put." An extensive eastern trip by one of the editors showed that nearly everywhere building now costs more than it did last fall, or in the early spring. Well-posted builders in Cleveland, Ohio, said costs had increased there in the past few months 25 to 30 per cent. They said each new material bill shows some advances, while union wage scales have come to mean little in most of the skilled trades. Good workmen are hard to get and the wages they obtain from sorely pressed contractors and builders correspond. In the outlying parts and suburbs of New York City it was said a plasterer easily made \$20 per day. In Newark, N. J., a negro was recently arrested in morning hours for speeding his automobile. Brought to a police station he produced a huge roll of greenbacks and deposited \$25 cash bail, jumped into his car and speeded away. He said he was a hod carrier and didn't want to be late for work.

This increase in costs is apparently the result of several factors, the most important of which is the great demand for houses and small buildings of all kinds. Operations of this kind are generally not as expeditiously nor as efficiently handled as larger jobs, and require more laborers in the aggregate than the same amount of larger construction. Also there is not the same control of costs as in business buildings. The continuance of the strikes of the coal miners and the railway employes is having a very appreciable effect on prices of building materials and will have more effect as the season advances. It is freely predicted that a car shortage of the same character as existed in the fall of 1920 is now a certainty. The Associated General Contractors of America, and many other organizations and agencies interested in promoting building, are urging that all possible shipments of materials be made immediately, and that cars be promptly unloaded.

Contractors and builders should plan their work ahead for the next few months so as to avoid so far as possible expensive

delays for want of necessary materials later on. Co-operation with local dealers and with building material producers is very essential, if the building needs of various local communities are going to be adequately taken care of. Every indication points to a year of record construction, provided building material needs can be taken care of before the expected transportation pinch occurs. June construction contracts for the country as a whole were appreciably less than in the record-breaking early spring months, but in this respect 1922 does not differ from other years. It merely means that work on contracts let in March and April is now in full swing and it is difficult for contractors and builders to take on any more. On the other hand, building permits increased.

Chicago Situation

Building permits issued in the city of Chicago for the *six months* from January 1 to July 1 totaled nearly \$112,000,000, which is a larger figure than any previous total for a *whole year*, by over \$1,500,000! "The figures are a striking proof of what can be accomplished when building is unhampered by strikes, extortion, and restrictions upon the use of building materials," said F. W. Armstrong, general manager of the citizens committee to enforce the Landis award.

An analysis of contracts reported let between May 10 and July 7 showed the committee contractors to be winning 82 per cent of all work costing \$25,000 or over. The figures were, Landis award contractors \$25,328,000; non-Landis contractors \$5,485,000.

"A peculiar feature of the statistics," said Mr. Armstrong, "is the steady drop in the activities of the so-called speculative builders who have been operating heavily in the apartment building field with the idea of making quick and profitable sales as soon as a building is completed."

The Citizens committee celebrated the Fourth of July by passing the 15,000 mark in the mechanics placed in the Landis award army. The exact number of mechan-

ics placed to July 5 in the thirteen "outlaw" trades was 15,073, of which 5,881 were carpenters, 2308, laborers, and 2027 painters.

Recently the terrazzo mechanics, inspired by the amount of work in sight, struck for an increase of 10 cents an hour and the substitution of a new contract for the one given them by Judge Landis. The contractors appealed to the committee. After several conferences, a number of terrazzo mechanics were brought in from outside cities and crews were organized. The union heard of it and underwent a change of heart regarding the extra ten cents. The organization, meanwhile, had been placed on the open-shop list because of the strike, so the men went back to work in an individual capacity side by side with the men who had come in from out of town.

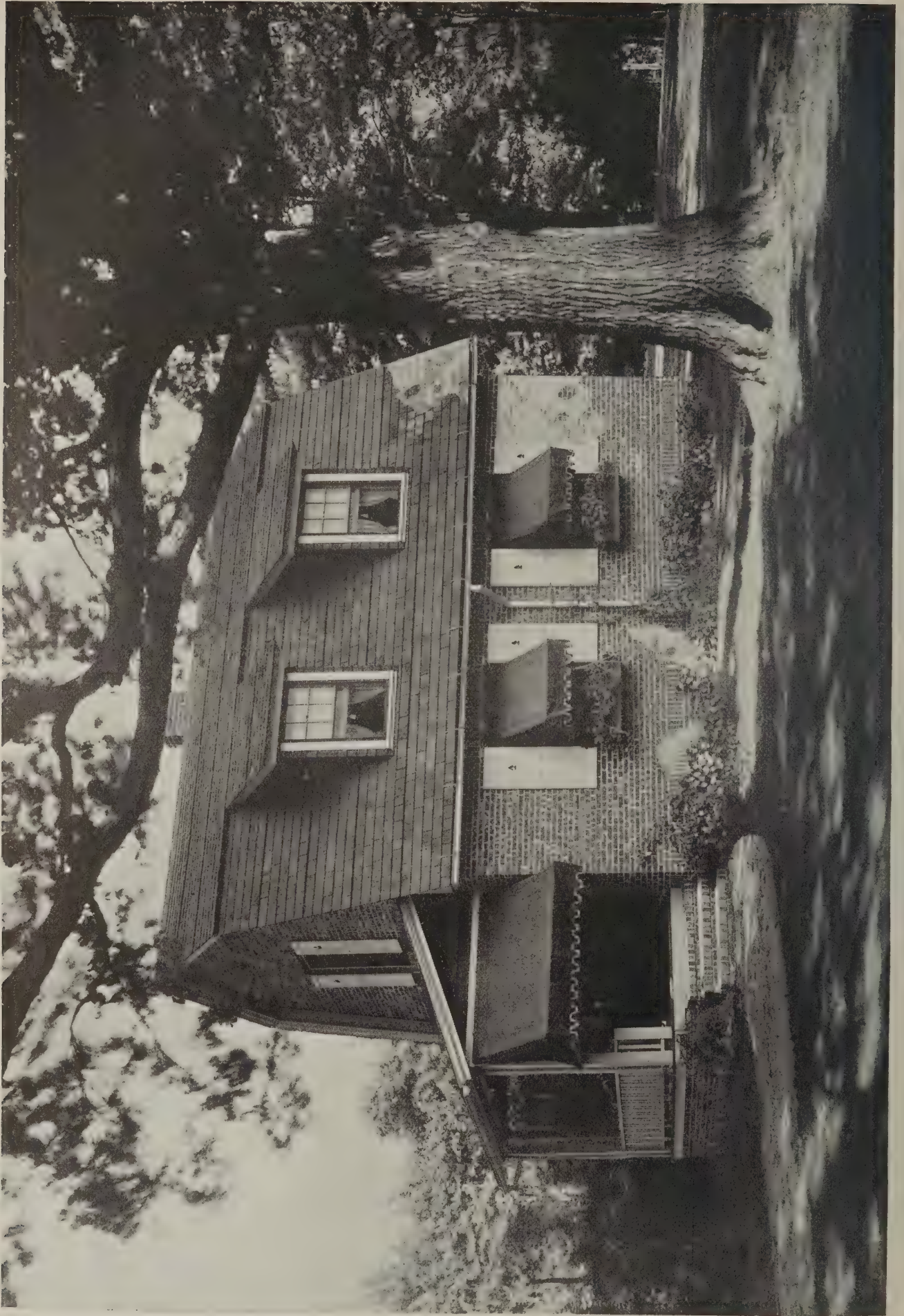
On July 20, the national officers of the building trades unions outlawed by the citizens committee met in Chicago, to re-establish if possible closed-shop conditions. The conference is headed by John Donlin, president of the building trades department of the American Federation of Labor.

This conference recommended two days later that the Chicago Building Trades Council be reorganized and the various unions "outlawed" by the citizens' committee sign contracts with the employers under the terms of the Landis award.

Unless the eleven open-shop unions abide by the recommendations they must forfeit their charters from the American Federation of Labor. These unions are the plumbers, sheet metal workers, hoisting engineers, cement finishers, composition roofers, slate and tile roofers, fixture hangers, lathers, glaziers, laborers and terrazzo laborers.

The painters' union is not in the list instructed to abide by the Landis award. When former Judge Landis was appointed arbiter in the building trades dispute on wages the contract of the painters hadn't expired and they didn't participate in the original arbitration proceedings.

Boston, Mass., contractors recently returned to closed-shop conditions, after over a year of turmoil, but not on unqualified union terms.



A Small Dutch Colonial House of Brick. Wm. Carver, Architect
Working drawings are given in detachable plan insert in this issue

A Small Dutch Colonial House of Brick

Working Drawings and Details Are Given
in Detachable Plan Insert in This Issue

THE photograph reproduced on the opposite page shows an unusually attractive small house, using brick for the exterior walls. With exterior dimensions of only twenty-five feet by twenty feet, the plan provides surprisingly spacious well arranged rooms.

The living room is 11 ft. 2 in. x 15 ft., and has a cheerful fireplace at the end, the stairway to the second floor starting alongside of this fireplace.

There is a large 8 ft. wide cased opening between the living room and dining room, the dining room itself being 12 ft. x 10½ ft.

The kitchen is provided with plenty of cupboard space, clothes chute and broom closet, all of which were considered and arranged so as to save as many steps for the housewife as possible.

The second floor has two bright and airy bedrooms, one 11 ft. 2 in. x 12 ft., the other 12 ft. x 8 ft. 9 in., an adequately sized bath room, 6 ft. 6 in. x 6 ft., a linen closet with shelves and clothes chute, and an airing balcony just off the hall.

To obtain a rough idea of the cost of this house, multiply the cubic contents, 13,500 ft., by the average cost per cubic ft. in any locality. It will be found that as a rough average the cost will range from \$4,500 to \$6,000.

The house was actually built with solid walls but another considerable saving can be made by using the new Ideal wall instead, and this construction is therefore shown on the working drawings inserted in this issue. The use of the Ideal wall brings the cost of a brick house to practically that of frame, saving about one-third the cost of the masonry.

There are two types of Ideal wall, the rolok-bak and the all-rolok. In the rolok-bak, the backing bricks are laid on edge while the facing bricks are laid flat with a continuous air space between the two. This type presents the appearance of the regular brick wall when viewed from the outside.

The all-rolok wall, however, is the least expensive to build and also is the strongest wall, all of the brick being laid on edge.

The advantages of this new construction, it is claimed, are that it provides an air space which is continuous from the bottom to the top; and has no through mortar

joints. This has been demonstrated to make it almost impossible for any moisture to penetrate the wall even in severe weather, assuring an absolutely dry wall on the inside which, of course, eliminates the necessity of furring; the plaster, therefore, can be applied directly on the brick.

One sq. ft. of all-rolok wall requires but 9 brick.

Quantity Survey for Ideal Wall Houses

Rough grading.

124 cu. yds. excavation.

Brick quantities for solid brick and Ideal all-rolok walls.

Exterior basement walls to first floor.

Ideal All-Rolok

Brick, 8¾ thousand

Lump lime (180 lb. bbls.) 2 bbls. or

Hydrated lime (50 lb. sacks) 11½ sacks

Cement (94 lb. sacks) 10 sacks

Sand, 3 cu. yds.

Bricklayers' approximate time, 73½ hrs.

Laborers' approximate time, 60½ hrs.

Solid Brick

Brick, 13 thousand

Lump lime (180 lb. bbls.) 5½ bbls., or

Hydrated lime (50 lb. sacks), 30 sacks

Cement, 27 sacks

Sand, 7.3 cu. yds.

Bricklayers' approximate time, 72½ hrs.

Laborers' approximate time, 97½ hrs.

Brick, 14½ thousand

Lump lime, 3 bbls., or

Hydrated lime, 22 sacks

Cement, 19½ sacks

Sand, 5.8 cu. yds.

Bricklayers' approximate time, 123½ hrs.

Laborers' approximate time, 63 hrs.

Brick, 18½ thousand

Lump lime, 6½ bbls., or

Hydrated lime, 39 sacks

Cement, 35 sacks

Sand, 9½ cu. yds.

Bricklayers' approximate time, 132 hrs.

Laborers' approximate time, 137 hrs.

Steel Lintels

3 4x3x5/16 angles, 4' 8" long

1 4x3x5/16 angles, 4' 2" long

1 4x3x5/16 angles, 4' 0" long

2 4x3x5/16 angles, 3'10" long

1 4x3x5/16 angles, 3' 0" long

3 cleanout doors

3 thimbles; 1 ash dump

1 damper; 1 fireplace damper

32 lineal ft., 8½"x 8½" flue tile

50 lineal ft., 8½"x13 " flue tile

3.8 cu. yds. concrete cellar floor, or

2400 brick cellar floor paving

225 fireplace brick

475 yds., 2 coats hard wall plaster

3 yds. plaster on metal lath over furnace

9.18 squares 2x8 joists and bridging—1st and 2nd floors

3.75 squares 2x6 joists and bridging—2nd floor ceiling

90 lineal ft. 2x4 stud partition, 8' 3" high

10.2 squares ¾" rough flooring 1st and 2nd floor

11½ squares select oak floor 1st and 2nd floor

9.5 squares 2"x6" main roof rafters

9.5 squares 1"x4" roofing boards

9.5 squares shingles main roof

1.2 squares 2"x6" porch joists

1.5 squares porch flooring

1.5 squares porch ceiling

1.5 squares 2"x4" porch ceiling joist

1.5 squares 2"x6" porch rafters

1.5 squares 1"x4" porch roof boards

1.9 squares shingles porch roof

.56 squares 2"x6" joists rear porch

.5 squares canvas—balcony floor

.5 squares 1"x3" rear porch flooring

1 17-ft. 4"x12" built up porch beam

9 6"x6" built up porch columns 8' 0" high, front and rear porch

2 6"x6" newel posts 3' 6" high, rear porch

24 lineal ft. top and bottom porch rail with 5/4" square spindles

19 lineal ft. top and bottom porch rail with 5/4"x3" and 5/4" square alternating

1 set rear porch steps, 2 risers

138 lin. ft. fascia board for porches

52 lin. ft. main cornice 14" wide

128 lin. ft. cornice at rake 8" wide

2 cypress zinc lined flower boxes 5'0" long

2 pr. blinds for 40"x24" window

2 pr. blinds for 30"x24" window

1 flight cellar stairs, 12 risers high

26 lin. ft. 6"x10" wood joist supporting beam

1 flight stairs 1st to 2nd floors, 14 risers high

1 front door 3' 0"x6' 8", with frame and trim

2 rear outside doors 2' 6"x6' 8" with frame and trim

2 windows with box frame, weights, cords and inside trim (glass size 40"x24")

2 windows with box frame, weights, cords

- and inside trim (glass size 30"x24")
- 1 window with box frame, weights, cords and inside trim (glass size 34"x16")
- 1 window with plank frame inside trim (glass size 20"x24")
- 1 window with plank frame inside trim (glass size 40"x24")
- 2 stud wall windows with box frames, weights, cords and inside trim (glass size 30"x24")
- 1 stud wall window with box frame, weights, cords and inside trim (glass size 18"x18")
- 3 cellar windows with plank frames (glass 3 lights 10"x16")
- 1 built-up mantel shelf
- 7½ lin. ft. kitchen cupboard
- 1 drain board
- 1 broom closet with shelf
- 1 china closet with adjustable shelves, leaded glass door and trim
- 1 linen closet with shelves
- 1 medicine cabinet with shelves and mirrored door
- 1 2' 4"x6' 8" inside door with frame and trim
- 5 2' 6"x6' 8" inside door with frame and trim
- 4 2' 0"x6' 8" inside door with frame and trim
- 1 2' 6"x6' 8" door in basement coal room
- 1 8' 0"x6' 8" cased opening between living room and dining room
- 21 lin. ft. hook rail for closets
- 250 lin. ft. 1"x8" beveled base
- 100 lin. ft. picture mould
- 260 lin. ft. carpet strip
- 81 lin. ft. 5" hanging gutter
- 50 lin. ft. 4" conductor pipe

Flashing around 2 chimneys, plumbing, heating, electric wiring and fixtures, painting and decorating, shades and curtain rods, sidewalks, gardening.

A Strongly Built Porch Column

THE dovetail corner construction of porch columns is clearly shown in the illustration. These columns are being used in



a Colonial house built in Irving Park, Chicago, for Leon, J. Tillman of the Pulaski Lumber Company.

Real Estate Office Built Like a Lighthouse

THAT architectural design can be made an advertising vehicle as well as can the printed page, has been demonstrated in numerous cases, notably the Woolworth

salesmen's desks. The lighthouse proper surmounts the main structure and is chiefly ornamental.

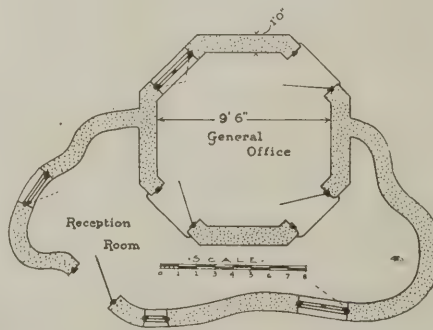
The architect of this novel building,



Real estate office, Hollywood, Los Angeles, Calif.

building. But that small buildings can also be so designed as to spread their fame far and wide has not been generally recognized. Therefore special interest attaches

which has instantly attracted much attention to the firm owning it, is A. F. Leicht, Los Angeles. The cost is approximately \$2,000. The design has been copyrighted by Miss Mary Vidatoc, the chief member of the firm which commonly advertises itself merely as "Mary."



Plan of real estate office

to a striking example of unconventional architecture, the frank purpose of which is to secure advertising. This structure is a real estate office in Los Angeles designed to resemble a lighthouse on a rocky promontory. It is built of reinforced concrete, with a very rough exterior finish, and walls 12 in. thick. The lower portion of the novel structure is irregular in shape to resemble a huge rock in the sides of which windows of fantastic shape have been inserted, as well as a door at one corner, the glazing of the door corresponding to that of the windows. This ground level portion contains a small private office surrounded on three sides by a passageway of varying width in which are placed

The Principles of Interior Decoration, by Bernard C. Jakway, university extension lecturer in interior decoration, University of California, published by the Macmillan Company, New York, is one of the most notable and timely works in the furtherance of taste in housing. The work amply fulfils the publishers' succinct description: "A discussion of the whole field of interior decoration, giving scientific and artistic bases for judgment and taste in decoration." The author presents the most helpful information for interior decorators, students of design, architects, teachers and all who are seriously concerned in the furnishing of homes. The numerous illustrations in the book are treated in a new way, the author using line drawings and simple photographs to illustrate the principles. The clear and easy style in which the information is given, the indicated research and thoroughness of treatment is most satisfactory. The book is handsomely printed, its 289 pages are illustrated with 51 drawings and 16 plates; bound in blue, grained covers stamped in white and gold. Price \$2.50.

"The Best Is None Too Good"

The Jos. E. Jones Co., Realtors and Builders, of Oak Park, Ill., Carry Out the Slogan, "The Best Is None Too Good," in a 54-House Enterprise Which They Are Developing—Good Design and Quality Materials Characterize Their Houses, Which Are Sold Complete, Including Even Gardeners' Services for Two Years

ONE frequently hears the statement that the speculative builder is not interested in building well, that quality has no meaning for him and price is his only consideration. Without attempting to discuss the point now, it can be said without contradiction that the work of the Jos. E. Jones Co., in Oak Park, Ill., cannot be questioned so far as the quality of their materials or workmanship is concerned or the good taste and sound judgment shown in the character of their designs.

materials of known quality and for workmanship that will stand inspection, to afford them a good business; and the Joneses, if they were in any other community than the one in which they are now building, would say the same thing applied there, and would have the courage to demonstrate that they are right.

Neither member of this firm is a gray-beard, by any means, yet they have a creditable record of accomplishment behind them, although both are still young men.

in the United States, boasting a population of over 40,000. It is suburban to Chicago and its inhabitants are mostly families whose breadwinners work in the larger city. In other words, it is a residential community and it is of very cosmopolitan character, for its people are of all "classes," from the richest down to those of very moderate circumstances.

In this village, the Jos. E. Jones Co. operates. This concern is now developing three blocks in what is known as the "Fair



The twelve houses now under construction. Seven are visible in the picture, but foundations for five more are in between the houses shown beyond the first two. Seven will be "Stonekote" stucco, four stucco and brick veneer, and one—the center house—all brick veneer. All are of English design, some with half timbers. The houses do not line up in a straight line in front, but sweep back in a graceful curve from each end; thus each commands a view up and down the street and, with the terracing and shrubs in, will present a pleasing appearance as a group. Other houses to be built on other streets will be of the Colonial type

The Jones brothers—there are two of them financially interested in this company, Joseph E., president and George H., vice-president—believed that there are enough people in their community who have the good taste to appreciate a home that is architecturally correct, and who are willing to pay the little extra that is necessary for

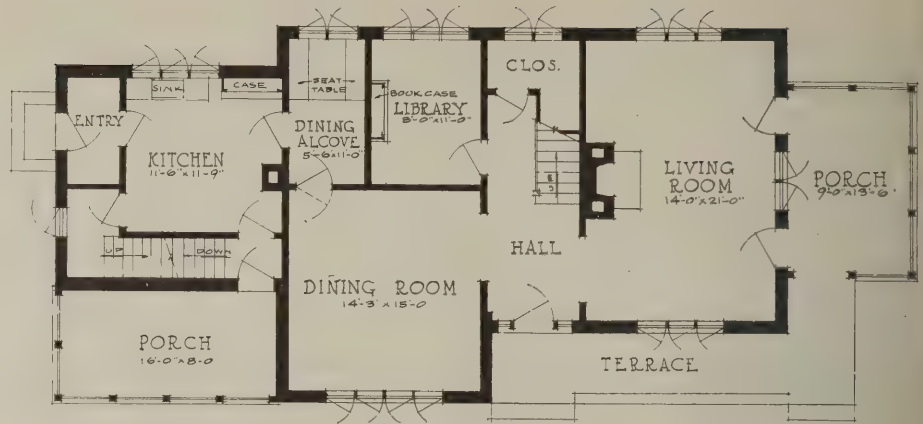
The project they now have under way could easily break them financially, if it did not go—a fact which would make many young men in their circumstances hesitate to do what they are doing, but which adds all the more zest to the game for them.

Oak Park, Ill., is the largest "village"

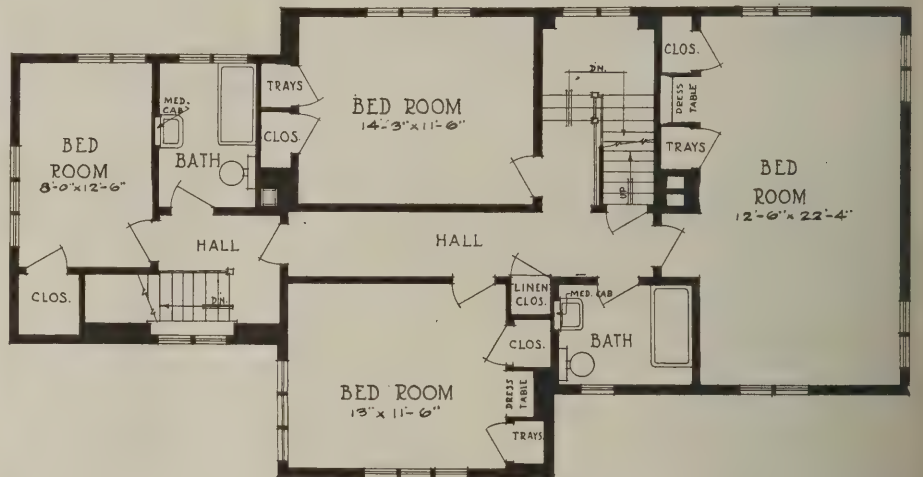
Oaks" section, a district situated some five blocks from electric transportation, but reached by bus or by auto over very good paved streets. Eventually street cars will undoubtedly penetrate the district and one prominent street will be made a boulevard. A well known golf club is some half mile distant and within five minutes drive one

can reach the Des Plaines river and the beautiful Forest Preserve.

The Jos. E. Jones Co. owns 3165 feet on three streets, all running north and south, on which they plan to build 54 houses. This provides an average of a little less than a 59-foot lot for each house, and the lots vary in depth from 80 feet on one street to 175 feet on another. The lots occupied by the houses shown in the picture run from a width of 57 feet to 69 feet and are 125 feet deep. The houses are and will be all of from six to eight rooms in size and all two-story. At present twelve are under construction. Seven are shown in the illustration, but in between those beyond the first two, are the foundations for five more, which will be com-



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Floor plans of corner house, shown on next page and page 33 of Style Sheet



**Joseph E. Jones, President,
Jos. E. Jones Co.**

pleted as soon as those now under construction are finished, making one entire side of an entire block. This done, work will be started on the remaining lots until 54 houses in all are built. A two-car garage will be built with each house, to harmonize with it in design and material. The Jos. E. Jones Co. have their own building organization which is in charge of Frank C. Brown, superintendent of construction.

"In planning this development," said Mr. George H. Jones, vice-president of the company, "we have had in mind building something more than merely four walls and a roof. We wanted to build houses that would have some architectural character and that people of taste would appreciate. Nothing of the kind has ever been done, in the middle West, on the scale that we contemplated, though some very successful developments like ours have been carried through in the East and they stand today as splendid monuments to the wisdom and character of the men who are responsible for them.



**Frank C. Brown, Superintendent of
Construction**



**George H. Jones, Vice-
President**



The corner house, entirely completed, with terracing done and shrubs and trees set out. The design is distinctly English, with its steep roof projecting only about eight inches at the eaves and finished only by a rake mould on the gables



The corner house from the south. Note the lattice treatment of the back porch and the dormer with triangular wing sash. All the houses present an attractive appearance on every facade. The second story slightly overhangs the first



The second house from the corner, built of "Stonekote" stucco in a buff tint over metal lath. The half-timbers will be painted a dark brown to contrast



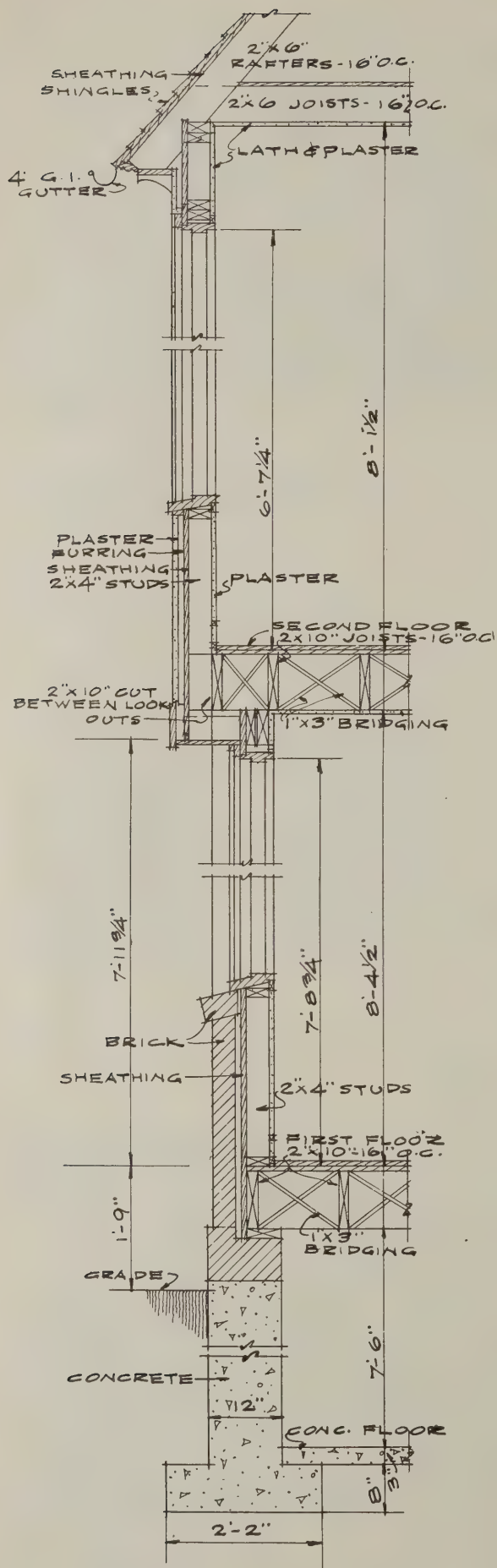
This house is in the center of the row and sets back farthest from the street. It is entirely of brick veneer and is the largest house in the group. A "sold" sign already claims it



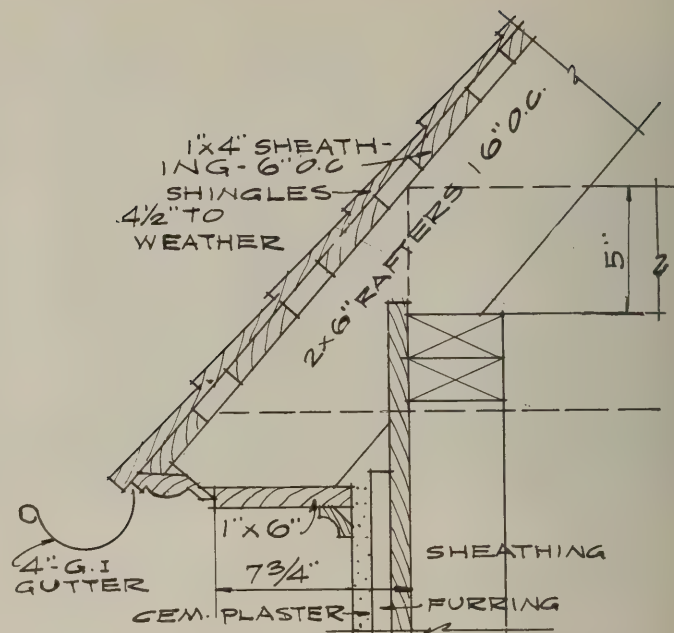
Because of the scale on which the Jos. E. Jones Co. are building, they have erected this temporary warehouse on the property to take care of the large quantities of materials that are delivered and in which to do special work



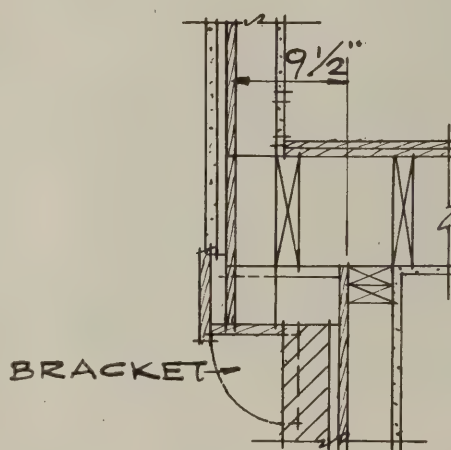
This attractive little building is known as the Fair Oaks office, as indicated by the legend of the flower bed. It was erected on the property as headquarters for the superintendent of construction and for the salesman on the job



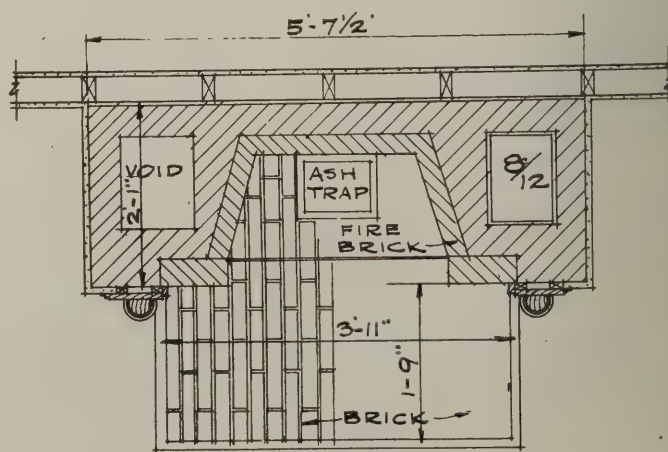
MAIN WALL SECTION



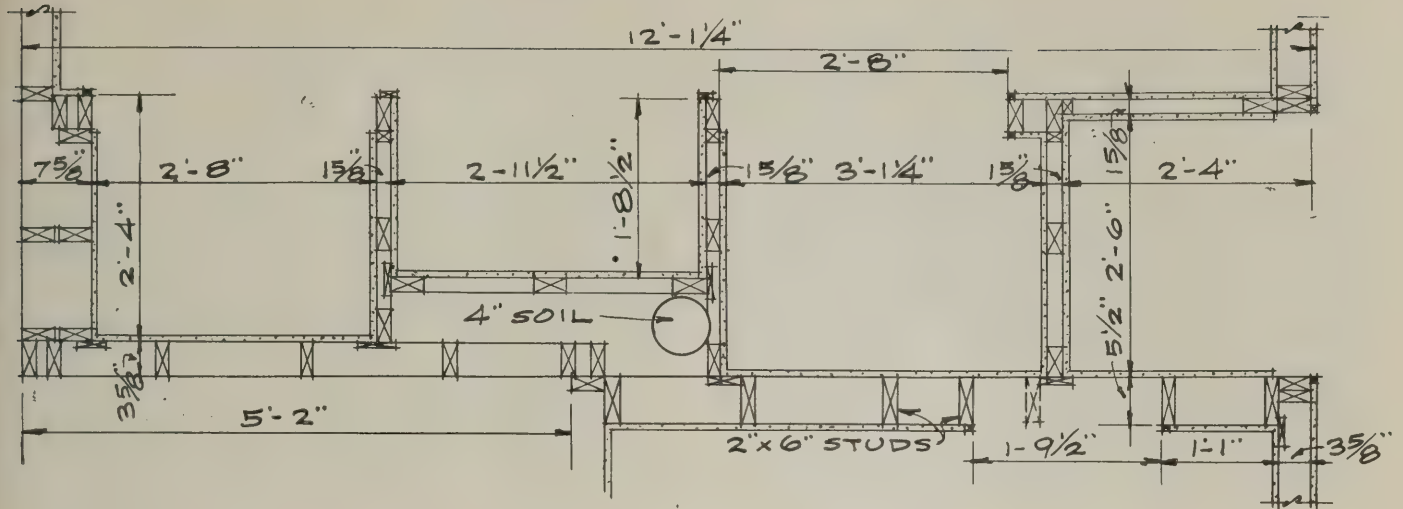
CORNICE DETAIL



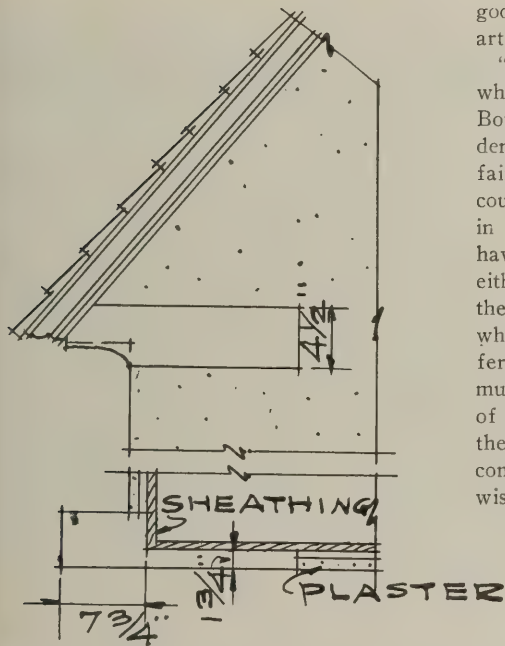
TYPICAL SECTION THRU OVERHANG



FIREPLACE PLAN



FRAMING PLAN FOR BEDROOM CLOSETS.



GABLE DETAIL

"We have felt right along that it was about time the speculative builder paid some attention to the appearance of his houses as well as to their construction. We ourselves have built houses that are no credit to us so far as their designs are concerned, and we don't want to build any more of them. In the houses we are building now, we have found the widest differences of opinion concerning them. Some 'think them 'the limit' so far as their exteriors are concerned; others are delighted with them. It is the latter class of buyer that we are looking for, too, for as a rule, they are people who have traveled and seen good houses elsewhere, or have studied architecture and know good forms when they see them, or who have innate

good taste and immediately appreciate the artistic value of our houses.

"We chose two architectural styles in which to build--English and Colonial. Both are very popular in the better residential sections of the country and we felt fairly sure that the majority of people could find just what they want in a house in at least one of these styles. Thus we have stayed away from the extreme at either end. Oak Park is full of houses of the Frank Lloyd Wright type, for this is where that style originated, so we preferred not to add any more to the community. Besides, that is an expensive type of house to build. The Spanish house, on the other hand, is as yet a little too uncommon in this part of the country. Likewise with other architectural expressions.

We chose, therefore, as previously
 stated, to stick to something that
 was *right* from an architectural
 standpoint and yet that was con-
 servative enough to appeal to a
 wide variety of prospective buy-
 ers. The English and Colonial
 styles seemed to embody just what
 we were looking for and we are
 building and shall build houses of those two
 types.

"Our plans and designs are the work of one of the best known firms of architects in this country, Trowbridge & Ackerman, of New York City. This concern is in high standing in the field of domestic architecture and have to their credit such houses as those of George D. Pratt, at Glen Cove, L. I., and Senator Newbury's at Grossepoint, Mich., rated as two of the twelve "best houses" in America.

"The woodwork in these houses—that is, the doors, windows, trim, built-in furniture, etc., were likewise designed by this firm of architects and were obtained from a manufacturer who produces them as standard designs. We use 'stock' material everywhere possible, only of course, when

it comes up to requirements in design, material and workmanship. With stock forms we are able to keep down the cost of the houses—a common objection to the house planned and designed by the architect, when special forms are usually detailed.

"Of the twelve houses we now have under way, seven will be straight stucco on the outside; four will be a combination of stucco and brick veneer, while one house, which is the center of the row, will be entirely brick veneer. The brick are of varying texture and color, judiciously used so as to produce the best effects not only for each house but for the twelve as a group. The stucco is smooth finish 'Stone-kote' laid over metal lath, so that it won't crack, and is in different tints so as to produce variety, without discord, in the exteriors.

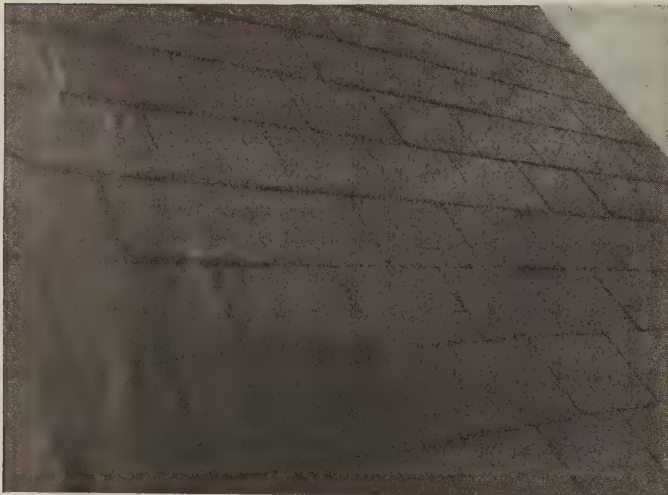
"The roofs are all slate with copper flashing and valleys. We have tried to put roofs on these houses that their owners will never have to touch, to replace or repair. The copper flashing and valleys cost only about \$30 per house more than tin—a difference that any sensible home buyer will be glad to pay as insurance against repairs. The slate roofs are of varying shades. You see, we have built not one house, but a group of houses, a community, and we have designed it as a whole made up of harmonious units. For example, we are not lining up the houses on one side of a street, but instead, their fronts sweep back in a graceful curve from either end of the block, allowing every house a view up and down the street and avoiding the stiff, mechanical appearance of houses lined up in a row. The average street is full of houses that fight each other instead of enhancing each other's beauty, for each individual builder tries to get something 'different' and in the attempt usually strikes a jarring note so far as his neighbor's houses are concerned. It is right here where the realtor-builder has



The development of the Jones property in the Fair Oaks section meant the paving of streets and alleys as well as the building of houses. Sewers and gas and water pipes had to be laid, too



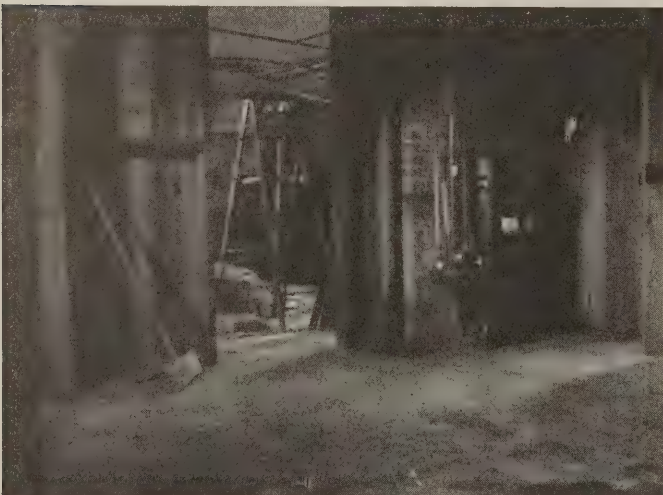
Steel beams and steel posts support the houses themselves. These steel members cost only \$28 more per house than wooden beams and posts would have cost, and they make an effective "talking point"



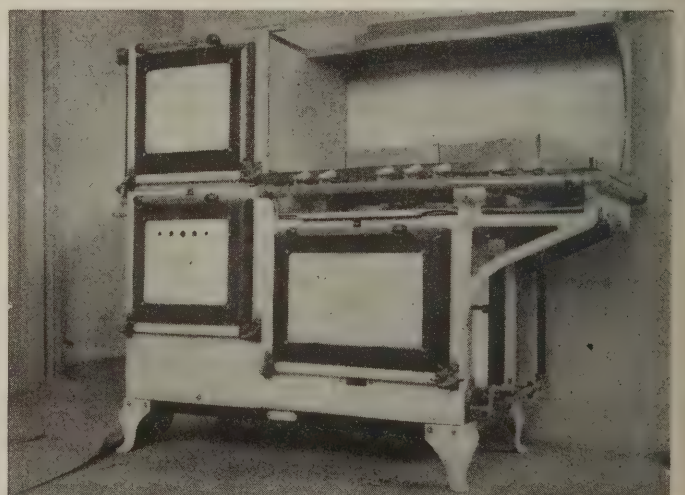
Slate roofs of different shades and colors produce a harmonious appearing group and add beauty to each house. Copper flashing and valleys insure each house against future repairs



Casement sash with small panes are used throughout every house. They are operated by special casement hardware, making them very practical as well as attractive



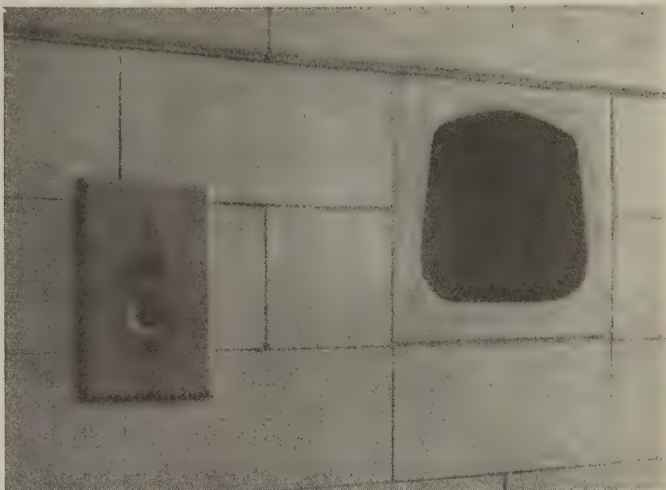
A gas water heater in the basement supplies instantaneous hot running water for every house



This handsome stove is an aid to selling every house. It is equipped with an oven heat regulator



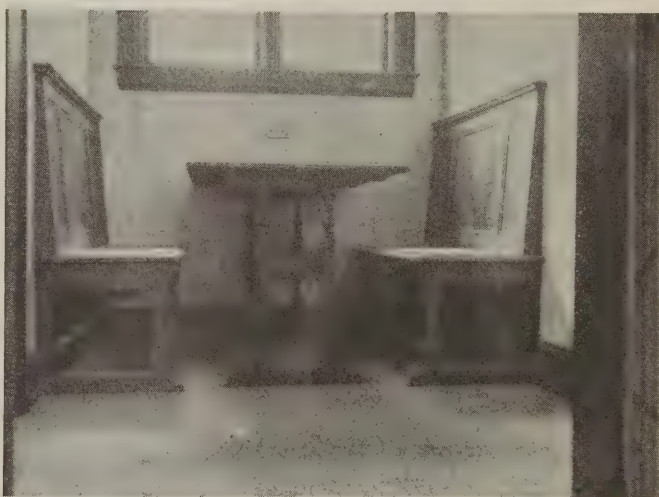
Built-in tubs, sanitary washstands, silent closets, and built-in medicine cabinets comprise the equipment for every bathroom. They all have tile walls and floors



Tile walls in the kitchen, tile floors for the porches, vestibules and terraces, and tile walls and floors in the bathrooms, make an attractive house and one that is easy to keep clean



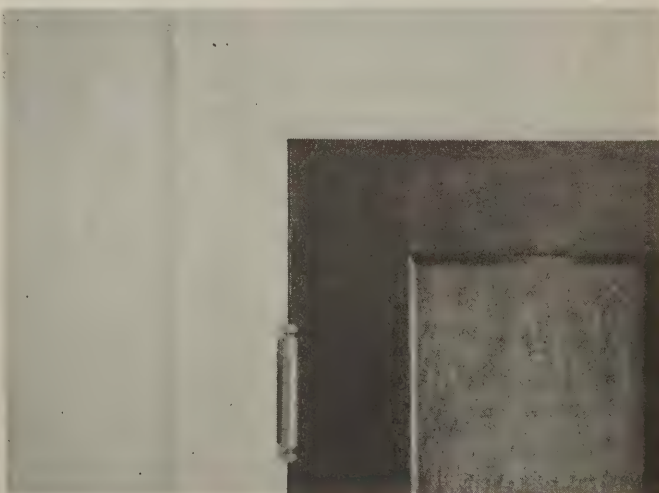
A dining room buffet. Sideboards are used in some dining rooms and corner china closets in others



Nearly every house has a dining alcove. Note the tile floor. The benches and table are movable



Detail of the trim used downstairs. It is finished with Early English Stain, very dark, and rubbed to a dull finish. Note the excellent workmanship on the mitred joint



A detail view of the trim used on the second floor—a simple round edge casing. Every piece of trim, before installed, was coated with linseed oil, to prevent its warping and joints from opening up



French doors help to make light rooms downstairs



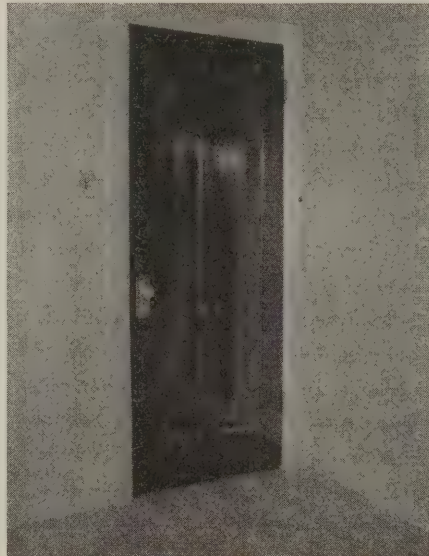
An eight-panel door of charming proportions is also used downstairs



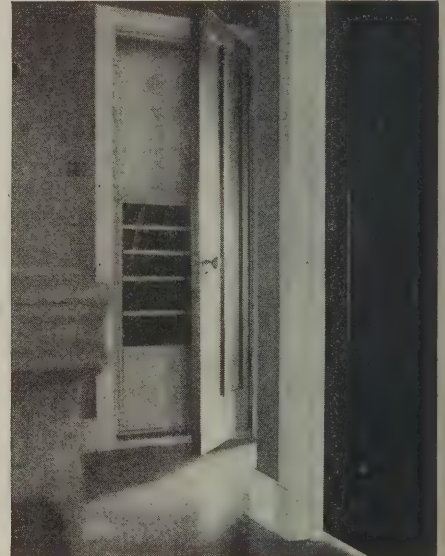
The living room mantel. Note its refined details and beautiful design



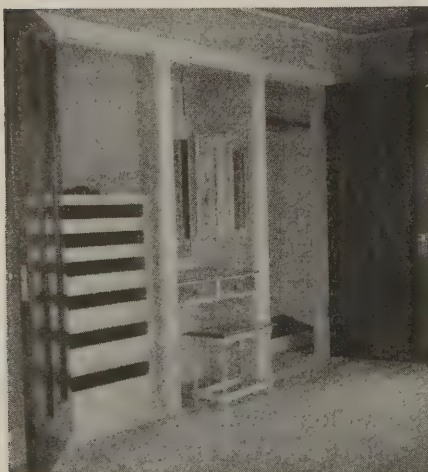
A refrigerator, usually placed for icing from the outside



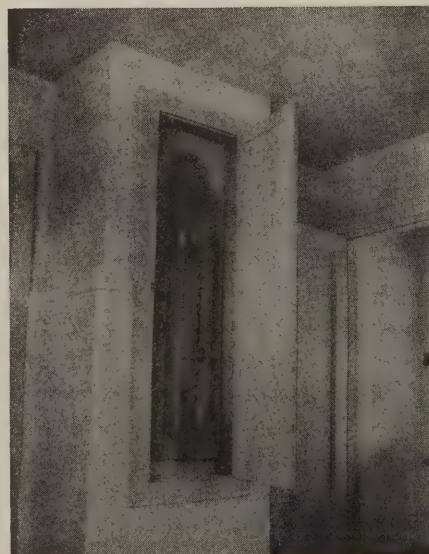
Upstairs the trim is finished in ivory enamel rubbed to an egg-shell finish



An upstairs hall linen closet with open-end trays and drawers



The type of built-in furniture with which the bedrooms are fitted



The built-in ironing board in the kitchen. It is adjustable in height



The center light fixture in the dining room

Light fixtures of standard design but finished in polychrome to conform to the color of the wall covering of each room, add much to the attractiveness of the interior



The wall light fixture in the dining room

an opportunity to render his customers the greatest service. He can build groups of houses and so insure each being in perfect accord with its neighbors, which adds value to all of them and makes a better looking street or community.

"Although our houses are on the highest point in the Fair Oaks district and each will have a terrace around it, we have waterproofed the foundations, making absolutely dry basements a certainty. We might have saved money here and no buyer would have known the difference, until perhaps his basement became damp, which is not likely under any circumstances in that location, but waterproofing adds more to the salable value of these houses than it costs.

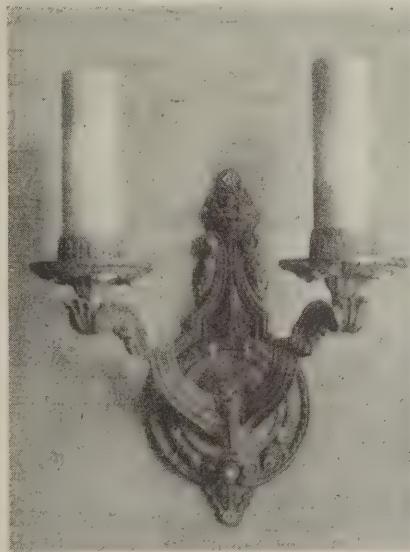
"Another quality feature is the steel beams and posts. Wood beams and posts would have served just as well for the purpose of holding up the superstructures, but people think that steel is synonymous with strength and solidity, and so we used steel. The steel beams and posts cost only \$28 per house more than wooden members would have cost—a difference that we will easily get for them, because they make good selling points.

"Our woodwork attracts attention, too. It is not only 'architecturally correct' in design, but it is also of excellent material and construction. Our carpenter foreman, who installed it, and who has also installed woodwork in the homes of two millionaires on Lake Shore Drive, tells me that it is of far better quality than that in the more expensive homes, and it is evident he felt his responsibility in putting it in, for notice the painstaking care with which the mitered joints in the trim are put together and the beautiful workmanship he has given us throughout. Every piece of trim is coated on the back with linseed oil before being put in place—to insure it against warping and to prevent joints from opening up. The flooring is narrow 1½-inch

oak of the finest quality and is laid with great care. The sanding and finishing of it are excellent and something any housewife will be proud of.

"In building these houses we have had our eyes open for anything that would please the women. That is why we have tile walls in not only the bathrooms but also in the kitchens. We have tile floors in the bathrooms, too, and all porches, terraces and vestibules have tile floors. The housewife who does her own work will find these houses easy to keep clean and a pleasure to work in as well as live in."

The Jos. E. Jones Co. is going considerably farther in their work than the average builder who builds to sell, ordinarily ventures. They are building their houses complete in every detail. Light fixtures of unusual beauty and especially finished to conform with the decorative scheme of each room, are part of the equipment. The houses are heated by hot water systems and instantaneous running hot water is



This type of wall light fixture is used in the den

supplied by a gas heater in the basement. In the kitchen the prospective buyer finds, already in place, a handsome white enamel, nickel-plated stove, with oven heat regulator attachment, and a 125-pound capacity refrigerator in white enamel with nickel-plated trim and hinges. It is interesting to "listen in" on the conversations that take place between different members of the families that go through these houses, when they observe this kitchen equipment. Other rooms in the house are equipped with built-in furniture—the dining rooms with sideboards, buffets or china closets; the living rooms and dens with mantels and bookcases; the bedrooms with dressing tables, tray cases and hanging closets; the bedroom halls with linen closets, and the bathrooms with medicine cabinets. The fixtures in the bathrooms are also of inter-

est—built-in tubs, sanitary washstands, shower baths, and built-in medicine cabinets.

Perhaps the last word in the completeness with which these houses are sold is to be found in the landscaping. The sale price of each house includes the services of a care-taker or gardener for the site for two years. This is to insure each owner getting the right kind of surroundings for his house. This is another move toward producing a well designed, harmonious community. The landscaping is being done by a local concern which assumes all responsibility for producing attractive lawns and gardens.

The Jos. E. Jones Co., is financing their project mostly with their own money, but the development is carried on with a local bank as trustee. The houses will sell from \$23,500 up to about \$30,000. A good sum for "speculative" houses, to be sure, but, as the wife of one prospective buyer said, "Look what you get for the money, a house, a double garage, a gardener's services for two years, tile kitchens and baths . . ." and she went on to enumerate a host of desirable features of the houses.

It takes and will take salesmanship on the part of the Jones organization to sell 54 houses averaging over \$25,000 a piece, but the Jones brothers have no doubt about their ability to turn the trick. They are using quarter-page space in the Saturday editions of one of the Chicago daily papers which reaches the better class of readers, and pages in the local papers, to "tell the world" what they are offering. The result has been a constant stream of



The living room wall light fixture

visitors to the property—a stream that is increasing every day as the houses get farther along.

Weather Profits in Building

By V. L. Sherman

Weather Conditions Have a Big Influence on Builders' Profits. Herein are Valuable Points on How to Make Use of the Services of the United States Weather Bureau and on the Character of Service Rendered

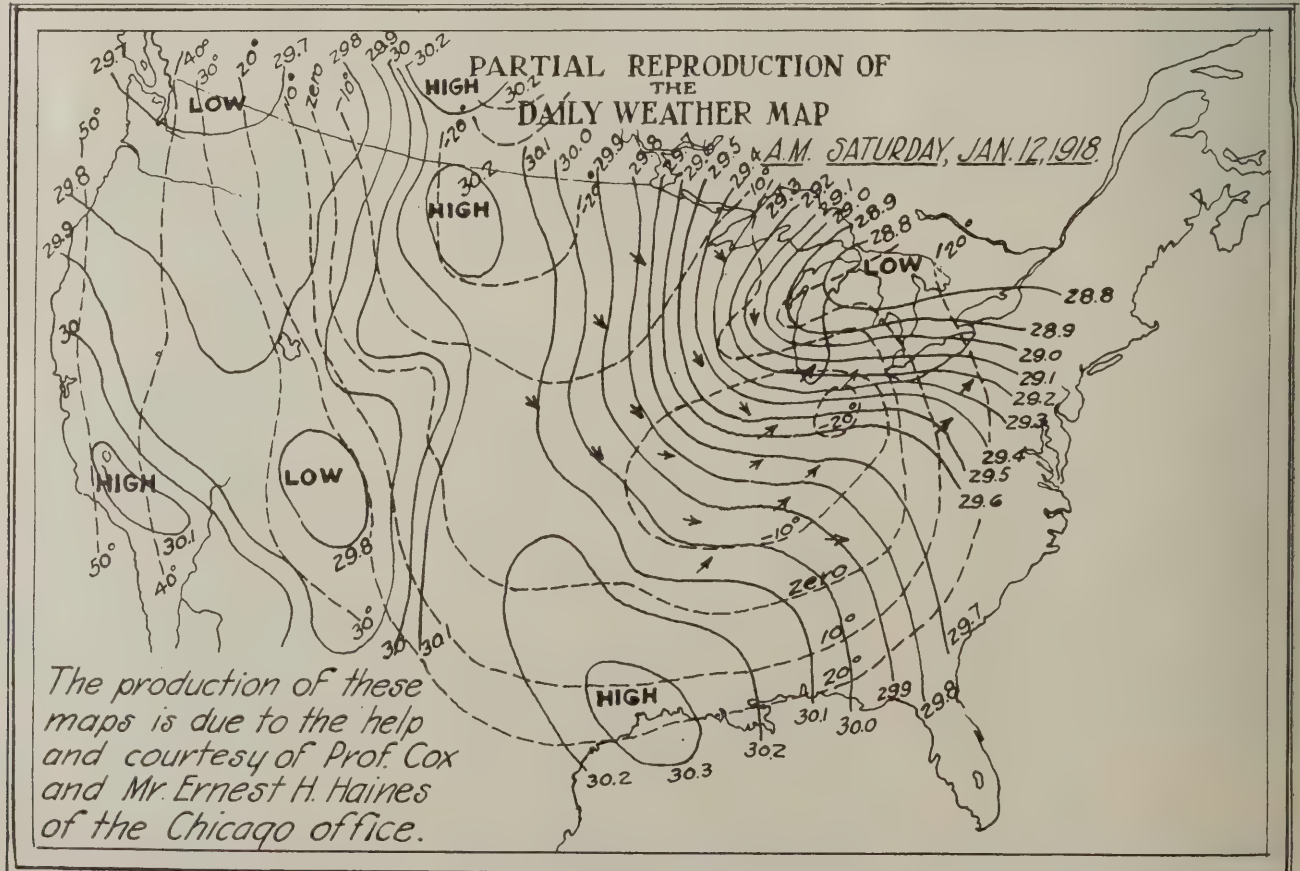
IF the builder, especially the year-round builder, would follow the daily forecasts and weather maps he would have fewer regrets after a passed mild spell, or thrown rafters after a high wind, fewer idle men during a wet season and protection against severe weather and extreme cold. If underwriters decline risks on houses with unclosed doors and windows, why shouldn't the builder protect himself, as he very well can in most cases, against both wind and rain, if given warning. Painters' work can often be arranged for minimum delay when the prospect of rain and its duration are known. Every one must take a chance, of course, but I know of four excavations for dwellings, half dug 12 days ago, that have been and are now brim full of water, and will remain full of water for another four

or five days unless they lay the sewer.

Weather the world over travels toward the east, in this country at the rate of 450 to 500 miles a day. Generally speaking, weather is affected in two ways, by high pressure areas and by low pressure areas. The "lows," or cyclones (not tornadoes), are shown on the weather-map as a more or less concentric group of isobars. The isobar (*i. e.*, equal barometer) is a line connecting points on the map at which the barometric pressure is the same. These equal barometric pressure lines are shown in the accompanying partial reproductions of weather charts. The wind flows into the "low" in a counter-clockwise direction, spiraling up from the ground and spreading in the cold upper air. Should a trough of low pressure form, the wind flows north

toward it on its approach and follows south as the barometer rises. The moisture carried up from the earth's surface condenses, forming clouds, and is often carried high enough and far enough ahead of the storm to form visible cirrus clouds. These clouds, made up of ice particles, may be so thin as to present only a glare in the sun or a light ring around the moon. Rain or snow do not always accompany a low spot, but the temperature usually rises on its approach, and during the warmer weather thunderstorms, and occasionally tornadoes, form in the southeast quadrant of the area. North of the "low" sharp thunderstorms often appear in the "break," or dip, of the barometer.

Anti-cyclones, or "highs," invert the procedure, the cold upper air spiraling down



Map of the blizzard of 1918 when severe temperature, snow, and gales tied up the railroads and business for two days

The storm with gales crossing the Lakes and cold temperature waves succeeding

Local Architects and Contractors Must Keep Up-to-Date

Must Know More About Building and Business Methods
and Find a Way to Meet the New Order of Things

HE who runs may read the signs of the time as they affect the building construction industry. More and more, the planning of modest-sized homes and simple structures is passing out of the hands of the local architect and builder into the hands of special service bureaus of one kind or another. The building work in cities is constantly gravitating into the hands of large construction organizations which specialize in certain types of building; and to some extent these larger organizations are invading the suburban and country districts.

There seems but one way for the local architect, builder or contractor to combat this form of competition. That is for him to make himself a more important factor in local business politics. He must take and read such journals as *NATIONAL BUILDER* and become better posted on matters relating to the *profession and business* of building in its larger aspects.

Co-operate with Local Dealers

The inroads local lumber dealers are making into those branches of the construction industry hitherto considered the architects' and builders' very own are best illustrated by the following extracts from some recent addresses of Theo. F. Laist, Chicago representative of the National Lumber Manufacturers Association, who said:

"The potential value of the lumber retailer as a source of disseminating valuable information in relation to building construction, plan service, and materials cannot be over-estimated. He is the one who comes in close contact with the ultimate consumer. He can dispel such notions as that there is not sufficient wood for all practical purposes for generations to come and what is more, he should be able to answer such questions of a technical nature as the average person, interested in house building, would put to his architect.

"Under the new order of things, if the retailer desires to keep pace and not be driven out of the small-house material supply business by the ready-cut-house and other mail order concerns, by contractors who carry their own supplies, and by real estate operators and speculators, he must meet such competition on its own grounds."

In regard to the mail-order ready-cut house competition Mr. Laist made the following more extended remarks:

"During this somewhat extended tour I have had occasion to discuss the subject of ready-cut house competition in many places, and have found that where the local dealers have given the matter serious study, they, instead of being apprehensive of such competition have welcomed the impetus given to home building, taken advantage of the situation and profited by the opportunity such competition has created for wider business. The progressive dealer has seen the hand writing on the wall and instead of endeavoring to continue in the old way of selling only lumber is now selling *houses* which means that his field of activity has been increased to the extent of providing for his customers plan service and, to a limited extent, the services generally rendered by architects.

"I am told that wherever the local dealers have competed against the ready-cut house they have been able, without difficulty to meet the price of the out-of-town producer. In some places there are dealers who make a blanket offer to meet the figures of the manufacturer of all such ready-cut houses."

Special Plan Service

The plan service now given by some lumber dealers extends to special drafting service. Speaking of the plan service bureau of the Northeastern Lumber Dealers' Association, which carries the usual stock of small house designs, Mr. Laist said:

"Numerous instances were cited by subscribers to this association to whom special designs had been brought, cut perhaps from some newspaper article or catalogue, asking for figures. The lumber dealer wired to the home office for complete plans and bill of materials which had to be made to order. In some cases these were finished within twenty-four to forty-eight hours from the time the order was placed. In every case, where retail dealers have combined and carried on an advertising campaign to acquaint the public with the fact that the local dealer was in a position to furnish service of this nature they have successfully met competition of ready-cut and mail order houses."

Use Local Talent as Well as Materials

The suggestion *NATIONAL BUILDER* has to make is that local architects and builders are just as much interested in meeting the dealers' problems as he is himself and they should be in such close touch with the dealers that it would be unnecessary to send away for assistance in fighting these local battles. Any architect can draw the working plans of a house from a photographic view; and any wide-awake builder ought to be able to make up a bill of materials. The floor plan may or may not be as in the original design. It may be a better floor plan, and in any event it will have the merit of being made to *suit local conditions* and the purchaser's desires. The same applies to many details of a house shown in a published picture, a duplicate of which it may be desired to erect.

It really is not very creditable to local architects and builders that lumber dealers feel it necessary or desirable to organize and give service and expert advice that are distinctly with the province of the local architect and builder. The sales efforts of the lumber dealer should supplement not rival those of the real users of his material. That such local conditions exist must be equally the fault of the local builders and architects as well as the dealer's. Why not get together and cooperate to exploit local talent as well as local materials?

Practical Suggestions in Demand

The local architect, contractor and builder must strengthen their positions in the building industry or eventually yield much of their present work to outside organizations. The time has come for co-operation and organization of the various elements within a community as well as the now universal district and national organizations of individual industries and professions.

NATIONAL BUILDER is designed to be just as much the journal of the local architect, builder or contractor as it is of any branch of the professional building field; it hopes to be an important factor in helping him to hold his own. Any suggestions and comment along this line will be more than welcomed by its editors.

The House-Building Industry as Seen by an Engineer

More Co-operation Needed Among Architects, Engineers, Builders and Realtors—
Are We Coming to Shop-Fabricated Chimneys, Whole Bathrooms, and What Not?

By **W. H. Ham, M. Am. Soc. C. E.**

General Manager, The Bridgeport Housing Corporation, Bridgeport, Conn.

Introducing the Author

W. H. Ham graduated from Dartmouth College in 1897, and in 1898 from the Thayer School (Dartmouth) of Civil Engineering and Architecture. For several years he was a member of the staff of one of the most famous firms of sanitary engineers—Waring Chapman and Farquhar, New York. In 1902 Mr. Ham became chief engineer of the New York Expanded Metal Co., and in 1906 chief engineer of the General Fireproofing Co., Youngstown, Ohio.

From 1908 to 1916 Mr. Ham was a member of the firm of French and Hubbard, consulting engineers on factory building. He then became manager of the Bridgeport Housing Company and as such had charge of all the housing property in Bridgeport, and in an advisory capacity, of that belonging to the United States Housing Corporation in Bridgeport. This work consisted of the construction of 1200 homes. He is now managing the company's houses and carrying on a consulting practice in relation to industrial building, housing developments and house-building organization.

The Bridgeport Housing Co. is a building and operating organization financed through the efforts of the principal manufacturing companies of Bridgeport. The Housing company has built and operated its own properties consisting of city villages, apartments and individual houses as well as operating those built by the government, a large portion of which were purchased by the Bridgeport Housing Co. at the close of the war. The Bridgeport Housing Co. also has a management department for properties already built, both those of its own ownership and of other ownership, and an engineering department doing professional consultation work in connection with the development of housing properties generally for manufacturing companies, and for land developing companies who are building homes for the market.

THE fundamental problems in building houses can be simply referred to as: (1) Securing building lots, (2) financing, (3) plans for houses, (4) labor and materials for construction. Everyone of these main items is affected by lack of co-ordination, and each should have most careful study by trained experts in the closest co-operation with real estate men, landscape architects and with bankers, building and loan association officials and manufacturers. There should be the closest co-operation with the best architects in the country for

development of proper house plans. Engineering skill should be thoroughly developed in the problem of building houses with all possible simplification and standardization of the labor and materials.

Lot Determines Type of House

Taking the first item, land division into house lots: Most of our cities have estab-



W. H. Ham, general manager Bridgeport Housing Corporation

lished a standard lot with street frontage varying from 16½ ft. to 50 ft.; these lots vary in depth from 100 ft. to 150 ft. When the land is thus divided, the type of house is automatically established and in most cities repetition of type with minor changes in exterior and interior becomes the prevailing form which the house takes.

There are three distinct types of single house which stand out as important in the great building era just ahead of us. In the cities which are thoroughly built up and lots are subdivided into small frontages from 16½ ft. to 25 ft. row houses will and should prevail. This house is built with

party walls and has openings only at front and back except those on corner lots.

Immediately the question of whether a city has alleys providing a service to the rear arises. Alleys have their serious objection. The history of the row houses teaches us that several methods of avoiding the alleys have been in use in some of the older cities for a long time and, in my opinion, all alleys should be eliminated.

Proper Homes for Narrow City Lots

The street front of the house should be formal with a service entrance minor in appearance to the main entrance; and the rear of the house should be developed for use of the tenants. It should be developed for use both summer and winter, so as to have complete use of the lot area in the rear. I would suggest a sun parlor built on the rear of the house leading to a garden, however small in area. This layout would apply to all of the houses built on lots 20 ft. or over in street frontage.

Smaller houses built on the lots from 16½ ft. to 20 ft. are handicapped by lack of space for proper room division and, in most cases, have been used for a house with a kitchen-living room at the rear. My feeling is that the minimum depth for proper subdivision of lots is 20 ft., and that some special form of building should be used where division is into smaller lot areas.

The Detached House

The second type of single house which has a very large and important place in the building program is the single six-room cottage type, built on separated lots, usually with from 30 ft. to 50 ft. of street frontage. In our smaller cities where land values have not advanced, this is the most important house for future consideration.

Streets that are thoroughly built up with houses having a frontage of from 30 to 50 ft. have little in front of the house which can lend to the individuality of the family except the architectural treatment of the house itself, and it is my opinion that the grounds of such houses should be developed with a view to the neighbors' grounds, so as to harmonize the whole street front-

age into one continuous planting area.

The introduction of the piazza on the front of the house in most cases is wrong. Here again, the formal entrance with a minor or diminutive porch sufficient only in area to accommodate visitors for a brief period, and the complete development of the rear lot into private garden, and a sun porch where the exposure is correct, or a side porch for reaching the proper exposure, would be very much better than a continuous row of piazzas, so often built with clumsy incorrect architectural lines, disfiguring to the architectural development of a street.

History of houses in America would indicate that the piazza is of recent origin, and that the terrace overlooking the garden in the rear has many examples where values have been retained for over a century. The French home knows no other layout. English gardens are the accepted thing. The American piazza is passing and those who are building for future values should recognize this and either build the "living-out" room or sun porch at the side or rear of the house. When this is done the whole landscape of the area lends itself to more complete and simple treatment.

Rear gardens are private personal enclosures and should be enclosed with hedge, fence or wall, depending upon the exposure and the kind of land. In this garden can be grown the perennial and annual flowers, some small garden vegetables, vines and dwarf trees. In the front of the house on the lawn flowering shrubs, and, where no nuisance from smoke obtains, dwarf evergreens. Street trees complete the planting. We have then a whole city divided as a shrubbery garden in front of the houses and flower gardens and small vegetable gardens in the rear.

Placing the Garage

So far, nothing has been said of the automobile and its garage. In the city of Bridgeport 2000 automobiles stand out without any garage at all, principally for the reason that there is no plan made for location of a garage on the house lot and there is insufficient area for a driveway at the side of the house, the regulation calling for 5-ft. clearance from lot line, unless two adjoining owners combine many houses cannot have a garage at all.

In laying out the house lot of the future the garage is exceedingly important and should be considered thoroughly. The one-car garage can be built very economically and sufficiently complete for the storage of a car. It can be heated with the house if built adjoining the house itself. The architect should dictate the form of building, but many successful simple, flat-roof structures have been built. These simple buildings can carry lattices or vines and become a part of the house without any disfiguring effect, if their placing is carefully planned in advance.

In the more pretentious buildings the tendency toward building the garage as part of the house is more marked and there is no doubt whatever but that the introduction of the same principle in the small house will prevail because of the economy and simplicity of the building and the elimination of an outbuilding inferior in quality to the house which it disfigures.

The two-car garage really does not naturally accompany the small house, but has similar characteristics to the single-car space and can be very well treated in connection with the house itself. The most economical entrance, of course, is directly from the front. Where the land area is large enough the entrance from the rear

Two Extremes

Mr. Ham's vision of the future of house building in large groups is in striking contrast to the views expressed by Mr. Dunlop in his article on the Guild System of building organization, now developing in England, in the July issue of National Builder.

In considering both views it should be borne in mind that a great amount of house building is done in the smaller cities and towns by builders and contractors who do a very modest amount of building per year, and that present methods of handling the work in the country as a whole are certainly in no immediate danger of being revolutionized in either direction.

—Editors.

has been successfully developed and should be considered.

Dividing the Front and Rear of the Lot

I believe there should be a division between the front or public part of the lot and the rear or private part; and many different types of division should be considered. Among the simplest is the lattice which carries vines, the wall which also can carry vines on both sides and the simple fence or hedge. If the lattice is used, an archway in the lattice can be arranged so as to have the entrance to garage inconspicuous and a part of the landscape work.

Out-House Storage Facilities

The great American home of the past generation has many references in it to the woodshed which was an active part of the home life of the country people. This was a storage space for the fuel used and every American boy of the past generation had some controversy with his father in the woodshed. With the use of coal for heating and storage of this material in the

cellar, there is very much less demand for a space outside of the house for storage than in the old-time country homes, but this demand is not entirely eliminated and there should be a space set aside for the storage of children's toys, accumulated rubbish (which is to be taken away presumably by the city collection department) and the variety of household necessities most conveniently stored in some definite space where they will neither clutter up the backyard nor disfigure the formal front of the home.

One very simple arrangement which has been successful is to develop a clothes yard behind a lattice between the house and the garage. The garage is placed with its front on the same line as the house, space between the garage and the house being paved and screened from the street with a lattice covered with vines, and from the garden with the same form of lattice work. Entrance to the rear of the house being through the gate in the lattice, this open space, either covered or not, is open area for storage and becomes very useful with the small home on a limited land area.

The Two-Family Type House

The third type of house which has a very important influence on the home life of the people, and is in many cities a very important part of the building program, is the two-family house. Usually, it is arranged with flats having individual entrances for each family. Such a building should not be placed on land less than 50 ft. wide and should be very carefully studied for individuality of entrance and separation of the families, and, of course, should be built with sound-proof floors and double equipment throughout.

The advantage of the two-family house is not so apparent as in previous years because of the increase in the cost of building, lowering the value of the two-family property as an investment, and the great demand for money in other forms of investment. This brings the average citizen into touch with many forms of security in which his money can be invested to very much better advantage.

However, the type still prevails and should have the closest attention according to its requirements. The two-family house with its two garages, its two gardens two clothes yards and two piazzas as now built leaves very little on the lot, if 50x100 ft., which can be used for anything except the smallest kind of a flower garden. My own opinion is that this type of building has so many disadvantages that it should be discouraged.

Single-Family Type Best for Most Conditions

The American home should be the single type of house, either in row type or individual, where land values are low enough to allow each family to have sufficient land for

its own home, and where land values have advanced beyond this figure the multiple family house or many varieties recently developed should be considered.

The Multiple-Family House

It is this multiple-family house that requires the most careful study by the engineering profession, architects and financiers, and we could and probably will work out a suitable form of ownership, which reaches down the scale to our lowest paid industrial workers. My own personal belief is that we will very soon arrive at a solution of this part of the problem by the development of a form of ownership different from the fee simple ownership of the land and buildings. I believe this form of ownership will have in it a means of progression from very limited early part ownership through the period of accumulation of savings to the fee simple ownership of one of the other types of homes, without loss in investment; but this is a great problem and not a part of this article. I only refer to it here as applying to that area of land in our cities which has advanced beyond the value which is suited to occupation by the individually-owned house, either of the row type or the individual type.

The Financing Problem

Referring to the financial problem before us in our great building program ahead, I stated in a paper read before the Massachusetts State Chamber of Commerce that our financing of homes was in practically the same situation as our agricultural financing in New England. In our great industrial cities, and in the small ones as well, the banker who handles the money accumulated by the people will say to you, "I am not interested in real estate; it does not pay." The manufacturer will say the same thing, especially if he has had any experience in the housing of his employes. The merchant will say, "I am not interested."

We have then before us a problem in which the three fundamental dictators of industry, the banker who finances everything, or guides its finances by his advice and influence outside of his own field, the manufacturer who creates wealth with which to finance, and the distributor of the manufactured articles, have all three abandoned the building field because it does not pay. It often leaves the financial side of building homes in the hands of those who are determined to take every advantage of the tight money situation.

The reason for this lack of interest on the part of the banker is very simple. The tremendous number of securities on the market available, in small denominations, for investment of everybody's money, is in direct competition with the building of homes; and the careful analysis of financing back of these securities is so much

better than that which has guided the money side of the home-building problem that the house investment, even with the present high rents, is at best a very poor one.

The great problem of financing homes should have the closest attention of bankers, manufacturing executives and commercial retailers. Every one of these influences should be brought into the home finance problem in such a way as to take a fair share of the burden of the investment, bad as it is, and I would go so far as to say that every bank should develop within its organization the means of obtaining thorough classified information on the subject of financing of homes and have this information available for all of its customers.

Every manufacturing concern in an industrial community, in my opinion, should set aside from its earnings each year a certain amount of money, based upon its payroll, for investment in some form of building fund as, for example, the paid-up shares in building and loan associations or for investment through trust companies and banks in mortgages or in an operating housing company. Every successful retail store should set aside a certain percentage of its earnings for investment in homes, in some form or other, for it is the clerical force in the stores which finds the home problem one of the most serious to contend with.

Engineering Studies to Be Basis of Financing

It is very evident that the financial development of the great industries of this country have learned to depend upon scientific, thoroughly studied engineering reports and no great industry has ever gone forward without careful engineering investigation. The housing problem is a great and important industry and should have its engineering side fully developed so as to bring home to banking interests, manufacturers and merchants exact facts which are now lacking, and which are hidden behind a great deal of doubt as to values; and, what is worse than doubt of values, is the present morality of the building trades. The engineering profession from its foundations is based upon integrity. Facts are facts with the engineer and are so recognized in the financial world because of this fundamental schooling back of the engineering profession, and it is for this reason very largely that financial houses turn to the engineer for an examination of the case before any investment is made.

The engineer is needed in connection with house planning for all kinds of homes, with the introduction of water, gas, electricity, heating and many other mechanical devices which are to be installed in the homes of the future. The engineer has been called upon to lay the street mains, sewer, water and gas and determine in advance the required sizes for development of the city, proper materials for a long-

time use and regulations governing the rights and privileges of citizens who are land owners in connection with these public services.

The great question has always been: Why should the engineer stop at the point 5 ft. outside of the wall of the building and allow the remainder, which is the most intricate and quite as important a part of the whole intricate system of planning, to be carried out by other men, not especially trained.

"What is the architect's function," is naturally the next question. The architect's training at the schools of architecture in America and those abroad, where many of our best architects are sent for their finishing courses, is to provide a form of beauty with the structure that they build. The best architects recognize this and employ engineers, either in their own offices direct or through consultation with engineering firms, to carry out that portion of their work which is manifestly within the engineering field.

But the small house, which is our great problem, the individual home for the average American, has often been left without either architect, engineer or financier. The great question, of course, is who is to pay for this professional service. The individual small house cannot have this individual care. It must have the study made by groups, and it is this group study of the problem that will command the closest interest of the engineer.

What the Engineering Problem Consists Of

The engineering problem in connection with the building of ordinary houses, for the great class of home buyers who must of necessity purchase on the installment plan, has just begun to be studied; and a few examples of successful results where the engineering work has been done with care warrants the conclusion that the engineer is primarily suited to the construction end of the problem, and that the architect must dictate the style and provide the design. The architect of high standing cannot give his time to the construction items and is not properly trained to carry out this part of the work.

It is only when the engineering profession takes hold of the problem as it has the great problem of transportation, factory construction, sanitation of cities and road building that the lending institutions will look upon housing investments with favor.

When the work is properly co-ordinated, simplified and standardized those of us who have studied deeply into the subject anticipate that many improvements in methods of construction will prevail, a better relation with labor developed, and a more harmonious result obtained.

I venture to prophesy that a very large part of houses of the smaller type will be shop fabricated in the same manner as our

structural steel is today fabricated. I look for a very large field of industry to grow up in this very item of fabrication of parts of houses.

Shop Fabrication of House Parts

Among the items which will readily yield to shop fabrication with a good deal of economy are the doors and frames, which I venture to say will be fabricated complete in a factory, probably local, in a manufacturing process so as to be shipped complete ready for use. The same is true of window frames, sash, screens, including trim inside and out, cornices of the buildings in accordance with the architect's requirements and cut, if you please, with a cutter of his own design. Various mouldings, to suit his good taste, will be made and sold complete ready for installation including all members outside of the square building line. Dormer windows and interesting bay windows, having the best detail of architectural study, can be manufactured in the shop complete ready for installation at tremendous saving in cost.

The foundations of buildings should be made in a foundry, cast hollow, shipped to the job complete ready for erecting with the manufacturer's truck and setting derrick, to be erected by the manufacturer in an incredibly short time. These hollow castings, of concrete, can be filled with local heavy materials from the building site, for the added weight required. By the shop-fabricated method, the chimney of the average house can be built of reinforced concrete, including the flue lining of tile, and erected in much the same manner as a heavy telephone pole is now, handled by men familiar with this class of work and with a simple, proper, strong rigging attached to a motor truck.

Let us draw on our imaginations a little further and say that the plumber co-operates and allows his portion of the work to be simplified, standardized and fabricated at his shop so that all parts of the piping system are cut to measure by machine and fitted when carried to the job, because a templet is used in the layout and standard equipment planned for. Carrying this rather difficult matter of imagination to its logical conclusion would lead to the construction complete of the bath room itself from the floor to a low wainscot line in a shop of foundry, and this completed part of the building transported and erected by a simple derrick arrangement, much as a piano is handled, for the weight will be comparable and the size a little larger, thus making of this intricate and troublesome portion of the home construction a product of shop manufacture, available at a tremendously decreased cost.

Fabrication is a word made forceful by the engineering profession. I have on the authority of one of the largest lumber manufacturers in New England an estimate of the possible saving by fabricating

such items as doors and trim, windows with their detail and equipment of approximately 50 per cent in cost. I have no doubt that the whole house will yield at least $33\frac{1}{3}$ per cent by the fabricated method and, at the same time, furnish the opportunity for the mechanic to work continuously in doors, under shop conditions, and become a fixed citizen in a community

instead of a wandering workman dreading the completion of the job for fear of a gap in employment, and the necessary sacrifices which his family will have to make during this interval. Rain and snow will have no retarding influence when we fabricate our buildings indoors, ship them to the job and erect them with properly trained men.

A Useful I-Beam Chart

HERE is an I-beam chart that tells all about I-beams almost at a glance. It is much quicker than a table for solving many problems, such as are met almost every day.

I-beams are very much used these days and will certainly be used more and more. They are useful for all sorts of supporting work—for holding concentrated as well as for uniformly distributed loads. The

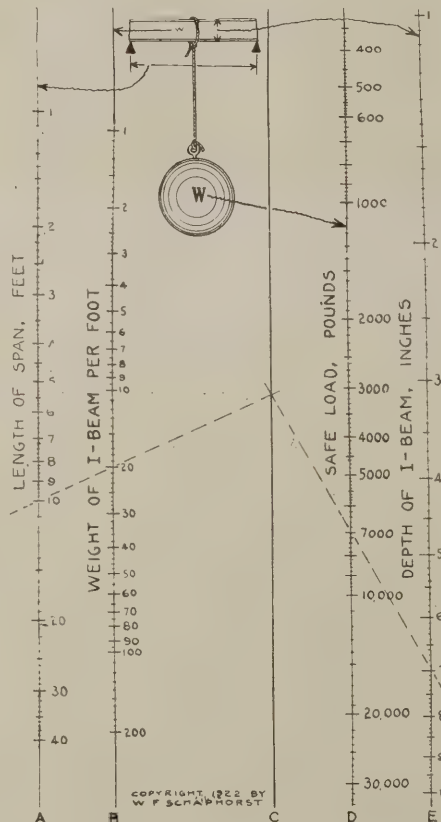
The wavy arrow lines running from the sketch to the vertical chart lines show at a glance just what each chart column means. Thus column A gives the length of the span in feet and includes all lengths from one foot to 40 feet. Column B gives the weight of the I-beam in pounds per foot and includes all weights from 1 lb. to 200 lb. Column D gives the safe load of the I-beam in pounds and varies from 400 to 30,000 pounds. Column E gives depths of beams in inches from one to ten inches.

For example, to show how the chart is used, let us suppose that a weight of 4,000 pounds must be lifted. A seven inch I-beam weighing 240 pounds is available. It is 12 feet long and therefore weighs 20 lbs. per foot. The minimum distance between supports that can be obtained for the lifting operation is ten feet. Is the I-beam strong enough to lift the 4,000 lb. load?

The dotted lines drawn across the chart show how the problem is solved by means of the chart. Run a straight line through the ten foot mark (Column A) and the 20 lb. (Column B) and locate the intersection in Column C. Then from the intersection in Column C run over the seven-inch (Column E). The intersection through Column D shows that the I-beam will support 7,000 pounds. Since the load to be lifted is only 4,000 lbs., the beam is amply strong. In fact, the reader can easily find by applying the chart that a four-inch I-beam, all other conditions being the same, would safely support the load of 4,000 pounds.

Similarly, it is easy to ascertain the maximum allowable span when the factors in Columns B, D and E are known. Or, the necessary weight per foot of I-beam may be determined when the factors in Columns A, D and E are known. Lastly, the depth of beam is determinable when the factors in Columns A, B and D are known.

For loads that are "uniformly distributed"—not concentrated—the safe loads in Column D may be multiplied by two. Thus, the above described beam will support a uniformly distributed load of 14,000 pounds, or 1,400 pounds per running foot.—W. F. Schaphorst, Brick and Clay Record.



I-beam is the lightest and most economical steel beam for most purposes.

Chart to Determine Safe Bearing Load of Beams

Inasmuch as a concentrated load, as shown in the sketch, represents the very worst conditions, requiring the largest beam for the given load, this chart is based upon concentrated loads for the sake of safety.

National Builder Style Sheet



No. 1—One of the homes of M. H. Holmes, in Evanston, Ill. See article and plans on pages 42-45. A splendid example of how a small house can be as attractive and inviting as a large house



No. 2—A sun parlor can be made one of the most livable rooms in the house the year 'round and it need not appear as an after-thought stuck onto the house. A detail of the doorway of this house is shown on page 41



No. 3—This house and the one below afford an interesting study in wide projecting eaves. Here a pleasing, umbrageous effect is obtained by omitting the cornice return. The house is well proportioned and the casement sash add to its beauty



No. 4—In recent years this style of house has become immensely popular in Chicago and its environs, where it originated. The woodwork is stained dark brown and the stucco is light brown



No. 5—One of the houses built to sell by the Jos. E. Jones Co., in Oak Park, Ill. See article, plans and other illustrations on pages 17 to 26



No. 6—The gambrel roof house is enjoying a deserved popularity. Here is a beautiful design, covered with shingles stained a gray-green



No. 7—Two small houses, this one and the one below, show what charming effects can be produced with just ordinary, rough-sawn boards. Both are stained a gray-green



No. 8—A remarkable sense of proportions and commendable restraint in the handling of the details of this little house at 55 Quick street, River Forest, Ill., are shown by its designer, owner and occupant, A. J. N. Duclos. A plain verge board marks the roof line on the gable, where there is no projection



No. 9—Home of Miss R. M. Kavana, in Oak Park, Ill., said to be the first house designed and built in America by Lawrence Buck, a Chicago architect, who is an Englishman by birth and training. A detail of the entrance is shown on page 41



No. 10—A house with Colonial details but which lacks the characteristic symmetry of the Colonial house. Ten-inch siding has been used on the exterior with asphalt shingles for the roof



No. 11—Another example of the beauty of wide eaves when properly handled. This feature, the slight overhang of the second story and the stained shingles and boards of the exterior suggest the Swiss chalet type of house



No. 12—A porch like this gives some privacy, yet it is open enough to be cool on hot summer days. This house owes its attractiveness to its simplicity and good proportions. See floor plans, page 41. The design is by the Southern Pine Ass'n



No. 13—An attractive treatment of a one-story house in which the rooms are rather spread out. Issued by the Southern Pine Association. See floor plan, page 41



No. 14—A house deriving its inspiration from the mission style of California and the Southwest. The square lines and flat roof, with an occasional round head doorway, window or wall opening and bits of ironwork are characteristic of this style



No. 15—A well proportioned square house with attractive details. A "close-up" of the entrance appears on page 41. The use of brick in the porch and for the window sills is good. The stucco is gray and the blinds are painted a pea green

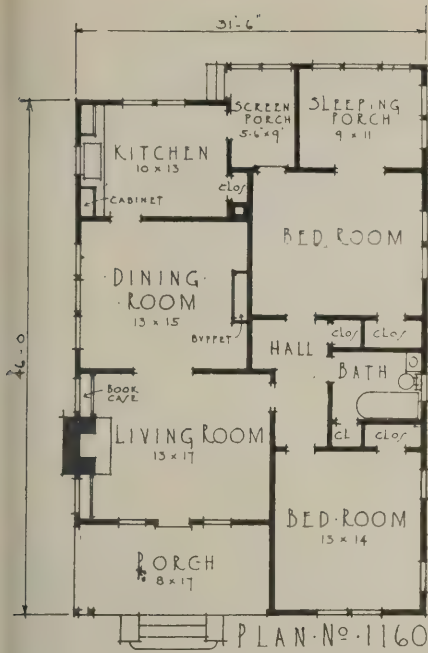


No. 16—No, this house was not built in California, but is to be found within a block of Lake Michigan on the north shore of Chicago. The stucco is a light buff with dark red brick trimmings and a red tile roof. Note the round-head doorway

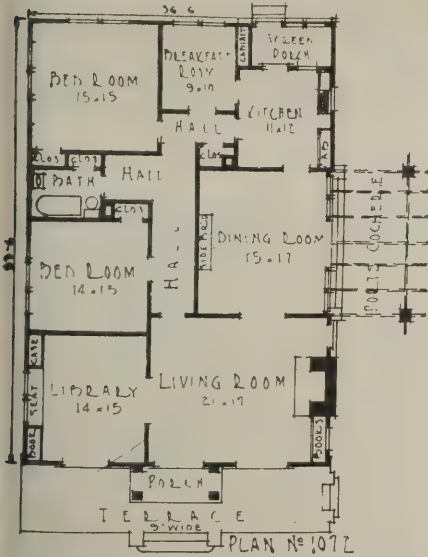
Some "Close-Ups" of Doorways

SOME of the houses in the Style Sheet of this issue have unusually attractive doorways and a few of them are shown

has a beauty that often makes it well worth its additional cost. The round-head doorway must, however, be carefully used. The designs shown cannot be adapted to just any house. If they were, they would appear woefully out of place in a great many instances. For example, take the doorway of Mr. Buck's house shown as No. 6 on page 35. This same form has been used on another house in a nearby community with as deplorable an effect as Mr. Buck's doorway is charming. This is all because the builder of the second house



Floor plan of house No. 12 in Style Sheet reproduced by permission from "Modern Homes," published by the Southern Pine Association, New Orleans, La.

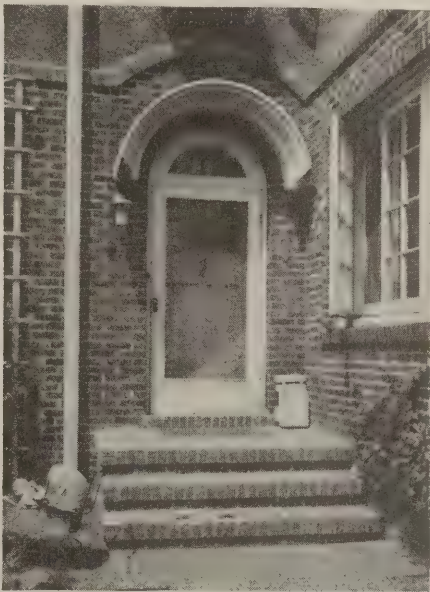


Floor plan of house No. 13 in Style Sheet reproduced from the same source as above

"Modern Homes" is a 60 page brochure issued and copyrighted by the Southern Pine Association showing a variety of small houses with floor plans and sent free on request or through lumber dealers.

Zoning Primer

A ZONING primer has been made up by the Advisory Committee on Zoning appointed by Secretary Hoover. This can be procured for 5 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.



Entrance to house No. 2, page 33, showing the effective use of a small protecting hood

here in large size so that their details can be more closely studied. It happens that all the doorways on this



Doorway to house No. 6, page 35. An open trellis is above it. Note the hinges that extend across the entire width of the door

page are of the round-head type. Such an opening is more difficult and more costly to build than the square-head type, but it



Doorway to house No. 15, page 40. Here the door is well sheltered from the sun and rain

simply copied Mr. Buck's details without attempting to correlate his doorway with the design of the house itself. An entrance must "belong" to the house of which it is a part and not look like a grafted-on feature.

The front entrance of a house is its most important single detail. All eyes center on it sooner or later and it comes under the closest observation by those who seek to enter. It should add expression to the architectural character of the exterior and suggest the beauty to be found within. Heavy brackets and large posts or columns are to be avoided if a well designed entrance is desired. A solid softwood door is to be preferred to one of hardwood veneer construction, particularly in the absence of a porch or wide protecting cover. The former will stand the exposure to heat and rain and cold, whereas the veneer of the veneered door is apt to warp and crack. The 1 3/4-inch door is best for front entrance use.

We Visit the Three Room Homes of M. H. Holmes in Evanston, Ill.

A Happy Combination of Good Taste in Design with Extreme Compactness of Space in Wee Houses Specially Planned to Fit a Peculiar Lot

FOR this Home and Housing number of NATIONAL BUILDER we have reserved this story about two delightful little bungalows to be observed by the lover of beautiful homes in Evanston, Ill.

These cottages were designed and built by their owner for his own use. The one was his "honeymoon bungalow," the other his second home, only recently given up because of his moving to California.

The builder of these little "love nests," M. H. Holmes, was the Eastern representative of the firm that his family founded in Los Angeles, the Holmes Disappearing Bed Company. The family has



Perspectives from two different points of view of the stucco bungalow designed and built by Mr. Holmes



Front view showing detail of entrance



French doors will eventually open upon a rear porch



Views from the front and rear showing the gate through the garden wall

disposed of their interest in the company and Mr. Holmes is moving back to California, his native state, where he will prob-

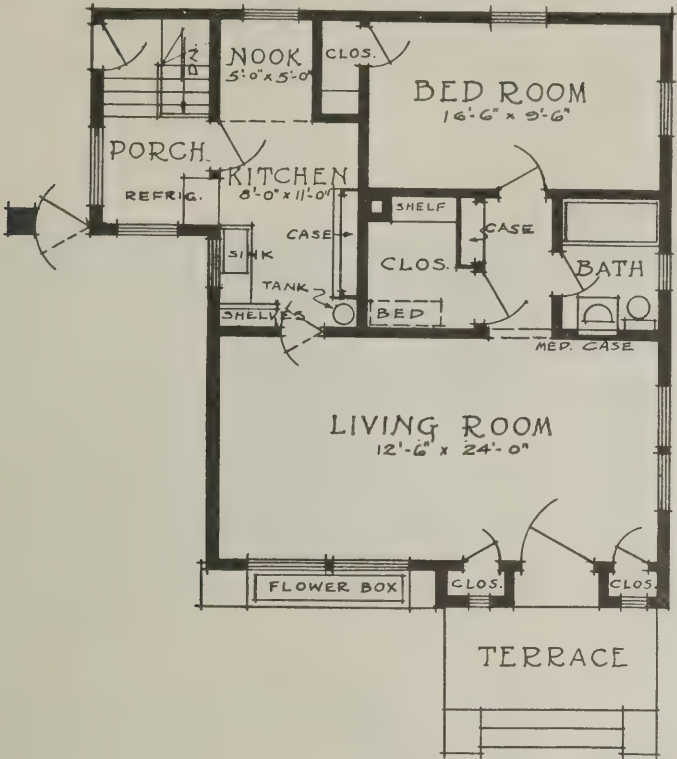
for some time in an architect's office in Sioux City, Iowa. Mr. Holmes' father before him was an architect and builder,

thing ever since the house was built. Hundreds of others she had seen drive or walk back and forth before the house and around it, wishing that they might see the inside but not having nerve enough to ask to see it, as we had and did, in order that we might tell you what the inside is like.

We went in and took pictures, and here they are, for your information, delight and study. Look at them carefully, for not all houses that look as well from the outside are so tastefully finished inside. That old secretary in the living room is a genuine antique, inherited by Mrs. Holmes from an ancestor who was a cabinet maker when cabinet making was a fine art.

Now notice the plans of the houses. Did you ever see any so compact? The closet beds make every inch of every room work both night and day. At the time we called the Holmeses were housing in their three rooms, in addition to themselves, three guests. At meal times the gate leg table in the living room did double duty and became a dining table. At other times the little dining alcove is sufficient for Mr. and Mrs. Holmes, and it is much less work to keep in order.

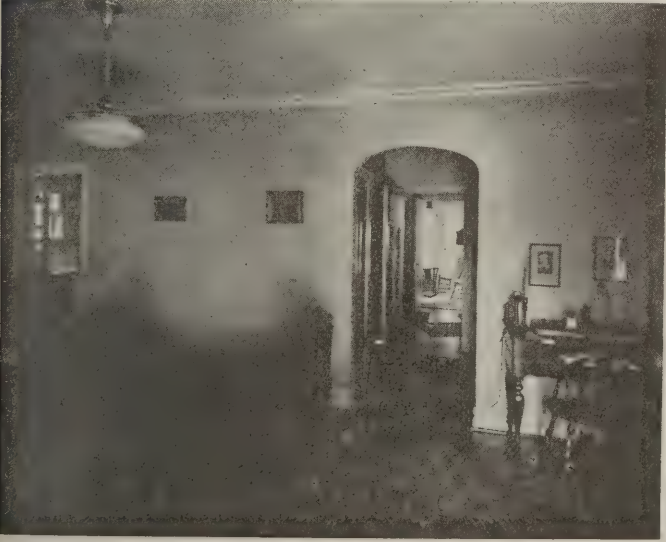
"I believe," said Mr. Holmes, in discussing the plans of his houses, "in making every room work all the time. It is as unnecessary as it is expensive to build a house with a lot of space in it that is used only now and then. Take the dining room, for example. It is used only at meals—three times a day, or a total of only about an hour and a half out of the 24. Yet it



FLOOR PLAN

ably again take up the designing and building of small houses. The phrase "again take up" is used cor-

so the constructive instinct was bred into him. His houses show that he has evidently inherited a fine sense of proportion



Looking across the living room of the stucco bungalow from the entrance and into the bedroom



The kitchen of the stucco bungalow is conveniently arranged. A small drop-leaf table in the jog in the wall serves as a breakfast alcove

rectly, for Mr. Holmes was in the building business long before he began the manufacture and sale of closet beds. At the age of 17 he was head of the building department of the largest real estate building concern in northern California, and had charge of the building of as many as 125 houses in a single year. He also worked

and form, for the good taste apparent in his designs would be difficult to acquire. It was no surprise to Mrs. Holmes the day we called, to hear a rapping of the knocker on her front door and to find strangers there asking her who was the architect and builder of her little house. Hundreds of passers-by had done the same

takes up perhaps 15 per cent of the space of the average house, and I don't think it is worth that, at any rate not to ordinary folks like us. "The day of the small house has just dawned. Already you notice in the big cities a drifting away from the cell-like apartment. People are beginning to realize

the advantages of the small house and to understand that it is within the means of anyone who really wants to live.

"Many people have had the idea that in order to build a beautiful home they have to build a large house. That has naturally suggested great expense to them. I think the opposite is true. A small house can have more real beauty and homelike charm than the most magnificent of palaces. It does not require the expenditure of a lot

of money to make a home beautiful; in fact, the less you spend the better, in the majority of cases. Ornaments on the small house are unnecessary. The important thing is that it has good proportions. Give a house that and you have insured its being beautiful. Good proportions cost absolutely nothing. Wild gew-gaws, heavy brackets which do not support anything, large, stubby columns, coarse door and other details as a rule cost considerably more than

simplicity and straightforward treatment of the architectural details.

"So many builders make a mistake in their use of wood forms particularly. They are inclined to get them too heavy. Wood is a very strong material and it is not necessary to give wooden details the thickness, heaviness or coarseness of details in stone; for instance, I had an interesting, if rather annoying experience in this matter, in the building of the front entrance



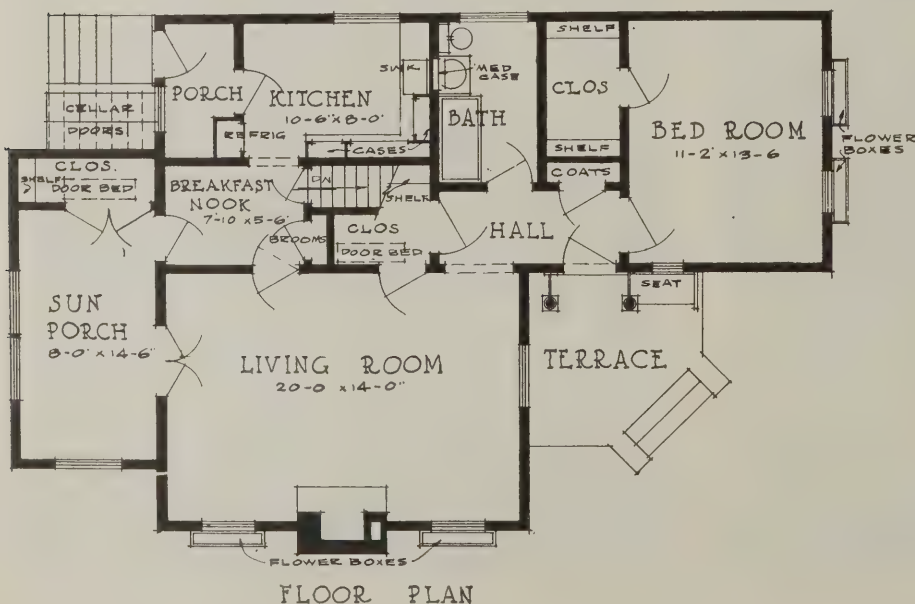
Two views of the frame house designed and built by M. H. Holmes



Detail of the front entrance



A view of the rear entrance



for the little white house. The carpenter persisted in getting his members too thick and heavy. Three times he had to do it over and I finally O. K.'d his work without being entirely satisfied with his product."

The little stucco house was the first that Mr. Holmes built and the one that he and his bride first occupied. He enjoyed building it so much that he thought he would build another, which he did. He bought the lot next to him and constructed the little white frame house, moved into it and rented the other cottage.

The property on which these houses are built is of unusual shape. It is like a piece of pie with the tip cut off, giving a frontage on the tip of only 15 ft., while it broadens out toward the back to 140 ft. on the alley. The street on which the houses face runs diagonally, and that accounts for the pie-shaped grounds. Mr. Holmes has planned and designed his houses to fit their location in the most advantageous manner.

That is one reason why the white house is in the shape of an inverted L, with the leg of the L pointing toward the tip of the pie.

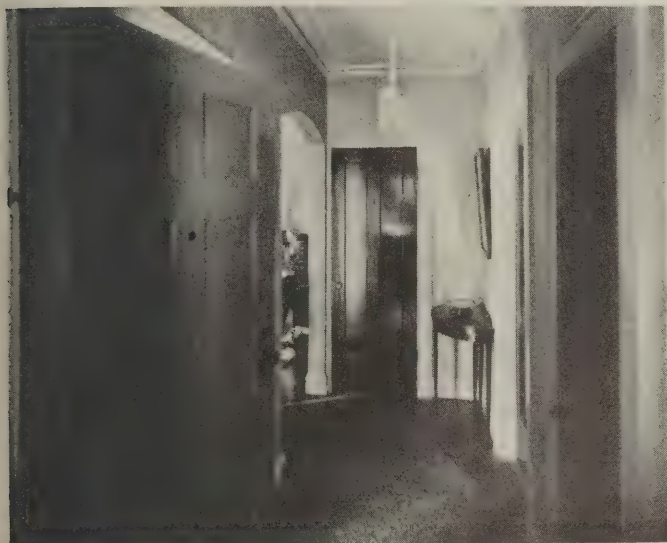
An interesting and unusual detail of the stucco bungalow is the 2x4 edge strip that encloses the roof on all sides. The roof is of asphalt shingles in a red tint. The stucco is a light gray, with the wood trim painted a dark green and the front door a light green with dark green molding. Red bricks

out to the alley. At some later date, too, an addition to the rear of the house will be built on in the form of a porch or terrace. The French doors from the bedroom and "nook" are already in place.

It would be difficult to name the architectural type to which the little white house belongs, although it shows strong Colonial influence. It is characterized by the delicate forms of the Colonial house, both in-

The roof is of green asphalt shingles and the chimney of dull red brick. Inside, the trim is small and simple in design and is ivory enameled with an egg-shell finish.

Contractors, builders and architects who have frequent calls made upon them for plans and designs for three room cottages that must be beautiful in design, full of conveniences and roomy and homelike, yet compact and requiring a very minimum of



The reception hall of the frame house, looking from the entrance to the bedroom



The living room of the little white house, looking through the plastered archway of the reception hall



The closet and closet bed in the sun parlor of the frame house



The compact kitchen where useless steps are not taken. Note the commodious cupboard

laid on edge form the entrance terrace, steps and front walk. An attractive detail of the front facade is the flower box below the living room windows. It adds a delightful touch of color to the exterior with its brilliant blooms. Provision has been made for eventually fencing off the alley, when the back door will be accessible from the street through an interesting little gate in an archway in one wall of the house that extends

side and out. The cornice is a little wider than one might expect of a pure Colonial, but notice how tastefully it is handled, with the small corbels and dentils. This treatment is unusual. The dentils, on a smaller scale, of course, are also to be observed in the entrance. A contrast with the white siding is found on the exterior of this house in the arched trellises, which are painted green, and in the blinds and flower boxes.

housework should find these homes of Mr. M. H. Holmes some suggestions of interest to their clients.

The little stucco bungalow was sold for \$9500 and the second house for \$10,500. The lots are worth between \$2500 and \$3000. These prices mean two things: first that the houses represented quality of materials and workmanship; second, that quality of design and construction were appreciated.

The Era of the Small Home

Three Original Designs in Wood, Stucco and Brick, Illustrating
a Presentation of the Reasons for the Era of the Small House

By Wm. T. Braun, Architect, Chicago

"BABSON," the statistical expert, tells us that the next 10 years will be the era of the small home, that the pendulum is swinging back to the "own your home" idea.

There are several reasons for this change in the idea of living. The automobile is bringing the suburbanite and those who reside at some distance from transportation, nearer to the city. High rents are also responsible for this change. For the real independent American, home life is impossible in a kitchenette apartment, and every family's desire is to own their own castle.

It is true that there has been considerable home construction this past year, but there is no doubt that we are still due for a number of years of a large amount of home construction.

The Small Home and the Big House

There has also been a change in the type of house wanted. People are looking for small homes. The old-fashioned 12-room house, which either required servants to keep up, or in which half of the rooms were closed up most of the time, is out of date.

Also the present cost of the big house is prohibitive.

Encouraging the Demand

In anticipation of this demand "Own Your Home" expositions have been held during the past two years. Various magazines have devoted considerable space to home building, and even the newspapers have articles at least once a week on this subject, with illustrations and valuable pointers.

NATIONAL BUILDER, realizing this need and knowing that especially in the small town the public depends upon the builder to supply this demand, is devoting considerable effort to help the builder solve the problem.

The Successful Home

The successful home must be correctly designed. This does not mean exterior only, as the plan is even more important.

The home should express the individuality of the owner. No matter how small the home is there should be something in the design to reflect the owner's personality. In bringing his friends to his home he should feel proud to say, "This is my home." The initiative and individuality of the average American citizen has been responsible for the failure of large housing groups in this country, such as they have abroad. In order to get this individuality in the house you must spend sufficient time with the prospective

owner. Study his requirements, let him bring in his sketches and plan books. It is true that he will have some ideas which must be cast aside, but the diplomatic builder will grasp the main ideas and incorporate them in the design.

The exterior must be attractive. Make it pleasing and simple, and not a lot of gingerbread and false work. Express the material used. If it is stucco, make it look like a stucco house. If face brick is too expensive, common brick laid up in a good bond with colored mortar is attractive.

To get attractive designs, make use of the services of an architect who knows small home building. The architect is trained in all of the above points in design and can get better results with a smaller outlay than the builder whose main business is to construct. By having the design attractive you will be able to sell for a higher price. The additional amount that you will get will more than offset the architect's fee. You will also have the benefit of the architect's experience and he may save you quite a few dollars.

The Plan

In deciding on the plan, it is very important to have the proper exposure for the various rooms. Living rooms should be given a south exposure if possible. It is also very pleasant to have the morning sun in the dining or the breakfast room. Try to keep the kitchen away from the west, so that the housewife, in preparing the evening meal, will not have the intense heat of the sun in summer, in addition to that of the kitchen. Locate the windows to get cross drafts through the rooms and the house, and also to take advantage of the prevailing winds.

Having decided upon the proper exposures, make the plan as simple and as efficient as possible. Arrange to have the working parts of the kitchen conveniently placed, putting most of the storage space in cabinets rather than pantries. You will have some good sales points in the modern kitchen if you give enough time and attention to the planning of the kitchen, along modern lines.

Provide a real living room, large enough, pleasant and so arranged that it will serve its real purpose. The living room is the keystone of the entire home.

The porch should be so constructed that it may be glazed or screened in. Many

times the owner would like to do this in his spare time.

The modern tendency is for larger bedrooms with cross draft possibilities, eliminating the additional expense of a sleeping porch. Plenty of closets should be provided and cut out the long halls and other space wasting features.

The Construction

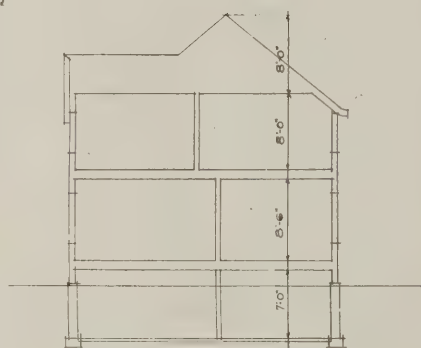
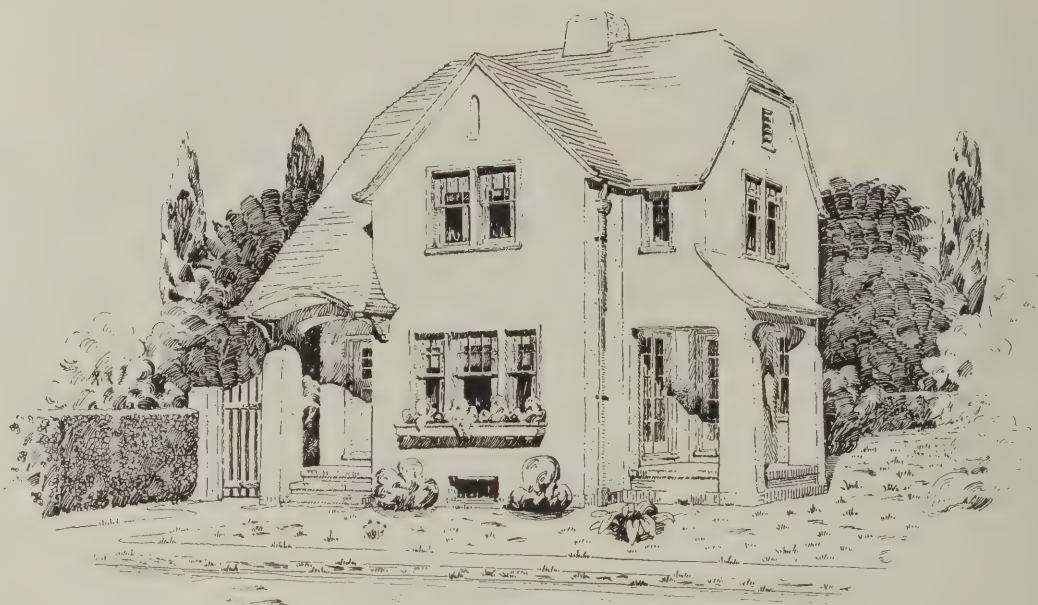
Considerable money can be saved by using stock sizes of timber and various materials, and fixtures, but be sure to have them of good quality. Set out to make a reputation on quality rather than cheap prices. It will probably take longer to build up a reputation of this kind, but if you want to stay in the business it is the only kind to have. By efficient handling of the job you can save on your cost. If you are building to sell call attention to the good points in the construction and invite inspection of the homes during construction.

You will have to spend some time convincing people regarding the costs, but if you are patient and draw comparisons with the increased cost of building and the increase in other necessities of life you can convince the prospect. Your prospective buyer has probably not built for ten years or more and is still thinking in figures of that time. He has been made gradually to pay more for the necessities of life, and it is only natural that the increase in cost of construction from the time he last built will require plenty of explanation. There are constantly new methods of construction being introduced, and it pays to investigate these and see where they will bring a reduction in cost or result in better buildings.

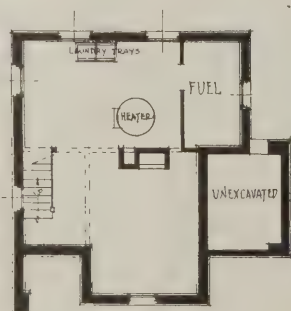
Some builders make the mistake in just completing the house proper, and leaving the surroundings looking like a junk pile. Install the necessary cement walks. Bring the lot up to grade or terrace it, whichever may be necessary, also a few dollars invested in shrubs, etc., will add considerably to the attractiveness of the house.

Homes Illustrated

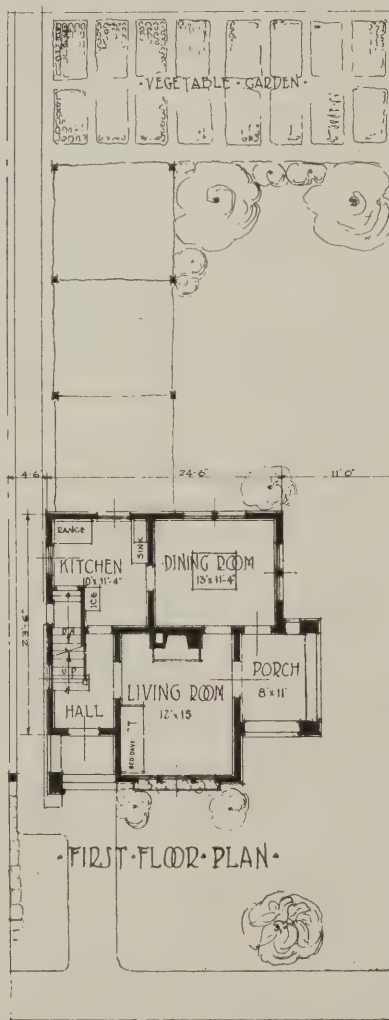
In the three illustrations accompanying this article the above mentioned points are well brought out. The exterior of these houses express the material of which they are constructed. The designs are attractive, and, while the houses are small, there is dignity and charm about them which has



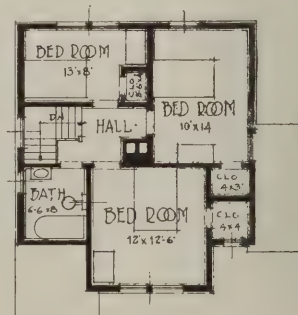
• CROSS SECTION •



• BASEMENT PLAN •



• FIRST FLOOR PLAN •



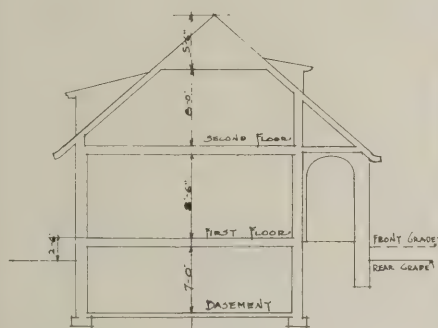
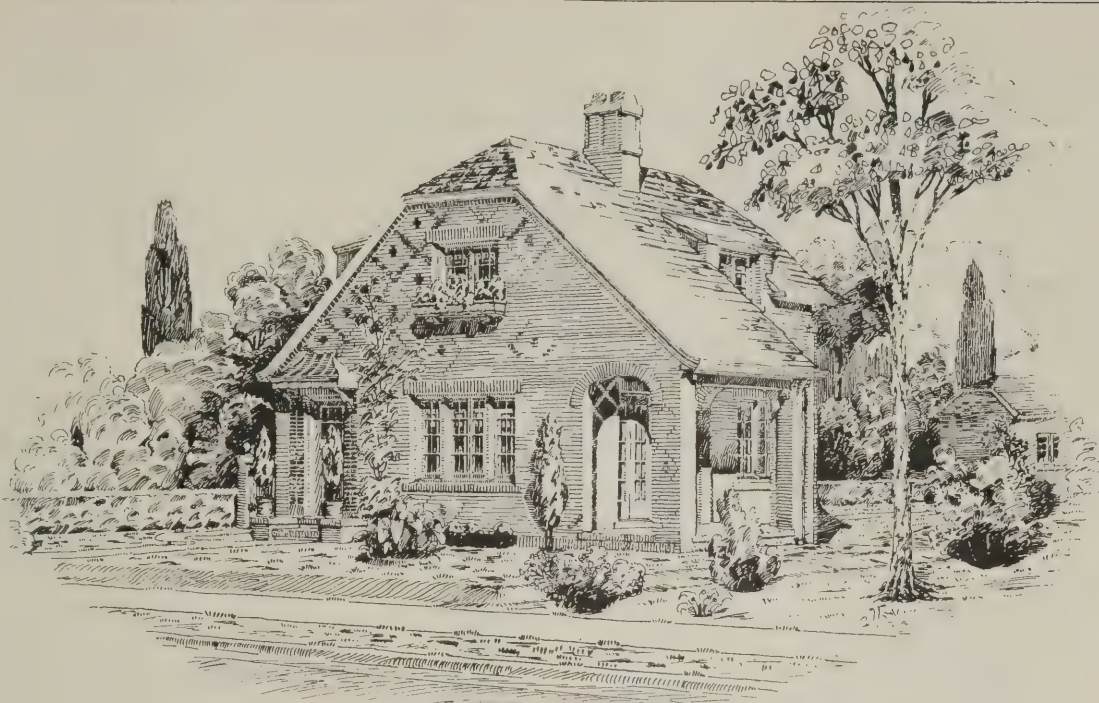
• SECOND FLOOR PLAN •

DATACUBICAL CONTENTS

MAIN SECTION	23'-6" x 24'-6" x 28'-6"	16453
FRONT SECTION	4'-6" x 13" x 26'-6"	1550
LOGGIA AT ENTRY	5' x 7" x 19	665
PORCH BEYOND HOUSE	3' x 12' x 16	576
TOTAL CUBICAL CONTENTS		19244 CF

MATERIALS & COLORS

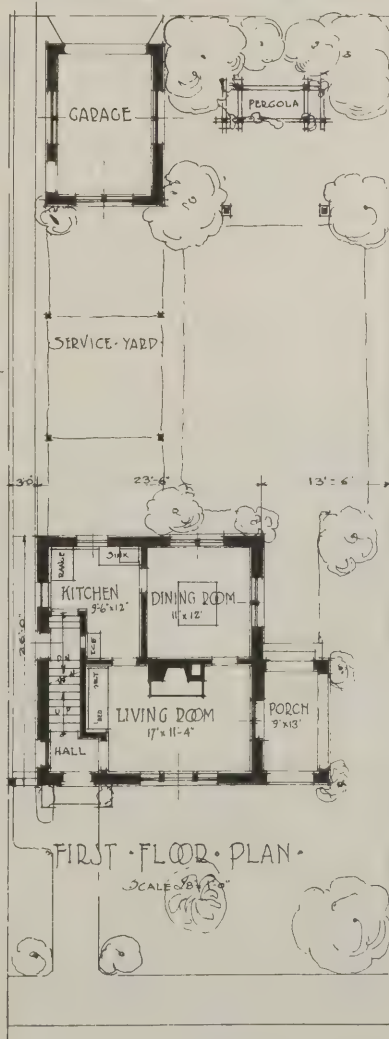
STUCCO BUFF COLOR
 TRIM AROUND WINDOWS TOBACCO BROWN
 SASH & OTHER TRIM WHITE
 BROWN WIRE CUT BRICK BASE
 BROWN STAINED SHINGLE ROOF



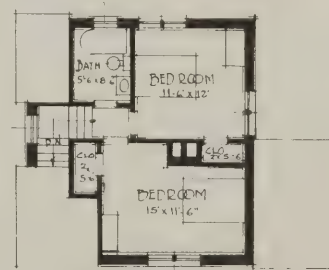
•CROSS SECTION•



•BASEMENT PLAN•



•FIRST FLOOR PLAN•



•SECOND FLOOR PLAN•

DATA

CUBICAL CONTENTS.

HOUSE AREA 23'-6" x 26' - 611'

AVERAGE HEIGHT 25'-0"

HOUSE CONTENTS 611 x 25 = 15275 cu

PORCH CONTENTS 9 x 13 x 16 = 1/2 = 936

TOTAL CONTENTS

16211 cu ft

COLOR SCHEME:

STIPPLED FACE BRICK FULL RANGE COLOR

DARK HEADS IN DIAPER PATTERN

VARIEGATED SLATE ROOF

CREAM PAINTED TRIM

•FIVE ROOM BRICK HOUSE•

been obtained by eliminating sham and gingerbread work and keeping the window openings and doors in good proportion.

The four room frame house is Colonial in design, which is the best style for a wood exterior. The stucco and brick houses are modern in design, the close cropped gables suggesting the English country house.

The plans have been designed with a view toward efficiency in house work; stock sizes of lumber can be used; cross draft has been provided for practically all of the rooms; the halls and other space wasters have been eliminated, making the plans compact and very desirable.

The cubic contents of each house is given, making it easy to estimate the cost if you know what this type of construction costs in your locality. The color scheme is always very important. This has been very carefully worked out for these designs and is noted on the designs. If this is followed out it will result in a pleasing harmony of texture of materials and color scheme.

Flower Box Is Outside Chimney Ornamentation

IN the accompanying illustration is shown a simple but highly effective idea in ornamentation for the outside chimney, in the nature of a very attractively designed flower-box. A recessed space in the face of the chimney wall and an extended ledge underneath combine to provide a shelf for supporting the box. The flower container

itself is constructed of wood, which is painted green and then decorated outwardly with a neat lattice-like covering painted white. The chimney is principally constructed of grayish-white brick but is trimmed with dark red brick, the flower-box ledge corresponding with the latter. It will be noticed that the long flower-box beneath the group of windows to the left of the chimney is also covered with white latticing to match the chimney box.—*Charles Alma Byers.*

How to Splice Verge Boards

MANY times it is necessary to splice verge boards because it is often the case that suitable finish lumber cannot be obtained in lengths long enough to be used

without splicing. Then the carpenter wants an easy method of splicing and at the same time a method that will make a substantial splice, one that will not draw apart the instant it is subjected to a strain, such as the weight of the roof, etc.

Fig. 1 shows the very best methods of splicing a verge board. A splice of 1½ to 2 ft. made in this manner with tight fitting joints gives the full strength of the timbers, making a splice that will not open up either from the weight placed upon it or from the shrinkage of the material. The joint as shown by Fig. 1 is not difficult to make. It can be fitted with the timbers lying on saw horses or any convenient place and perfect fits can easily be made.

Fig. 2 shows the way in which carpenters ordinarily have been splicing verge boards. This is a very poor way, as the weight of

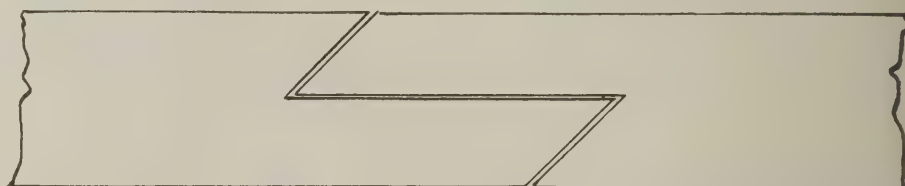


FIG. 1 THE RIGHT WAY

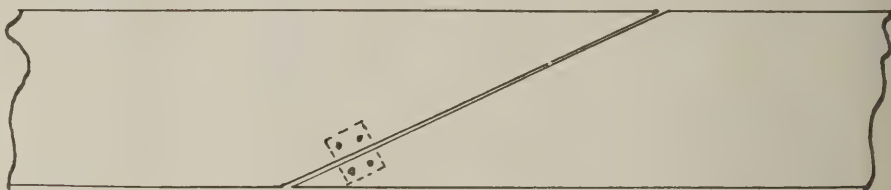


FIG. 2 THE WRONG WAY

the roof and the nailing of the sheathing on the roof is sure to make the joint draw open at the bottom edge. A joint made according to Fig. 2 can be greatly improved by nailing a strip of galvanized iron about 1½ in. wide over the back side of the bottom part of the joint. This will prevent it from pulling apart and the iron strap is placed where it will not be noticed. Dotted lines show the position of the galvanized iron which is to be placed on the back side of the verge board, but the joint as shown by Fig. 1 is the kind that stays in place without any additional support other than the joint itself.—*I. P. Hicks.*

Carborundum Tile Sales Representatives for U. S.

THE American Abrasive Metals Co., 50 Church street, New York City, manufacturer of Feralun, Alumalun, Vulcalun and Bronzalun anti-slip treads, has been appointed by the Carborundum Co., Niagara Falls, N. Y., to act as U. S. sales representatives through whom will be marketed the Carborundum anti-slip tile. This adds an important product to the line of anti-slip walkway surfaces marketed by the American Abrasive Metals Co.



A decorative feature for exterior chimney

Sanitation, Heating and Lighting of Suburban and Country Houses

By Edward E. Ashley, Starrett and Van Vleck, New York City

No. 8—Lavatories, Washtubs, Sinks

THE principal features of a lavatory are its non-splashing rim, integral water supply and the waste and supply fittings.

Basins may be of enameled iron or vitreous china and of various shapes, but they all should be provided with an anti-splash rim to prevent water from splashing out of the bowl. They should also be provided with large overflow so as to permit the basin from overflowing.

There are three types of faucets generally used for lavatories:

- (a) Compression type,
- (b) Quick opening type,
- (c) Fuller type.

We are all familiar with the regular compression type faucet which to open or close you turn the handle up or down a number

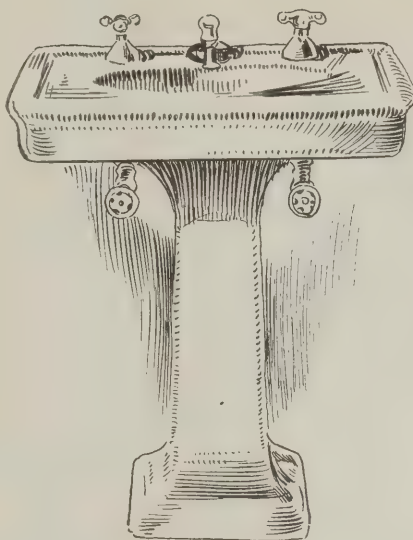


Fig. 46

eccentric permits of the wide travel, giving a free and unobstructed flow of water. It is a quick-opening valve and compares with the quick-opening compression, except that it is a little more difficult to renew the washers, as the faucet must be disassembled.

There are several types of waste and trap connections which may be used, the simplest being the ordinary waste and trap connection with chain and plug. This is by far the simplest and most economical. The next would be the "pop-up" waste, which is provided with a metal closing plug arranged on a lever and rod attached to a knob in the lavatory top, the knob being pushed down to open and pushed up to close.

In the shank passing through the slab of basin is a friction head and guide which holds the rod in a fixed position. The plug

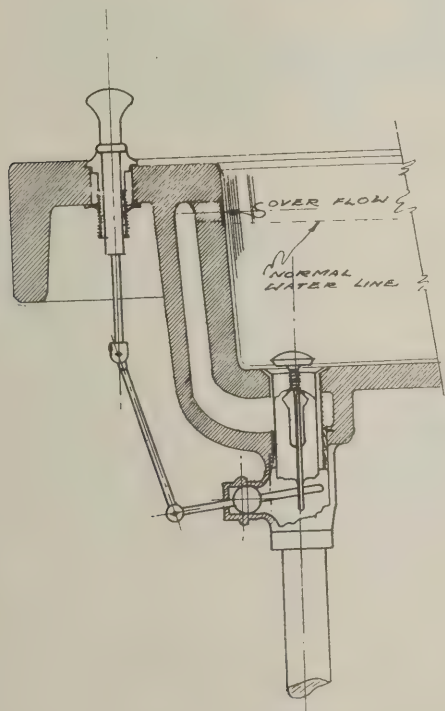


Fig. 47—Section through pop-up waste

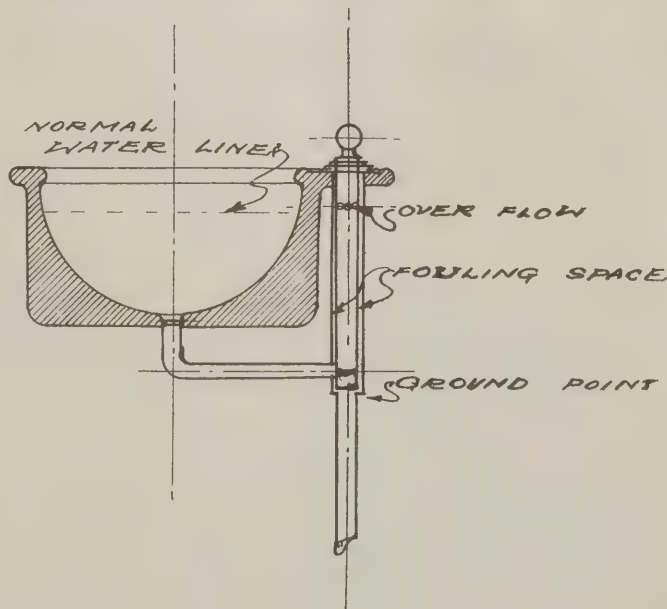


Fig. 48—Section through standing waste

of turns. The handle is mounted on the stem, the end of which is provided with a washer, which closes against a seat in the body of the valve. This type of faucet is very easy to repair and, if of substantial proportions, will last indefinitely.

The quick-opening faucet is similar in construction to the compression, differing

only in the pitch of the threads on the stem of the valve and because of this a quarter-turn of the handle gives a full opening of the valve.

The Fuller type of faucet is different from the compression type in that the operation of the stem on the seat is dependent on an eccentric and cam movement. The

is generally arranged so that it can be removed for cleaning. It has stood the test of service and is probably one of the best types of wastes in use.

The standing waste and overflow, which has been used quite extensively for lavatory work, combines the overflow and waste connection, using a tube with a ground seat

in the waste connection to hold the water in the fixture and provided with perforations to allow overflow to run through the tube. This type of waste connection with the continual filling and emptying of basin

mands. Avoid the so-called non-scalding mixing valves and have individual supply valves on both hot and cold water. If the shower is in a separate compartment these valves should be located near the entrance

a back-ache.

Whether the sink should have integral drainboards or wooden ones depends on the individual. However, if the most sanitary sink is desired, the sink with the integral drainboards will be selected. The sinks generally used for the home are 20x30 in. and 20x36 in. Probably more 30 in. sinks are used than larger. The sink should be provided with $\frac{3}{4}$ -in. hot and cold water supplies with either individual faucets or that which is very popular—a combination faucet with a swivel spout.

The waste pipe and trap should be at least 2 in. If it is convenient to provide with sink a small rack for the vegetable brushes and a soap dish, this should be done.

Pantry Sink

When pantry is provided it should be equipped with a small sink—preferably vitreous china—set into the wood top of the dish counter shelf. It should be provided with hot and cold water with combination goose neck or swivel spout. The counter top should be arranged to drain into sink and should be oil treated to avoid straining

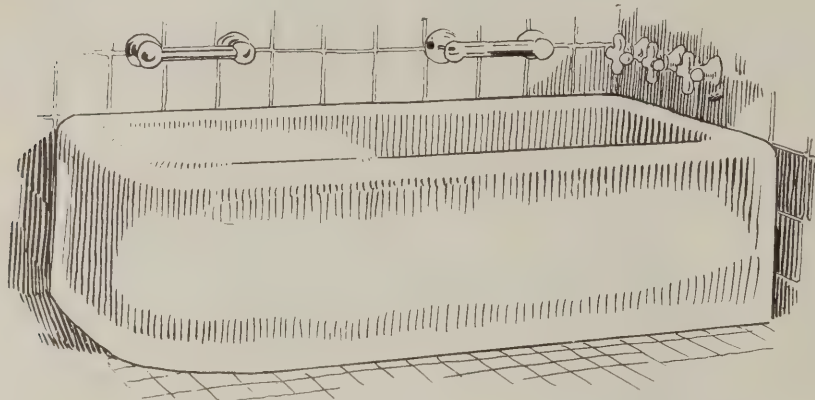


Fig. 49

soon becomes very much befouled and is not an ideal waste to be used.

Bathtubs

The bathtubs may be of either enamel iron or porcelain and should be of the built-in back and one end type to avoid difficult pockets or spaces to clean. The iron tub will probably prove the most economical both in first cost and in operating cost, as it will require much less hot water to warm the enameled tub than the porcelain one. The fittings, as described for the

(avoid stamped steel enameled) or porcelain and in the small sizes in vitreous china they may be provided either with or without backs or integral drain boards.

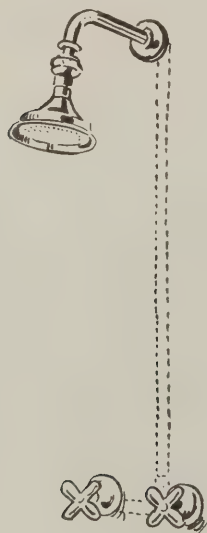


Fig. 50

lavatory, will apply to the bath tub; the waste connections should be large, direct and short so that tub will empty quickly.

Shower Baths

Whether showers are provided over tub or with its own receptor, the water supply to the bathroom should be proportioned accordingly, and the water heater should be increased to take care of the increased de-

mands so that they may be operated from outside the shower compartment.

Sinks

Sinks may be either enameled cast-iron. The sink should be of non-staining material and when set against a plastered wall provided with a back, it should be set so that the inner bottom of same is not less than 32 in. from floor. This will save many

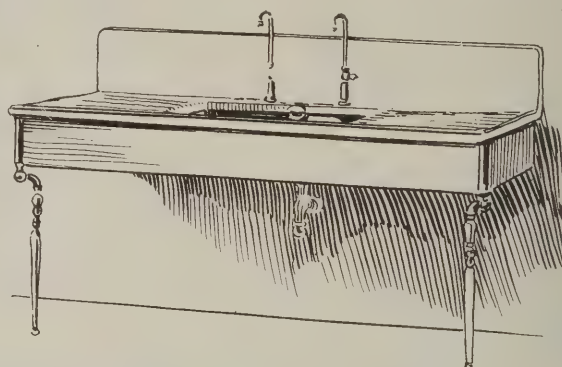


Fig. 51

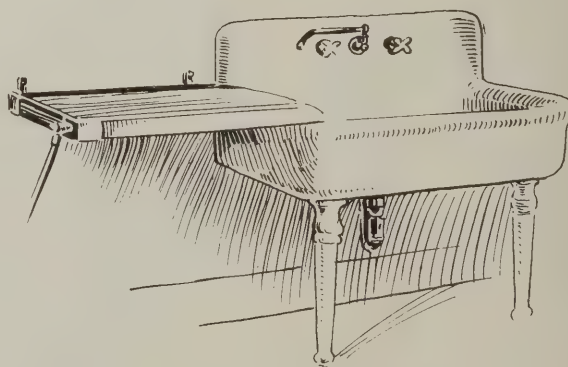


Fig. 52

and absorbing moisture. A water-tight joint should be made between sink and same, the opening of sink being slightly smaller than sink and a drip edge provided all around.

Wash Trays

The wash trays should be of non-absorbing or staining material, preferably white porcelain. They should be arranged in

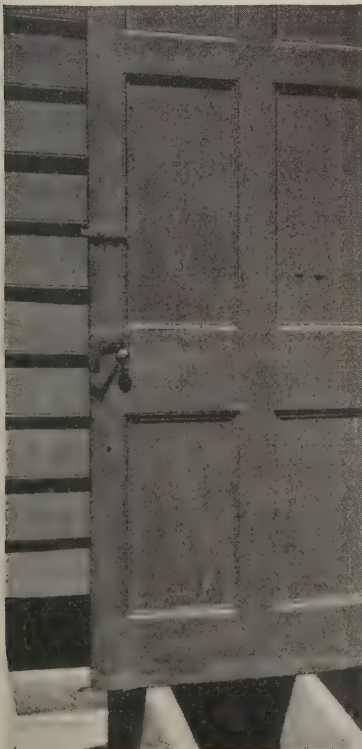
pairs, although with the advent of the domestic washing machine some advocate only one tub for rinsing and bluing.

They should be provided with hot and cold water supplies with compression joints with chain and plug, large waste and overflow and set on adjustable legs so that they may be set at the proper height—about 2 ft. Often, tubs are set too low for comfort.

(To be continued)



Home-made doors and colonial hand-made hardware



A knob turns the bolt up and a spring catches the bolt

When They Built for Investment Rather Than Speculation

EXPERTS find that one of the ills of the house-building industry today is the speculative nature of modern construction. Flimsy construction and uncertain length of life make a loan on a house a speculation rather than an investment. Money for speculative use has commanded,

"All this timber work was mortised and pinned, and every piece was numbered. In the views you will notice that the corner casings are fluted. All this was done by hand. These corner casings are 2½x12, in solid condition. The weather boarding is in good condition. The crown molding, a



A 125-year-old building still worth all it cost

and always will command, a higher interest rate than money for a safe and sound investment; hence one of the real reasons for high mortgage money today.

F. O. Muth, a builder of Edenton, N. C., writes: "I wish the editors of NATIONAL BUILDER could pay us a visit and see for themselves the many old buildings here, and what a pleasure it is to look at this old handiwork. There was no rushing and hurrying in the days when they were built. The money put in them was an investment—good for a century.

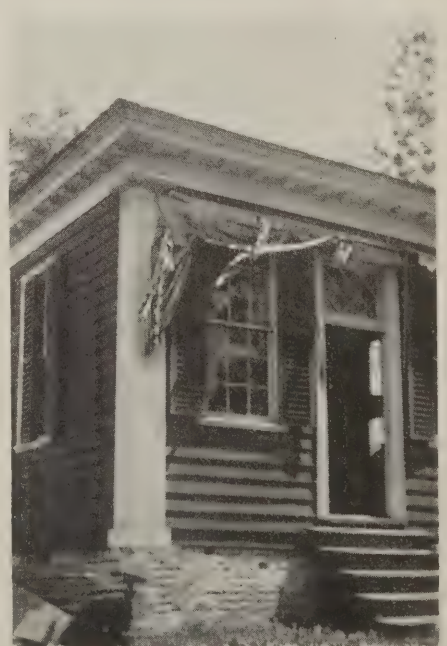
"Herewith are some views of a building that has 125 years of useful service to its credit, and looks good for 125 years more of service of a different character.

"This building was used for many years as a customs house. Then it was used as an office building. I am now rebuilding it into a residence. It has two rooms which will be the dining room and reception room when finished.

"The foundation is a 22-in. wall all around. The sills are 9x9's; the joists 4x10's on 24-in. centers, the corner posts are 4x12's and all the studs 4x4's. The ceiling joists are 4x8's on 24-in. centers; the wall plates are 4x10; the rafters 4x4 on 24-in. centers and the hips 1½x10's. The framing timber is cypress heart, whip-sawed and hewn.

piece of which I am sending, was hand-made from rough lumber. The doors are hand-made. The locks and catches are hand-made."

Was it a waste of time?



Solid 2½ by 12 corner post casing. Not for effect only

Copies may be obtained from the Associated General Contractors of America, 1038 Munsey Building, Washington, D. C., or through the secretaries of associated organizations, at 10 cents each or \$5 per hundred.

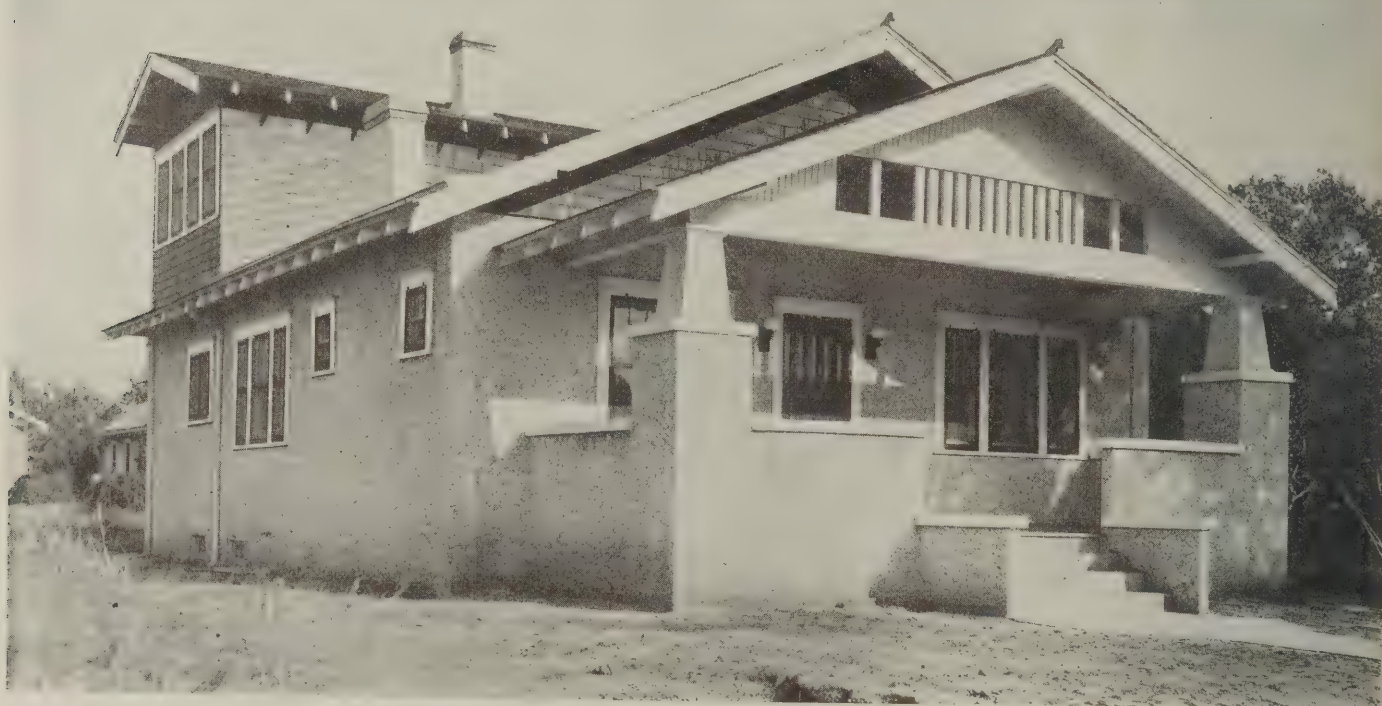
Concrete-House Construction by the Dodson Method

Complete Working Plans of a Popular Type of Bungalow

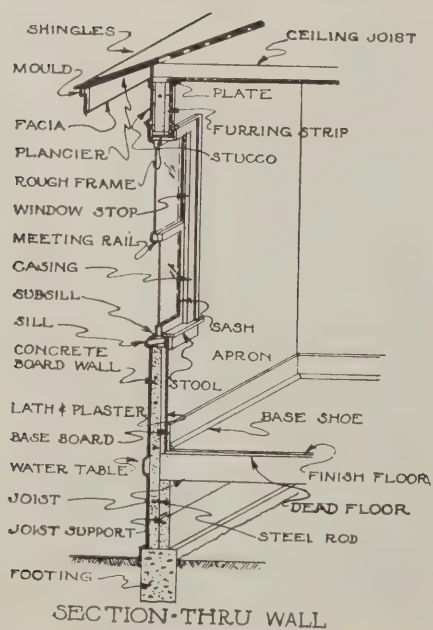
LEON A. DODSON, an enterprising builder and contractor of Wichita, Kan., has developed a system of concrete-

house construction, invented by his father, D. W. Dodson, which Dodson junior and several other builders in that locality are

city except in special cases, the plan being to sell concrete boards and their accessories and furnish one experienced superintendent



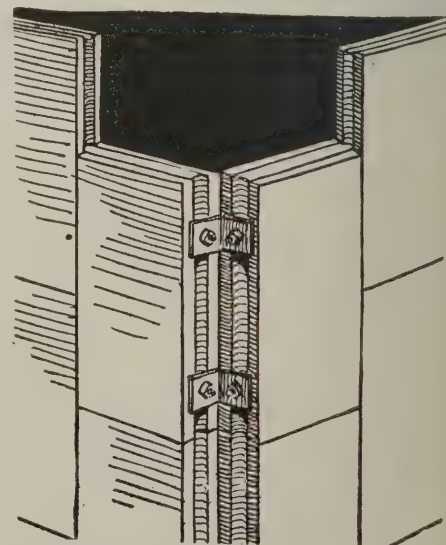
The completed bungalow. Shrubbery and vines will give it added attraction



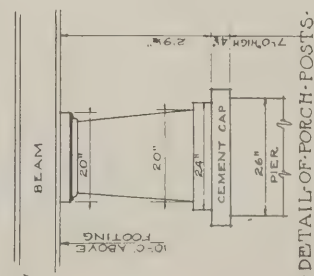
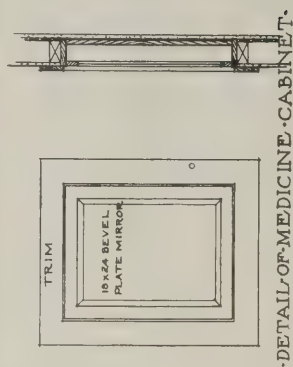
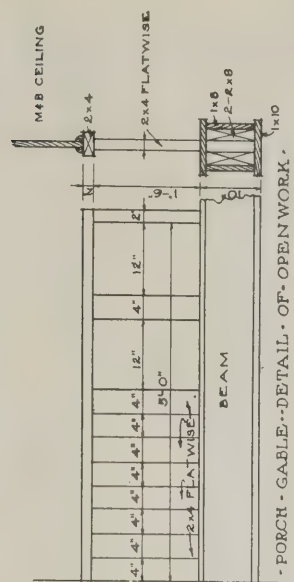
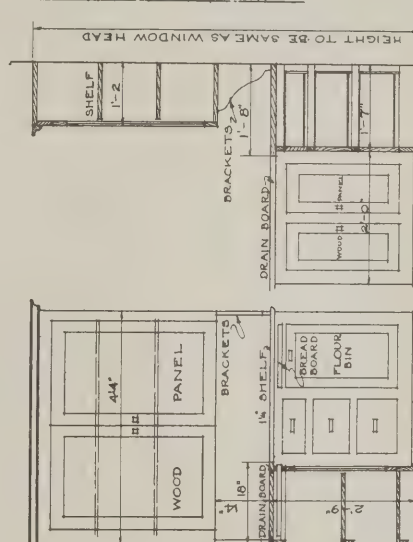
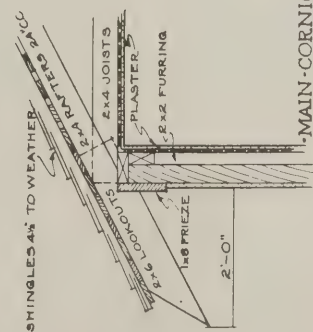
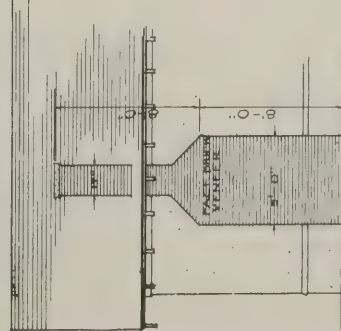
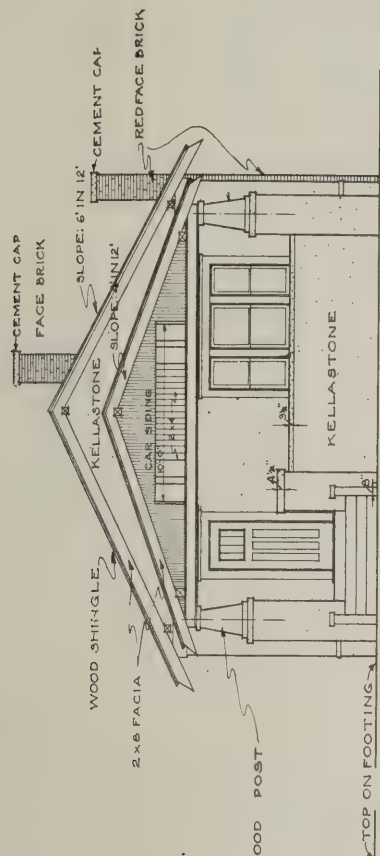
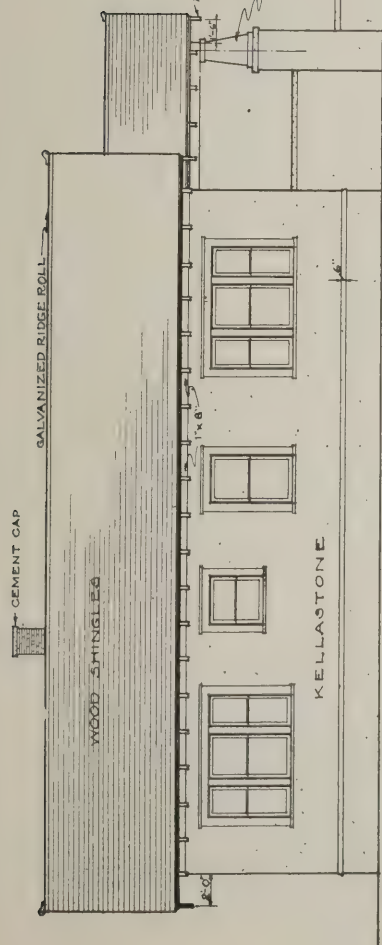
using with considerable success. Mr. Dodson calls the concrete units used "Dodson boards." They are thin tongue-and-grooved blocks, held together in the wall by longitudinal steel reinforcing rods. The blocks are made of plain 1:3 mortar concrete.

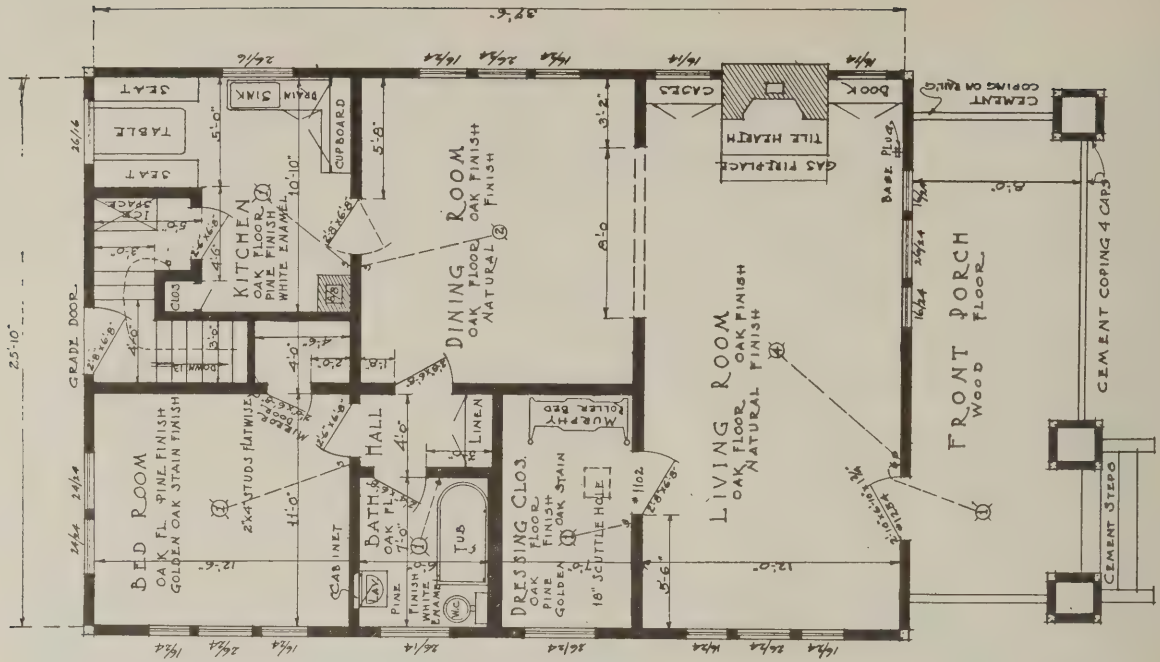
The Dodson development in concrete house construction is logical. They have been in concrete contracting work for a number of years and for a long time specialized in building farm silos of molded concrete units. Other silo builders will readily see the application of the same principles in this new system of house construction.

In order to market the product invented by D. W. Dodson the Dodson Cement Products Company was formed. This concern maintains a building department in Wichita for contracting house and store construction, but no contracting is done outside the

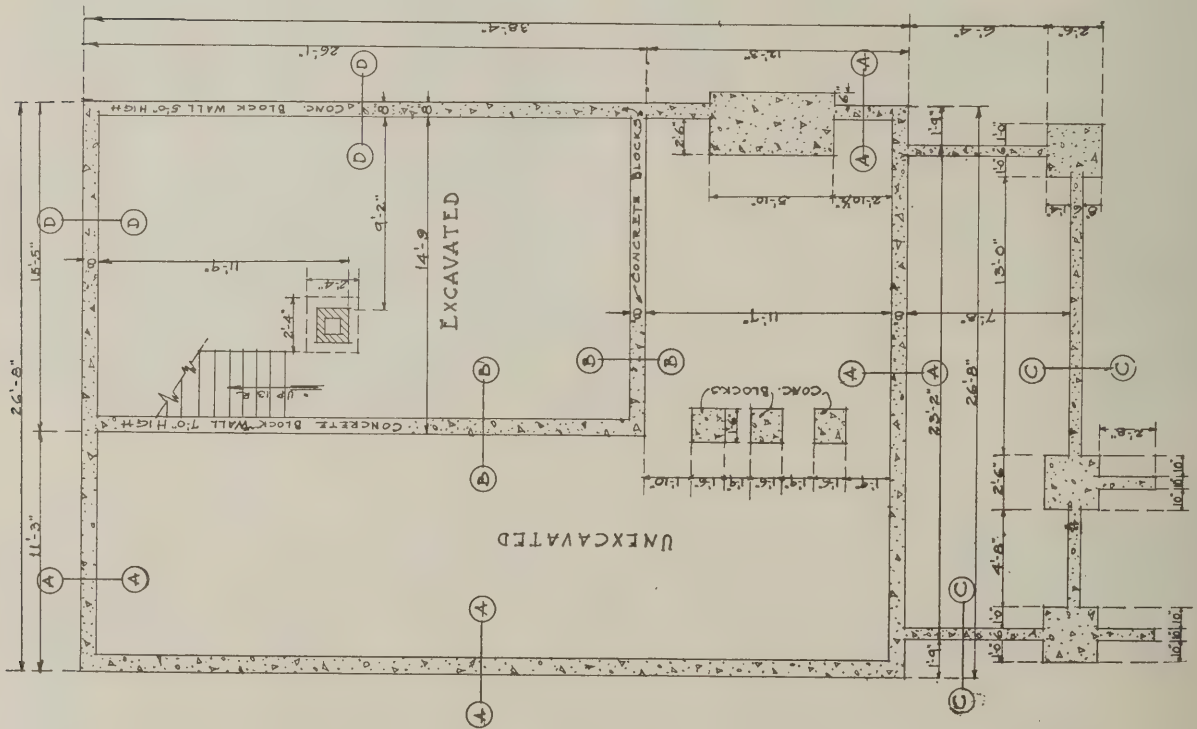


Angle-irons and bolts on the ends of the binding rods hold the units together

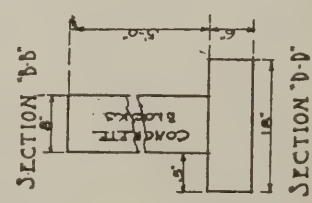
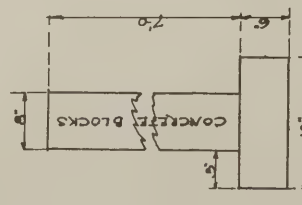
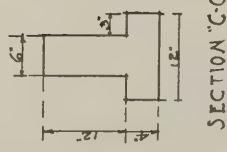
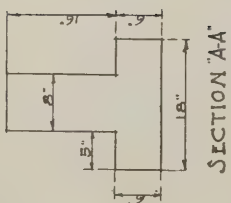




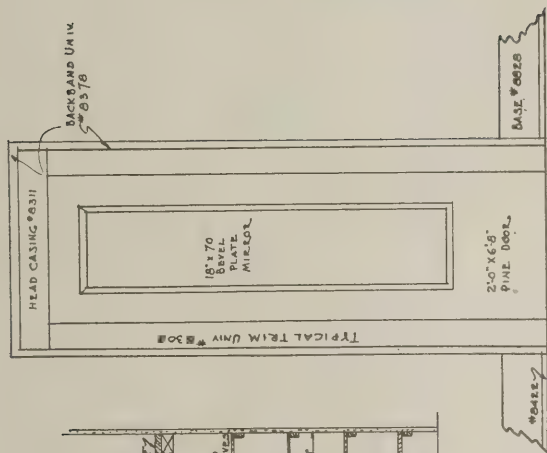
·FIRST FLOOR PLAN·



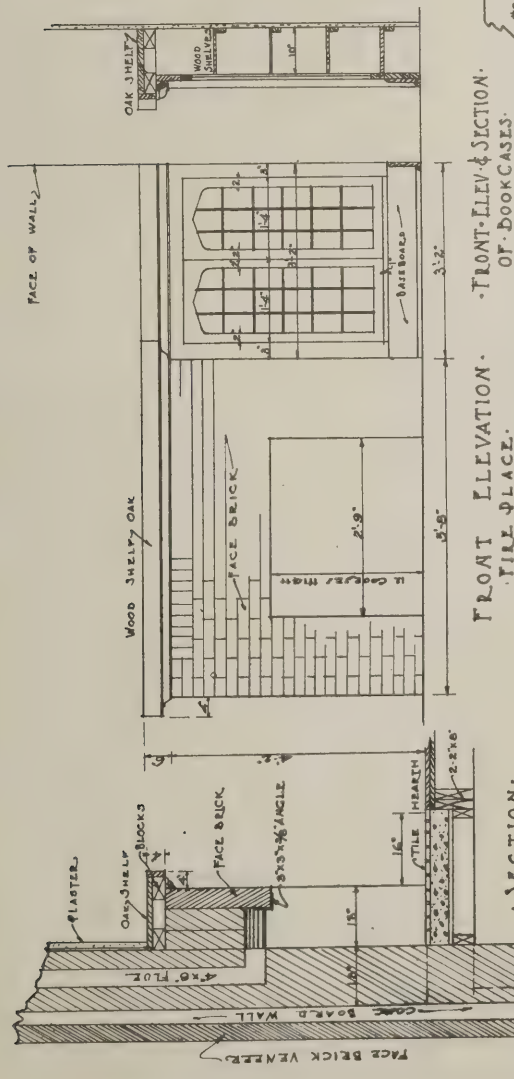
BASEMENT PLAN



·FOOTING SECTIONS·

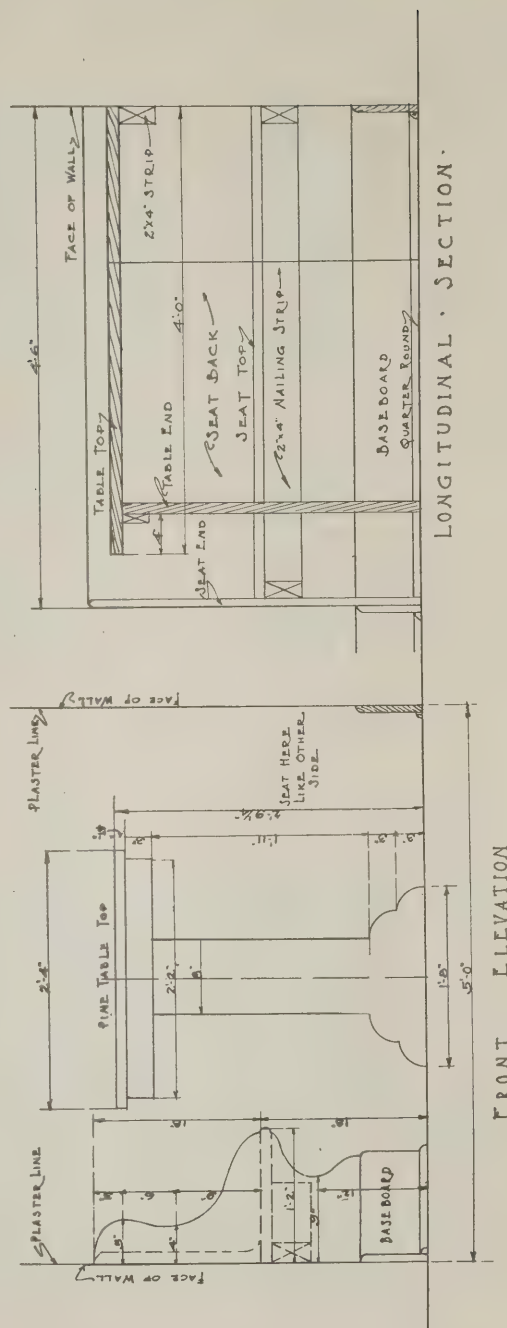


MIRROR DOOR IN BED R'M



FRONT ELEVATION. FIRE PLACE. FRONT ELEV. & SECTION. OF BOOK CASES.

GAS FIREPLACE DETAIL AND BOOK CASES.



FRONT ELEVATION

LONGITUDINAL SECTION.

DETAILS OF BREAKFAST NOOK.

LINEN CABINET DETAILS.

to oversee the proper erection of walls.

"Concrete Boards"

All the slabs are 3 in. thick and all are 10 in. wide, but the lengths (or heights) differ in regular series, from 7 in. to 28 in. in multiples of 7. Each slab has two holes sidewise through it, regularly spaced, so that reinforcing or binder rods may be inserted from one block to another.

The blocks are laid up dry, in a way described as "stacking books on edge." At regular intervals, as the erection detail plan shows, horizontal steel rods are passed through the blocks, from end to end of the building or to the sides of window and door openings as the case may be. At the corners or angles of the wall angle irons are placed to receive the ends of the rods. Bolts on the ends of the rod then bind the interlocking wall sections into a single unit, like the rings or hoops on a silo. It will be noticed that the longest rod used is 18 ft., so that no one rod extends through the entire side of the building. The ends of the intermediate rods are recessed into the tongue and grooved joints. The rods not only tie the building together laterally, but through the broken horizontal joints, using different heights of slab also tie the wall together perpendicularly.

When the adjoining wall panels are built up to the desired height, a form is built at the corner or angle, where the ends of the rods protrude, and a solid concrete post enclosing the panel ends is cast. In addition, where it is desirable for strength or architectural effect, the walls may be buttressed at intervals with ornamented pilasters of solid cast concrete.

The dimensions of the building in plan, including of course the door and window openings, must be in multiples of 10 in. and the height, including door and window openings, in multiples of 7 in.

The wall panels so constructed may be finished in a variety of ways. The walls may be double, thus providing an air space between, or the exterior wall may be brick veneer, providing thus for insulation. Where one thickness of wall is used and the exterior stuccoed, the interior plastering is separated from the wall by furring. As an additional safeguard against dampness the "boards" are treated on both sides with a waterproofing compound before they are placed in the wall.

Flexibility in Design and Construction

The small size of the unit used of course adds flexibility to the design. Numbers of houses built after this process in Wichita show much difference in architectural treatment, and, of course, as with hollow tile and other building blocks of large dimensions, simplicity of design and construction is assured.

In addition to houses, Mr. Dodson claims his concrete "boards" are equally advan-

tageous for the construction of numerous other types of building, including farm buildings of all kinds, elevators and industrial buildings, fences, sign boards, railway buildings and office buildings.

Economy Is Chiefly in Speed of Erection

The concrete units or boards may be made near the place they are to be used. They are cast in simple forms and are so small in size that they can be readily handled. But the chief economy claimed for their use is the speed of erection. Mr. Dodson claims that one of his houses can be lived in 20 days from the time the foundations are placed; that the walls of a bungalow like that illustrated can be erected complete in a single day.

It is claimed that with the assistance of such an erection diagram as the one here reproduced, the average foreman can readily supervise the labor of unskilled workmen.

An Unusual Business Card

THE two cuts herewith illustrate the two sides of a business card presented by C. M. Wheeler, president and general man-

Copper Salts Improve Casein Glue

IT has been found that copper salts added to casein glues greatly increase their resistance to moisture and also make them more durable when exposed to the action of molds and fungi. Casein glues containing copper are nearly as moisture resistant as blood albumin glues.

In the preparation of copper-casein glue at the Forest Products Laboratory, two to three parts by weight of copper chloride or copper sulphate are dissolved in about 30 parts of water and are added to every 500 parts of the ordinary casein, lime and water glass glue. The copper solution is poured into the glue in a thin stream. The violet-colored lumps formed at first by the coagulation of the glue by the copper solution are reduced by stirring vigorously for about 15 minutes, and a smooth violet-colored glue results. It is necessary to add the copper salts after the other ingredients are thoroughly mixed, in order to obtain beneficial results. Copper added to the casein before the lime and water glass is ineffective.

Glues containing little lime are especially improved by the addition of copper. A



ARCHITECTURE

MERCHANDISING

ADVERTISING

"Ye Planry" INC
Beautiful Homes

"A SERVICE FOR RETAIL LUMBERMEN"

C. M. WHEELER.
PRES. AND GEN. L. MGR.

MAIN OFFICE
DALLAS, TEXAS

ager of Ye Planry, Inc., an architectural service organization whose home office is in Dallas, Tex. The cards are not all the same but represent various typical homes that this company has designed.

low-lime glue with copper may be as resistant to moisture as a glue with more lime in it, and copper does not shorten the "life" or period of workability of the glue so much as more lime would.

Library Building Just for the Kiddies

Special Features of Interest to Architects and Builders
—Simplicity and Beauty in a Building of Low Cost

APPARENTLY Californians are the first to realize that there may be as much difference in the details of a library for children and one for grown-ups as there is between a grade school and a college. To a Pasadena firm of architects, Marston & Van Pelt, belongs the honor of interpreting the library needs of boys and girls in a building all their own.

The building is simple, as the views and construction details show. It is a plain rectangular structure approximately 60 ft. square with an 18x28-ft. court in the rear. It is frame construction with a cream-colored stucco exterior over metal lath and

sheathing. The trim is also stucco or plaster. The roof is of green-stained wood shingles. The shutters are painted green.

The plan provides one large reading room approximately 40x60 ft., a "story-hour" room 15x18 ft. in one wing and a work room the same size in the other wing. The kitchenette for the use of the library staff is a unique feature. The court between the two wings it is intended to develop later.

The building has no cellar, as heating facilities other than the fireplace and gas stoves are not required. The alcove setting of the big fireplace adds much to the charm of the big reading room. The reading room

has book stacks for 8000 books.

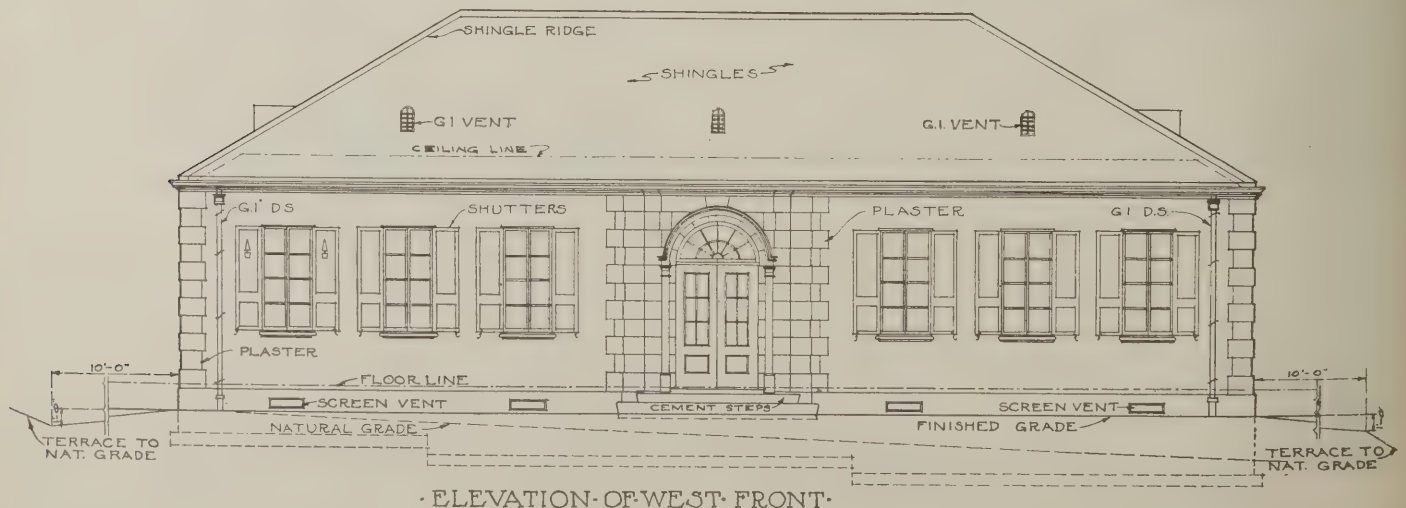
The cork carpet in the main reading room is a grayish green, with cretonne drapes of blue and gold at the windows. Though very simple in every respect, the entire scheme is designed for cheerfulness and harmony.

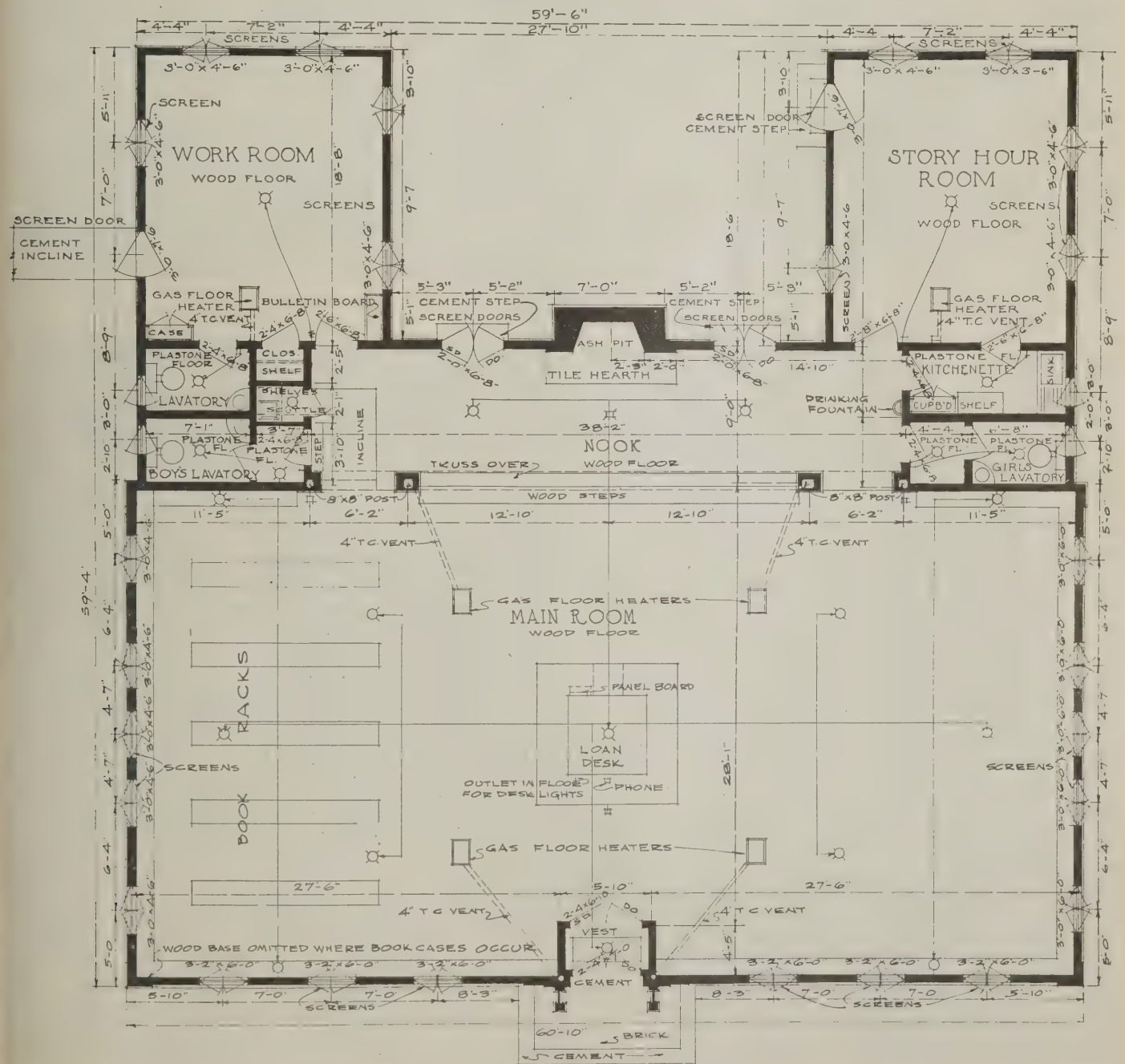
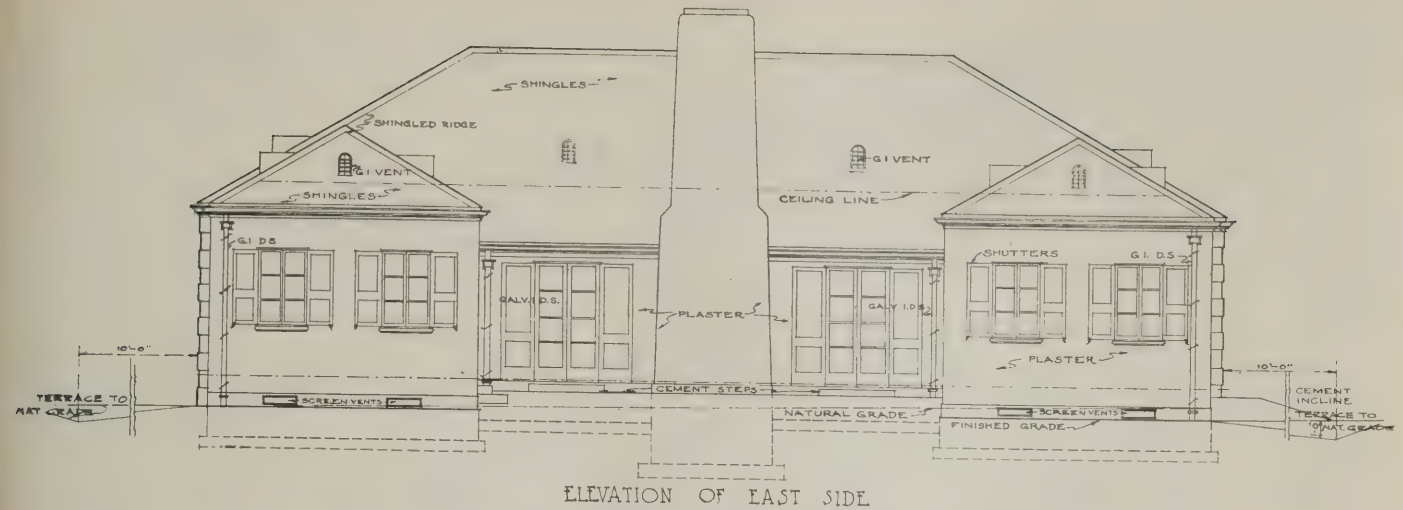
This building is situated in Library Park, adjoining the public library. Mr. Marston writes that it is proving quite successful in drawing the younger children to its shelves.

The cost of the Boys and Girls Library exclusive of the furniture, was \$11,500. It is probably this low cost and the attractive results obtained that will chiefly interest other architects.



Pasadena Boys and Girls Library. Marston & Van Pelt, architects







Beauty and comfort in the Boys and Girls Library, Pasadena, Calif.



Home-like surroundings in the Boys and Girls Library

Enamel Finish on Interior Trim

By A. H. Burt

THE enamel finish bids well to surpass in popularity all other types of finish for interior wood trim in modern residence construction. While particularly adapted to the so-called Colonial type of architecture, its use need by no means be limited to that style of architecture.

Up to a few years ago practically all of the enamel which was used on interior trim was white enamel, although ivory or cream shades enjoyed a certain popularity. Today white enamel still has the greatest call, but French grays, warm grays, silver grays and taupe color have become very popular.

There are many different types of enamels to be found on the market today, ranging in price from \$2.50 per gallon to as high as \$9 per gallon. The difference in price indicates the wide variance in quality. While very satisfactory results can many times be secured with an enamel of medium price, the use of a cheap enamel on interior trim is folly, because the best which can be expected from an enamel of that type is possibly one year's service. Usually at the end of one year, a surface which has been finished with a cheap enamel has either entirely lost all semblance of a gloss, or has checked and cracked, especially on window casings and window sills.

In the olden days, enamels were made from lead carbonate (white lead) and Damar varnish. It might be explained that Damar varnish consists of Damar gum cut in turpentine. No heat is required in its manufacture. Damar varnish differs from other varnishes in this respect, since other varnishes are cooked in copper kettles at varying temperatures for certain lengths of time, producing a much tougher and more tenacious varnish.

Since the olden days, great headway has been made in the manufacture of enamel. Instead of white lead, the pigment which is used in most enamels is zinc oxide, which is a much whiter pigment than white lead. Similar advancement has taken place in the development of the liquids used in enamels, so that it would be a very difficult thing to accomplish further improvement in the present day high grade enamels.

The builder who specializes on the erection of moderate priced dwellings may successfully affect economy in construction by employing unselected wood trim, but when it comes to finishing materials, if he is a wise builder, he will not think of using anything but enamels, varnishes and paints of the best quality. Regardless of how well a house may be built, the average owner will condemn it if the finish does not hold up. The performance of enamels and other

finishes under service is the first thing he notices, and if quality finishing materials are used, and are properly applied, all will be well.

There are two classes of enamels which can safely be used for the finishing of interior wood trim. These are enamels of the long-oil type which contain no varnish, and enamels of the high grade varnish type. Enamels made from Damar or cheap rosin varnishes should be avoided, as these enamels are non-elastic and do not stand up under wear.

In the long-oil enamel one finds the highest quality and greatest durability. This

wood filler should be applied, allowed to set up and then wiped off across the surface, leaving the pores of the wood packed. After about forty-eight hours the surface should then be thoroughly sanded. With this sole exception, the finishing of open-grain woods is identical with that of the close-grain woods.

In proceeding to "build up" a high grade enamel finish, the first step on close-grain woods is the priming coat, which should consist of pure white lead in oil, and equal parts linseed oil and turpentine with the addition of a small part of Japan drier of good quality. This is to give the wood a



White enamel finish is particularly adapted to so-called colonial architecture

type of enamel can be used for the finishing of exterior surfaces quite as well as for interior decorating. It is a slower drying enamel than the varnish enamels, but is more elastic and will not check or crack.

Enamels made with varnish are as a rule enamels designed to sell at a medium price. While these are somewhat easier to apply than a long-oil enamel, they do not possess the length of life, fullness of body and beauty of that type of enamel. An average job of enameling can, however, be secured with enamels of the varnish type.

Any type of wood can be finished with enamel, although close-grain woods are to be preferred. The finest enamel finish is usually secured on a close-grain wood, such as birch. Where an enamel finish is desired on open-grain woods, such as oak, chestnut or ash, a coat of transparent paste

good priming or preservative coat, which is to be sealed into the wood by the next coat, which should consist of very thin, pure white shellac. This coat should not be applied until the first coat has been thoroughly sanded with No. 00 sandpaper. The shellac coat should also be sanded when dry. The next two coats (third and fourth coats) should consist of an enamel undercoater of standard manufacture, the first of these two coats being lightly sanded with No. 00 sandpaper, and the final coat being sanded to a smooth surface with No. 0000 sandpaper. If the finisher prefers, lead and oil may be used to good advantage for these last two undercoats.

The next two coats (fifth and sixth coats) should consist of a long-oil enamel which should be flowed on in full even coats. If expense is a consideration, the

second enamel coat can be done away with. When hard, the final coat of enamel can be rubbed to a dull finish with powdered pumice stone and water, where such a finish is desired. Where one does not care to go to the expense of rubbing, high grade enamels can be secured which produce an imitation rubbed effect. This type of finish is known as "egg shell" finish.

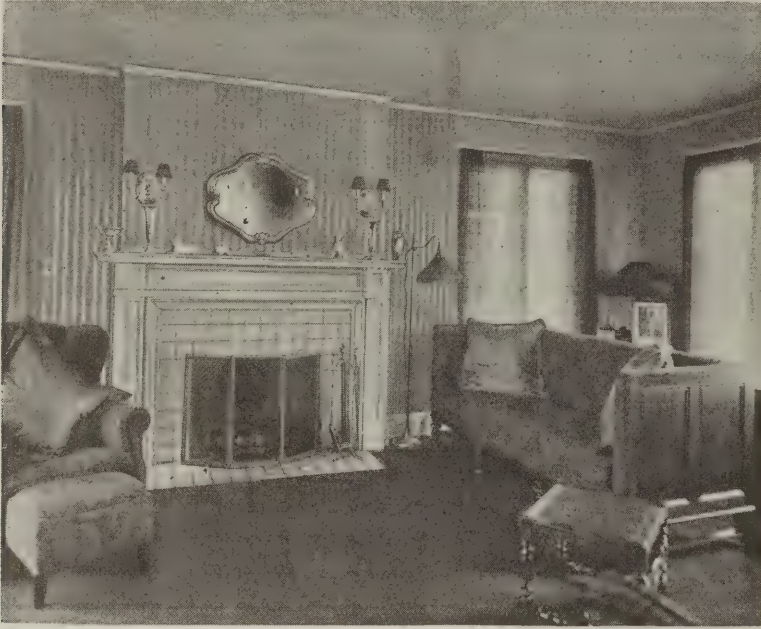
It must be understood, of course, that the above method of finishing results in the very highest type of enamel finish. Many times the cost of this type of finish would not be justified. Where a cheap finish is desired, the following method of finishing

should both consist of an enamel of the long oil type.

In selecting an enamel for exterior work, the manufacturer's declaration of contents should appear on the label of the enamel can, should be very carefully scrutinized to insure the fact that there is no varnish in the composition of the material. There are perhaps one or two manufacturers of long-oil enamels who add a slight amount of spar varnish to their enamel. Where only a very small amount of this type of varnish is used, the enamel will wear very nearly as well as a straight long-oil enamel. It is to be preferred, however, that

whiter than others, but this is entirely due to the difference in the ingredients used by the various manufacturers. Some white enamels may turn to an ivory color, while others may turn only slightly. There is just one enamel which will not turn color perceptibly, and that is the brittle Damar enamel spoken of before. Yellowing is usually caused by the darkening of the oil in the enamel. Since Damar enamel has no oil in it, there is not this tendency to turn color.

Manufacturers of high grade enamels have special processes for treating the oils used in their enamels, so as to make them as pale as possible. In these enamels, the best grade of French zinc oxide is used. This makes a very white enamel, and unless a spar varnish is also mixed with these ingredients, the enamel will only turn color slightly. Even after a high grade, long oil enamel has yellowed, if it is subjected to strong sunlight, it will return to its original snowy whiteness. White enamel on trim in a well lighted room should not turn yellow. If it does, the blame can be placed on the faulty construction of the enamel.



The enamel finish on interior trim bids well to surpass in popularity all other types of finish

is recommended. First of all, be sure that the trim to be finished is perfectly dry, then sand wood to a smooth surface. Apply first and second coats as recommended above, taking pains to see that the white shellac is applied in a very thin consistency, and that it is sanded smooth when dry. The third coat should consist of a good full-bodied, lithopone enamel undercoater, and the fourth coat should consist of a good grade of enamel of the varnish type.

Where an enamel finish is desired on exterior surfaces, such as doors, pillars, hand rails, balustrading, etc., nothing but pure lead in oil, turpentine, linseed oil and a small amount of drier should be used for the undercoats. Under no circumstances should white shellac be used, as in the case of finishing the interior wood trim. The proportion of oil and turpentine for the various coats should be as follows:

Priming coat: One pint of turpentine to one gallon of oil.

Second coat: Turpentine and oil equal parts.

Third coat: Turpentine, a small amount of drier and little or no linseed oil.

Fourth coat (and fifth coat if desired)

no varnish be present in an enamel to be used for exterior work.

While most enamels are sold in a limited line of colors, the average finisher prefers to tint his enamels himself. The tinting of enamels should be accomplished only in one way, namely, a small portion of enamel should be poured out in a clean cup or can, and then tinted with a strictly pure, first quality color ground in oil. As soon as the color has been thoroughly incorporated with this enamel it should be slowly poured back into the enamel which is to be tinted, pouring a little at a time, stirring thoroughly until the desired tint is secured.

Under no circumstances should the finisher endeavor to tint an enamel by first dissolving the oil color in turpentine, and then adding the mixture to the enamel, because the turpentine will tend to cut the gloss of the enamel and deaden the finish as a result.

Regardless of the claims which may be made to the contrary, there is no high grade architectural enamel made which will not turn yellow when used on surfaces not exposed to day-light, such as wood trim in closets, inside of cabinet doors and dark hallways. It is true that some enamels are

Home-Building a Key to Prosperity at Spokane

LAST month saw the beginning in Spokane of 50-odd new houses in which more than \$180,000 is invested. This is the high point to date of a rising curve that began about a year ago and has continued uninterruptedly since. There is a good deal of other construction under way, but the building of residences is the most significant sign of returning prosperity. People are building houses, first, because the city has grown until there are not enough homes to go around, and second, because building costs have gone down to a point where people can afford to build.

This condition is not peculiar to Spokane. Most cities are busy building houses, the only exceptions being communities that had abnormal temporary war-time populations and which were left with an oversupply of housing. Nearly everywhere home-building is the outstanding feature of improving conditions.

The effects are far-reaching. The lumber industry has emerged from the doldrums and is in an exceedingly thriving state. Mills are operating to capacity and logging is swinging into full stride. Other industries having to do with building are feeling the same stimulating influence. There is work for everybody connected with building trades, all of which is good for business in general.—*Spokane (Wash.) Review.*

NATIONAL BUILDER, as an exponent of practical architecture, is a consistent and progressive agency in bringing about a larger understanding between craftsmen, builders and architects. The views and suggestions of readers are cordially invited.

Paint Mixing

By A. Ashmun Kelly

Paint Rightly Used Not only Gives Greater Permanence but Immediate Profit Through Improved Appearance. There is a Paint for Every Purpose. Whether it is Best to Use Ready-Mixed or Self-Mixed Depends on the Knowledge of the Mixer and the Circumstances

THE question has been asked me why building contractors should use ready-mixed paints, instead of doing their own mixing. There are several very good reasons why. In the first place, the builder as a rule has no experience in mixing paint, and it does require that in order to get satisfactory results. I have been told recently of a man who was advised by a painter to do his own mixing, and he wanted only to paint a porch. My informant concludes his letter with the statement that this man "has mixed enough dope to paint two houses, instead of only one porch." Certainly it would have been better for that man to have bought a can of paint. There is an impression abroad that ready-mixed paint is not so good as can be mixed for oneself, and this is, of course, far from being correct. True, there is some of it that is inferior, but at the same time, anybody can buy as good a brand of prepared paint as can be made. I will say that it will cost more per gallon than a gallon of equally good paint will cost the painter who knows how to mix paint. But it will cost the inexperienced man less to buy than to mix. It is very easy for the latter to mix enough dope for two houses when he started out to mix only enough for a porch.

It is this way: You prepare your base and thin it up with oil until you think it is about right, but you find that it is too thin; then you add some more base pigment—that is, lead, we will say, and add enough to make it of the right consistency for applying; but you find now that it is too thick, so in goes some oil—and again you get it too thin. More lead makes it right, as you think, and we will let it go at that. But now you find that you have added too much coloring, hence in order to reduce the shade to what you wish, you must add more lead. Again too thick, and in goes some more thinners. But as thick paint shows a darker hue than thin, when you get it thinned down you find the shade a little too light, and you must add some more color. And so I might continue, and in the end you would have quite some paint,

more than enough to do the job in hand—and to use the title of a famous novel, what will he do with it? My friend, who wrote me regarding the man who wanted to paint his porch, said the man had mixed dope that nobody could use. No doubt of it.

Another reason why a builder would do better to buy ready-mixed paint is because he cannot mix colors properly. Indeed, there are many painters who cannot, painters who have handled a brush for years. This is because they have always worked for a boss, and have had no opportunity to learn how to mix. I have recently been in communication with a painter who is foreman of a gang of painters, employed by a contracting builder, and he wants to get a book that will teach him how to mix paints. He says, for instance, that his boss will tell him that a certain job is to be done in certain colors, and he does not know what pigments are to be used to produce these colors. He tells me that when he looks at a piece of colored work he can tell about what pigments composes it, but to mix them himself he needs to know more than this. Now this is an expert painter, given a responsible position, and he must be prepared to take a house and paint it according to the color scheme laid down by his employer, who likely gets it from the architect, for he himself knows nothing about color and leaves it all to his foreman. In such a case one cannot of course use ready-mixed paints, and I cite the case merely to show that when an expert painter fails it would be useless for an inexperienced person to succeed in mixing paint.

I can furnish a man with very many formulas for mixing colors, but the mere formula will not be sufficient, if the mixer be not expert. Moss green, for instance, is made from Prussian blue, medium chrome yellow, raw umber and white. Now, in order to get the true moss green one must know first what the true moss green color is. Then he must know what proportions of the colors specified must be employed to produce the moss green. The foreman painter mentioned was not familiar with these color names; he did

not know a moss green, for example, when he saw it. But give him the names of the pigments necessary to make the color, and still he would be handicapped. It was easier years ago, when very few colors were used in structural painting, for then the inexperienced man could make some fist at mixing white, or lead color, or umber color, for that only required white lead and oil, in the first case, and black and burnt umber respectively in the other two cases. Today many compound colors are used, hundreds of them, and the builder would waste his material if he undertook to produce such colors or their shades and tints.

Ready-mixed paints are ready to apply as soon as you open the can, no thinning or thickening required, no straining, for the paints will be perfectly free from specks or grit, flowing on perfectly smooth and clean. You take the color card and select your color. These color cards usually give all the popular colors, tints and shades, and more than that, they give the color combinations that do well on the different styles of buildings, or for body, roof, trim, etc. In most cases the builder will find no difficulty in getting the required color of the architect or client. It is simply a matter of showing your customer the color card and getting him to select the colors he likes—or that she likes, as may happen. This is far easier and more satisfactory than mixing a batch of paint and showing it on a paint paddle to the customer, as I have had to do in bygone years.

Another thing, if the builder is to mix his paint, then he must perforce have a paint shop and its equipment. This means a room fit for the purpose, and a stock of materials, with brushes, etc., all in good order. Of course, if he does any painting at all, and buys ready-mixed he still would have to provide a place to keep the stock in, with ladders, etc. But it would not require as much space or material as in the other case. He could buy his mixed paint and have it sent to the job, and hence no shop space would be required, as in shop mixing. Then there is the loss from deterioration of paint materials, like lead, for instance.

which dries in the can or keg and much of it is lost thereby. So too with the oil, driers and turpentine, there is bound to be more or less leakage and evaporation.

Frankly, while I am personally a believer in hand mixing of paint, for my own use, yet for the inexpert and occasional painter I do advise the prepared goods. They cost more, but there is also a saving that reduces that cost not a little. And there is better satisfaction with the customer, for the prepared paints will be true to color and look better than inexpertly prepared paints. The man at the factory is an expert paint mixer, or he could not hold his job. He is able to match colors, too, so that colors are always true to name, year in and year out. Wall paper makers are unable to guarantee that their goods will not vary in color, even on the same run, for it is not as easy to match the water colors used in paper making as it is with oil paint, so that the ready prepared paint is that much more dependable. Not many painters can match correctly, and with the best of them it is some job; the inexpert could not do it at all.

Contractors' Liability Rates Cut

THE National Bureau of Casualty and Surety Underwriters has announced the new national rates for manufacturers' and contractors' public liability insurance. These rates have been thoroughly revised by the bureau upon the basis of actual experience, and are made effective as of July 15. An average reduction of about 35 per cent is seen in comparison with the old manual rates. On individual classifications it is found the results vary widely, and in a few instances increases are noted in view of developed experience, but the general trend is downward, in many cases as much as 50 per cent. No state differentials are provided for, although after full consideration of this phase by the governing committee of the compensation and liability department of the bureau there was found a variation in the experience of the several states, it was found impossible to measure it with an accuracy to justify differentials in rates.

A comprehensive revision of rules has also been arrived at by the committee for the following liability lines: Manufacturers and contractors; owners, landlords and tenants; residence, farms and private estates; theatres; elevators; teams public liability and property damage and owners or contractors contingent or protective liability. Many important changes in underwriting procedure were made and, in addition, the rules were brought into a much more orderly and useful arrangement.

Useful Paint Mixing Scale

A PROPORTIONING scale, devised by W. F. Schaphorst, Newark, N. J., is shown herewith that will be found useful for multiplying or dividing any paint formula for painters or builders who frequently use formulas or recipes in making mixtures or combinations of any kind. Mr. Schaphorst says:

"The scale will be found extremely simple and applicable to many of the problems that confront the paint manufacturer or painter nearly every day.

"To use the scale or chart simply lay a slip of paper alongside it in position A as indicated and then on the slip write out the formula just as has been done here, for

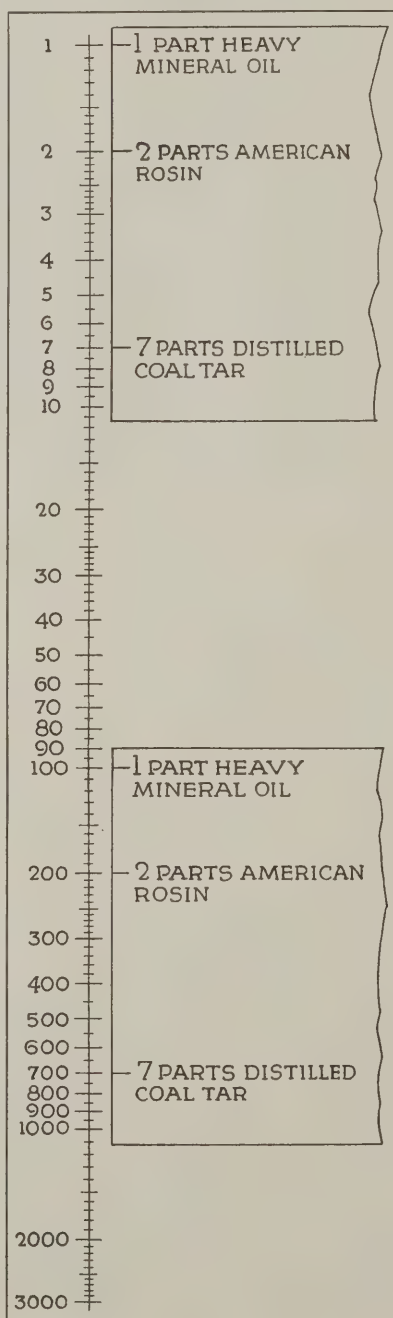
example, with the formula: One part heavy mineral oil, 2 parts American rosin and 7 parts distilled coal tar. This formula is sometimes recommended for paints to be used on tar-paper-covered roofs and is typical of problems that the chart will handle with ease.

"Now, to multiply this formula by 100 simply move the slip of paper down to position B so that the 1 part heavy mineral oil falls opposite the 100. That is all there is to it. The results are: 100 parts heavy mineral oil, 200 parts American rosin, 700 parts distilled coal tar.

"A very simple case has been purposely used here merely to show how to use the chart. The value of the scale will become more evident to the user when it is applied to formulas involving fractional amounts and when the formula is to be multiplied by 97, 76 or some such odd number that would be handled with greater difficulty mentally than when multiplying by 100.

"The number of elements, pigments or compounds in the formula makes no difference to the chart. The greater the number and the greater the complexity of the formula the greater the value of the chart to the user.

"To multiply a given formula, move the slip of paper downward. To divide the formula or to make the amount smaller, the method is the same as described above with the exception that the slip is moved upward. The proportions are always the same no matter where the slip is placed."



New Government Publication on Paints

THE second editions of Circular 90, "United States Government Specification for red lead, dry and paste," and Circular 97, "United States Government Specification for green paint, semipaste and ready mixed," became available for distribution on June 19. It should be noted that the titles have been changed from the first editions, that is, they now read, "United States Government Specification," instead of "Recommended Specification." Circulars 82, 84, 85, 87, 88, 89, 91, 93, 94, 111 and 117 have been ordered printed as revised with similar changes in title. All of these publications may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Cook Electric Hot Water Storage, and Portable Heaters for domestic and heavy duty industrial purposes are illustrated and described in a series of well designed leaflets issued by the Cook Electric Heating Co., Cleveland, Ohio.

Questions, Answers, Kinks and Discussions

Edited by V. L. Sherman

Herein is a Department of Mutual Help for the Exchange of Experiences and Ideas. It is Not Only Well Worth Your While to Give Your Experiences for What You Get Back from Others, but National Builder Pays You for Doing So in Good Hard Cash

Stairs

Attention has been called to a discussion in the *Carpenter* regarding stair building. Richard M. Van Gasbeek, of Pratt Institute, illustrates various problems in winders. These are turns which are out of the ordinary and his presentation of them is

arrangements are made for continuation schools, generally through the public schools, and it is hard to say just how successful they have proved as regards carpentry. Some of the better trade schools provide classes in carpentry, and of late years, or, since the war vocational work, you will find carpentry well taught in technical schools.

ment to secure suitable plans during the war work. These commissions wanted the best plans they could get which would be suitable for "workingmen," and were naturally solicitous about the domestic comfort of the "workingman" since the ultimate aim was the efficiency of the occupant of the proposed house. While no inflexible rules were made regarding house plans certain standards were proposed, and it was announced that plans which failed to conform were not likely to be accepted unless supported by very strong reasons.

In one and two-family buildings winding stairs were permitted but not more than two winders in series. *Treads must measure at least nine inches at eighteen inches from rail.* As a matter of fact most of the stairs I noticed carried no winders.

What do you think of the stairs in question?

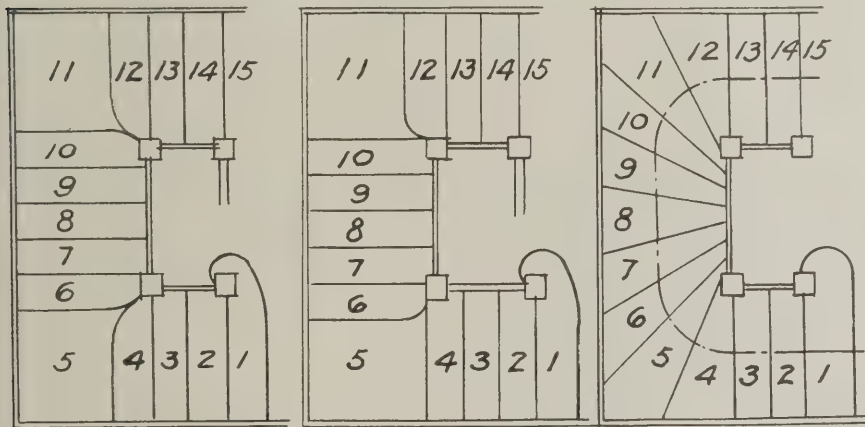


Fig. 1—Stair plans

quite complete. We wish to second his remarks concerning the ambition of a great many carpenters who go to considerable expense in time and money to further their knowledge in building. To quote from one of his articles:

"Our job is to train carpenters. Not boys who are to be future carpenters, but mature journeymen, ranging in age from 25 to 70 years. We therefore approach the subject from the viewpoint of what a carpenter needs to know. These men attend Pratt Institute three evenings per week, after working hard all day in the trade. Many of the men come from a distance, taking two hours to travel in either direction, arriving home at midnight or after. Men who deserve all the credit possible for their desire to be better informed on the more important trade processes."

The greatest question between the unions and the employers is the matter of training apprentices. In a few of the larger cities

That partly cares for the men in the larger cities.

The matter is rather complex. A really well trained carpenter has such a varied knowledge and ability that he can often command a better scale than the union asks and be a very welcome employe. There are a good many such, and they have gained their knowledge either by schooling for themselves as in the case at Pratt Institute or by adventuring into new fields and learning through hard knocks. Carpentry is not an easy subject to master. Training should be more readily extended to these men.

To get back to the stairs, and, perhaps, the kind of training that should be offered. Mr. Van Gasbeek's problems drew the fire of L. W. Cooper, who criticised the unequal treads, the arrangement of the winders, hollow landings, and some other things. Fig. 1 is a copy of the plans in question. This stairs problem brought to mind the problem of the housing commissions of the govern-

The Newel Post

A. P. S., Tryon, Neb., presents a method for placing the newel post, Fig. 2, which he says he has used with success for several years. He writes that "the advantage of setting the angle newel post diagonally is that it does away with one post, and gives plenty of room to fasten the rails both land-

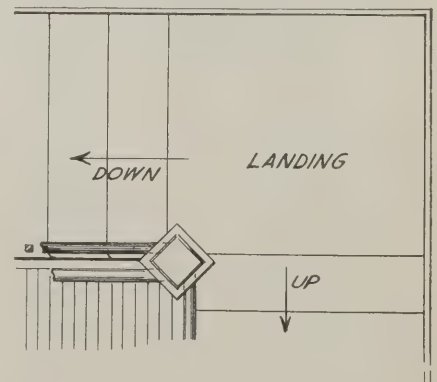


Fig. 2—Newel post set diagonally

ing and going. The hand will slip by on the going rail past the skirting board on the side of the well hole.

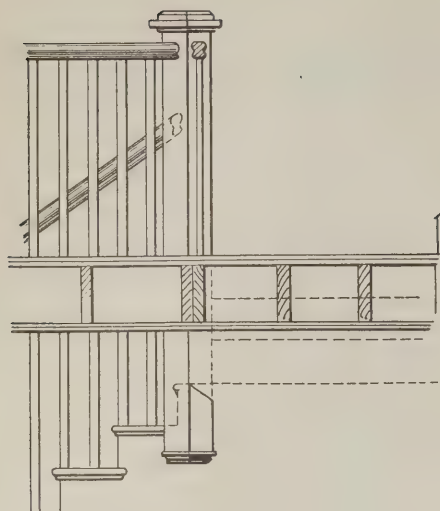


Fig 2a—Newel post

"It does away with cutting off and fitting the balusters to the under side of the well hole. This is a great saving of labor and looks better."

The editor admits that he did not "get" this at first. With apologies to the subscriber he has had the views rearranged. For an upper hall and a narrow stair-well the idea seems to be quite an arrangement. Two or three stairs have come to mind that would have profited by this arrangement.

Keeping Bits Handy

Dale R. Van Horn, College View, Neb., writes: "In the small farm shop the systematic storing of tools is a problem where expense has been cut down to a minimum. The wood bits, for instance, should be kept by themselves and away from metal of any kind. It is easy to nick or dull the keen

cutting edges. In the drawing, Fig. 3, is shown a good means for keeping either bits or drills within easy reach from the bench. To one or more studding, as the case may require, short lengths of two by fours are nailed after they have each been bored with the different sized bits. These holes are used to keep the bits which made them. Upon the adjacent studding the size of the bits may be marked with colored crayon or paint so that the right bit may be selected at a glance. In boring the block, clamp it in the vise and with the points spaced properly bore a diagonal hole nearly through from edge to edge with each bit. Another advantage of keeping the bits in this way is that by *squirting some oil in each hole*, the bits will be kept bright and shiny and free from rust so long as they are stored there.

A Good Job of Siding

Dwight L. Stoddard, Indianapolis, Ind., writes: "Hundreds of people might pass a

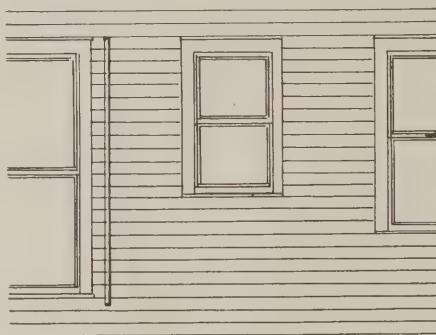


Fig. 4—Siding

house and not notice what kind of a cornice it has, but if it has a poor job of siding many will notice the fault. Some carpenters mark the siding and put it on regardless. It may come to the bottom and the top of the windows, and it may not. Others mark the casing hurriedly with the compasses and strange to say no two of them come up alike.

"Possibly it was easier to side a house years ago when the windows were usually of the same length. But today with three or more different lengths on the sides of a house we should use care and do it as well as we used to.

"The best way I have found is to take a stick equal in length to the longest window (see Fig. 4), space it off as you want your siding, and although it is just the same spacing, I prefer to mark the top end and always keep that end up. Lay off all the whole lengths of windows, then level out to the corner boards and mark them. Then with your stick at the top of the other windows make the necessary change in

spacing to come to the bottom of the windows if possible. After you have your house all laid off the siding goes on much more rapidly."

An Archaic Method?

Kipling's prologue to *The Wrong Thing* runs:

I tell this tale which is strictly true,
Just by way of convincing you,
How very little, since things were made,
Things have altered in the building trade.

A year ago, come the middle o' March,
We was building flats near the Marble Arch
When a thin young man with coal-black hair
Came up to watch us working there.

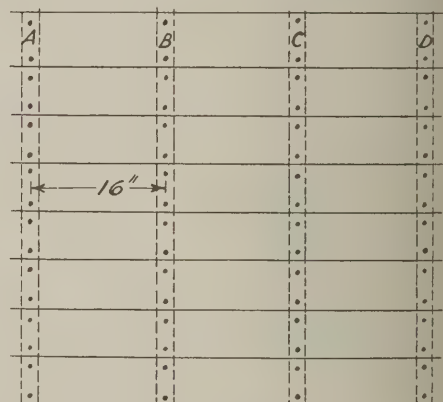
Now there wasn't a trick in brick or stone
That this young man hadn't seen or known;
Nor there wasn't a tool from trowel to maul
But this young man could use 'em all!

Then up and spoke the plumbyers bold,
Which was laying the pipes for the hot and cold:
'Since you with us have made so free,
Will you kindly say what your name might be?'

The young man kindly answered them:
'It might be Lot or Mathusalem,
Or it might be Moses (a man I hate)
Whereas it is Pharaoh surnamed the Great.

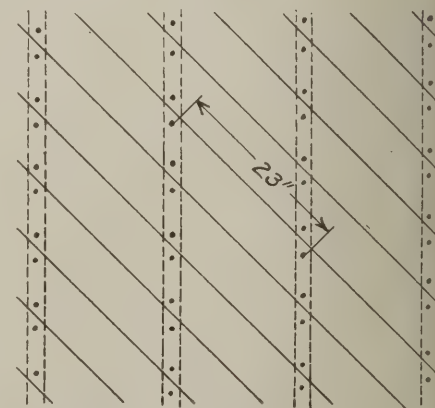
'Your glazing is new and your plumbing's strange,
But otherwise I perceive no change,
And in less than a month if you do as I bid
I'd learn you to build me a Pyramid!'

We herewith submit a letter from E. P. McC., an Indianapolis builder, and invite discussion by the readers, on diagonal sheathing. Archaic means to spring from



HORIZONTAL SHEATHING
48 NAILS IN 16 SQ. FT.
16" ON CENTER FOR BOARDS.

Fig. 5



DIAGONAL SHEATHING
35 NAILS IN 16 SQ. FT.
23" ON CENTER FOR BOARDS.

Fig. 6

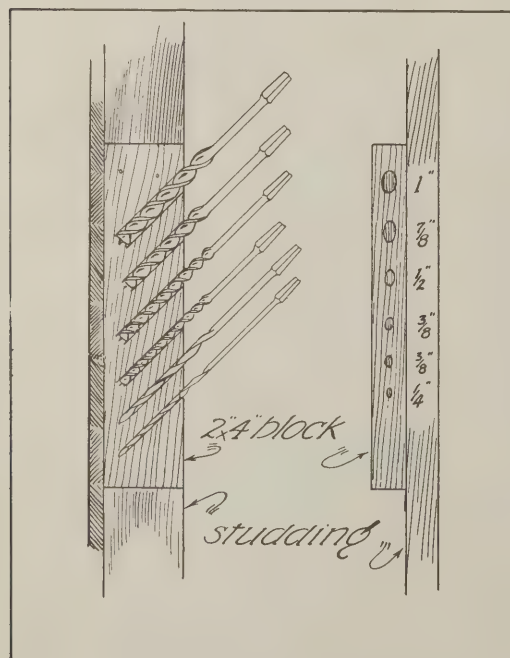


Fig. 3—A bit rack

the beginning, or it may mean obsolete. We admit it is ancient, but why isn't it obsolete?

Mr. McC. says: "This article is not intended as a new kink, but to illustrate a still prevailing folly in sheathing of walls to add strength. While looking around over my city a few days ago during a resting spell I noticed quite a number of houses in course of construction on which the sheathing was being applied diagonally instead of horizontally. I quit this more than twenty years ago because of its being much less effective than horizontal sheathing. By accompanying diagrams (Figs. 5 and 6), one can see the fallacy of diagonal application. Four feet square, that is, 16 square feet of wall, is shown. A, B, C and D are studs. The other lines show six-inch sheathing, nailed twice to each stud. Nails in stud D should not be counted as it is the first stud in the adjoining sixteen square feet to the right. It will be noticed that there are almost one-half more nails in the horizontal unit than in the diagonal. Nails add strength. Besides, the distance between bearing points is as 16 inches in the horizontal to 23 inches in the diagonal.

"Plastering and stucco will crack much worse in the diagonal than in the horizontally applied. Studs on either side of all openings are much better supported in the horizontal than the diagonal. Some lumber and much work is saved in the horizontal also.

"Why not cease this archaic method of construction?"

Chimney Heights

According to L. K. S. a number of builders, or, perhaps we had better say pseudo-

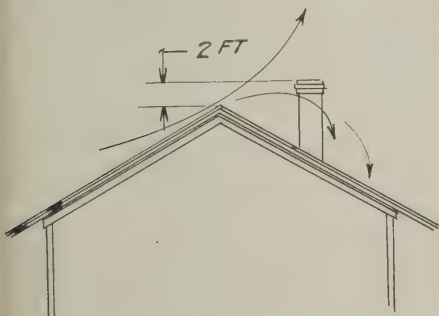


Fig. 7

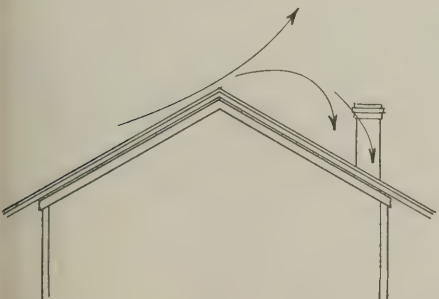


Fig. 8

builders, have committed the indiscretion of building chimneys of insufficient height. He writes that he has never seen so many errors in this line as he has this year.

"Back in olden times there were no chimneys as we know them. The fire was built on a hearth and the smoke was permitted to escape through a hole in the roof. Then came the hood and flue or duct, and then the permanent chimney. As fuel became more expensive and cleanliness more common, back-drafts became a nuisance. We have now come to the stage where perfection of draft and safety has led to the careful construction of chimney lines, flue-lining, and first-class treatment of the fireplace throat.

"The cap of the chimney should never be less than two feet above the ridge of the roof when the house is clear of all air eddies caused by nearby buildings, as shown in Fig. 7. Should such buildings exist the chimney should run high enough to take the natural air current. Faulty draft is not always to be blamed on the chimney. Figs. 7 and 8 illustrate the difference."

A Roof Joint That Can't Leak

Metal flashing under shingles and siding at the junction of the porch roof and the building wall insures a leakless joint. Though this flashing is entirely covered in the finished job, such practice reflects to the credit of the builder by giving the owner entire satisfaction.

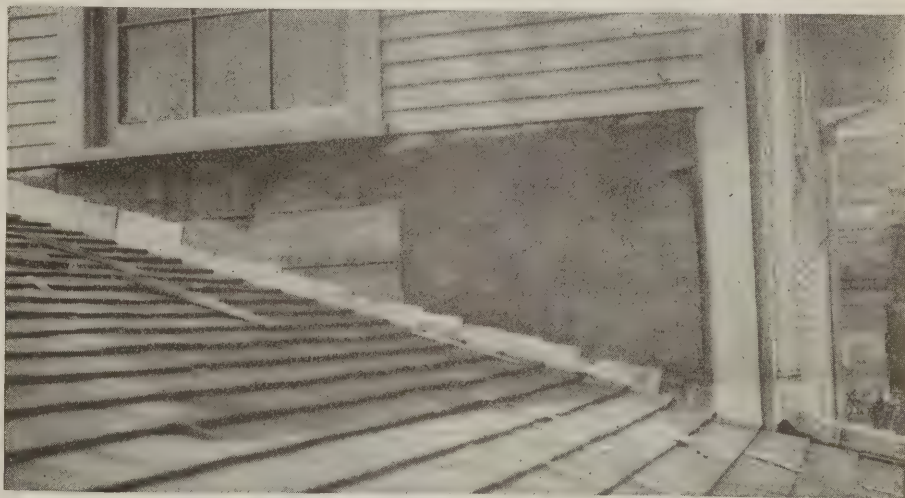


Fig. 9—Metal flashing

The Steel Clamp

F. R., Easton, Pa., submits a few kinks for the steel clamp, and writes: "There is one shop tool which seldom sees the outer world. When not in use it has a fixed, permanent place on the wall hook—it's the steel clamp, and it should have an occasional outing. For the built up girder or truss when the lumber twists and bows and proper spiking is impossible, it does some wonderful work.

"Clamp a cleat to the rafter heel and the raising will go on when help is scarce. It is handy in jobbing for splicing porch columns.

"These are only a few of the many uses to which it may be put. When trimming is started and teasing problems develop, there is often a short and easy way of solution. In putting down baseboards where a heating pipe or drain pipe has a fixed place in the wall angle, a cheese box (backed with strips to insure proper thickness) can be easily bent to any radius, either concave or convex, as occasion may require. Thus avoiding the old style uncertain, bumpy kerfing."

Mitering Siding Joints

W. E. B., Grand Island, Neb., says: "While putting the siding on a large house recently I decided to try mitering the joints. It worked so well that I sided all of it that way. At first I noticed I did not get the cut square across the face of the board, so I put a piece of siding behind the one I was cutting, but reversed it so as to bring the thick edge and thin one together. This makes the cut square across the face of the siding."

Full Size Floor Plans

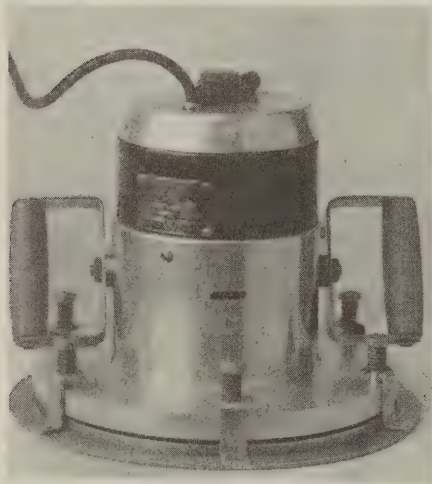
K. R. S., who is a builder of homes in a small community where matters are conducted on more or less personal lines, writes that he has read of the "Paris trained architects who have been taught to

place furniture in the rooms as they are laying them out on the board. I have a better way still. In front of my garage is a large cemented area. If any discussion arises as to floor plans my client and I take the tape and chalk out to the back yard and settle the matter in a few minutes. Everything goes down full size and there is no comeback on floor, furniture space, window locations or door swing. A few times we had to chalk up a detail elevation on the garage walls, but that is rather messy. However, I don't spend my evenings worrying over floor plans any more."

New Devices, Methods and Improvements in the Building Industry

A Hand Sanding and Polishing Machine

HOWARD WEDDLE, a contractor and builder and former president of a planing mill at Dinuba, Calif., is arranging to place on the market a small hand-sanding and polishing machine, illustrations of which are shown herewith. The machine was de-

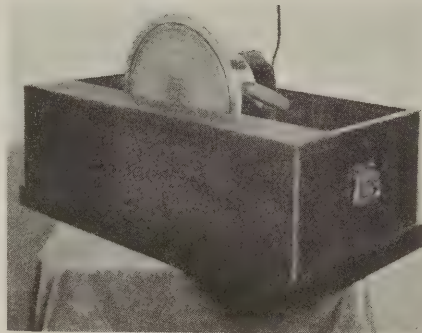


The handles are adjustable to any angle and removable for attaching the handle for floor work



The machine as used for floor work. It is shoved over the work like a plane, releasing on the back stroke

vised because the inventor says there is not a successful hand-sanding machine on the market, and to make a tool which the contractor can take on the job and use in various ways until his floors are ready to finish, then making it possible for one man to put the floors of an ordinary house in good shape in one day easily. Around mills and shops there is much work to be done such

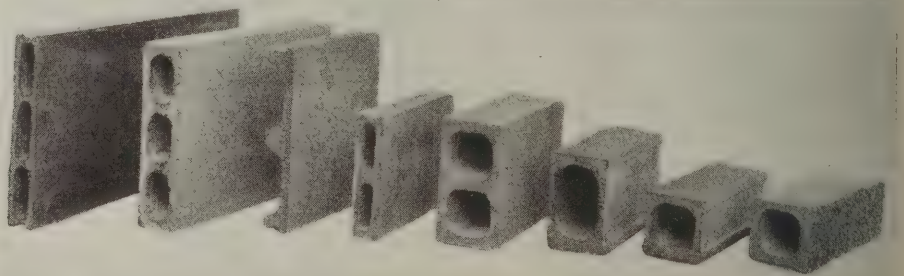


The wooden case acts as a support and working table for stationary work

as large doors, glued-up panels, counter tops, etc., and on the job removing paint and varnish. The machine is driven by a $\frac{1}{4}$ -hp. motor, operating on a lighting circuit. An automatic release guard permits renewing sandpaper quickly and changing from a sander to a polishing material, the tension nuts permitting fine adjustment. The disc has ball-bearings, and gears run in an oil bath. Adjustable handles are provided as illustrated, and the whole machine is contained in a box which is arranged to form a stationary frame for use in the shop or on the job. It weighs 38 pounds.

Sawdust Magnesite Building Tile

A NEW light-weight building tile made of sawdust or other fibrous material and magnesite cement is announced by Oscar Frossell, Williamsport, Pa. The variety of



Nos. 1 and 2—Partition or roof tile; dimensions, 24x12x2; 18x12x3. Nos. 3 and 4—Wall furring tile; dimensions, 12x12x1 1/2; 12x8x2. Nos. 5, 6, 7 and 8—Building tiles; dimensions, 12x8x4; 12x6x4; 12x4x4; 12x4, this last shows a granite dash face. The building tile, it is claimed, can be manufactured with a surface finish in granite dash or caen stone, and the wall furring tiles can be made with a surface of marble, caen stone or art stone or in tile effect. The tiles are said to be ready for shipment two hours after being made. In addition to low cost of production economy arises in that no furring or lath is required, a light coat of plaster or a coat of paint is claimed to be all that is necessary, applied direct to the tile itself. High crushing strength, 90 per cent insulation and total fire resistance are claimed for the product. Machines for the manufacture of the tile will be placed on the market shortly

sizes, shapes and uses of the new product is shown in the illustration herewith.

Waterproof Cement Paint

A WATERPROOF cement paint said to bond perfectly with all concrete and masonry, and containing no oil or inert materials, has been placed on the market by the Sandusky Cement Co., Cleveland, Ohio. The Medusa waterproof cement paint is a dry powder, 10 pounds to 2½ quarts of water, and is supplied in various colors, and has the same hydraulic properties as the cement from which it is made.

A New Insulating Material—Poured on the Job

BY invitation one of NATIONAL BUIDLER'S editors witnessed a new process of insulating houses in which the material is poured in place for the insulation of ceilings, or poured on the floor, cut in slabs, and inserted in the studding or elsewhere, as desired, with remarkable rapidity. The illustrations herewith are from the scene of the demonstration Friday, July 14, on houses being erected by Canterbury & Phillips, contractors, for L. O. Farnsworth at Lombard, Ill. The process as worked by the operator shown in the pictures was: First, a few quarts of water was poured in the tub shown in the pictures, then a few small shovelfuls of gypsum plaster were stirred in, and on top of this a small quantity of gas-generating compound was stirred in, and immediately the mixture frothed up



Fig. 1—Evening-off an Insulex pour.
Note the slabs in the wall studdings

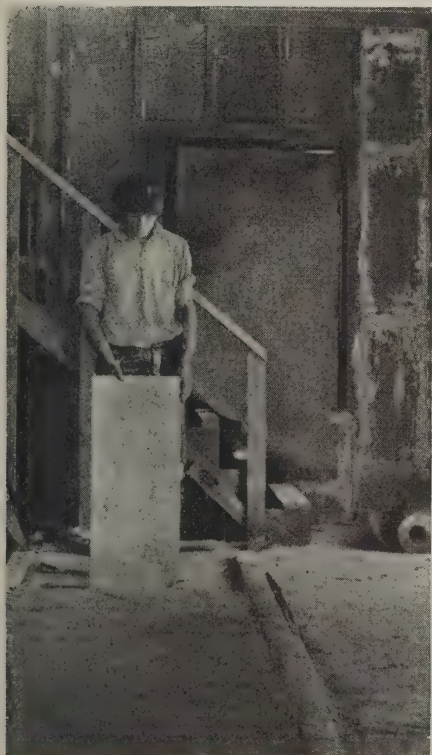


Fig. 2—An Insulex slab cuts to size like a stale cake

at the consistency of a thin batter. The mass was then poured on the floor between suitable retaining strips as shown in illustration, Fig. 1, and smoothed to an even thickness of approximately 2 ins., building paper being laid previously to

receive the pour. In from 10 to 15 minutes the slab was set sufficiently to be handled. It can be easily cut with a knife, wet or dry. The building paper adheres to the slab, which is very light and easily handled, as indicated in Fig. 2. Fig. 3 shows the character of the porosity of the insulating slab. The increase of the gas forming material in the mixture makes smaller pores and greater bulk, at once cheapening and improving the insulation, but making it more difficult to handle. The slabs being light and spongy, weighing about $1\frac{1}{2}$ lbs. per sq. ft., are easily and rapidly fitted, as will be noted between the studdings shown in the illustrations. The volume of the

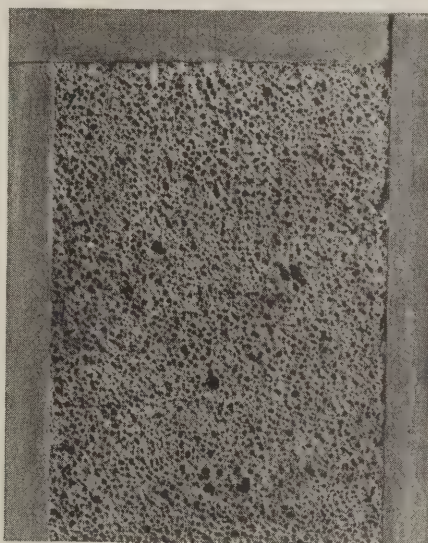
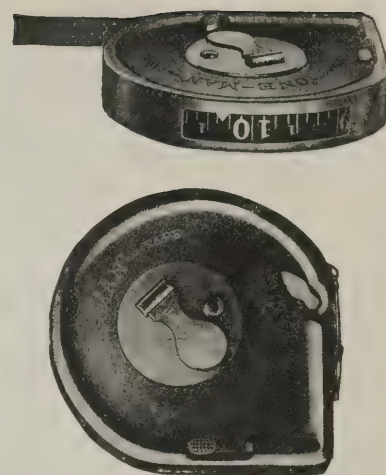


Fig. 3—Showing porosity of the Insulex slab

gypsum plaster used increases from 200 to 500 per cent, it is stated, according to the amount of the gas-forming compound used, thus making the use of gypsum economically possible. Saving from radiation, as shown by tests by the Armour Institute, range from 52 to 77 per cent. "Insulex," the trade name of the process, has been tested by the U. S. Bureau of Standards, it is said, and approved by the U. S. navy for pipe and boiler covering. Its inventor is H. S. Ashenhurst of the Illinois Asbestos Products Co., 1232 Marquette building, Chicago. As a means of economical and rapid insulating, fire-stopping and vermin-proofing this new material is of singular interest.

An Improved Steel Tape

AN improved steel tape has the advantages that it can be easily and accurately operated by a single person. The character of its form to comprise a grasping cam lock retains the measurements after they are taken, and improvement of the internal winding drums prevents slack or back-slack in the line. The "One-Man Tape," the trade name adopted, is substan-



The "One-Man Tape," showing its unusual form and compact construction, all projecting points being eliminated by folding and locking up

tially made, The A. S. Aloe Company, St. Louis, Mo., are the manufacturers.

Durability of Sash Chain

THE durable qualities of sash chain is explained in a leaflet by the Parker Supply Co., Inc., New York, to lie in the quality of the steel used and the method



Sash chain

of punching the links along the grain of the metal. The chain is electroplated, not dipped, and lacquered with a product which insures it against tarnish, and is supplied in a variety of finishes and weights.

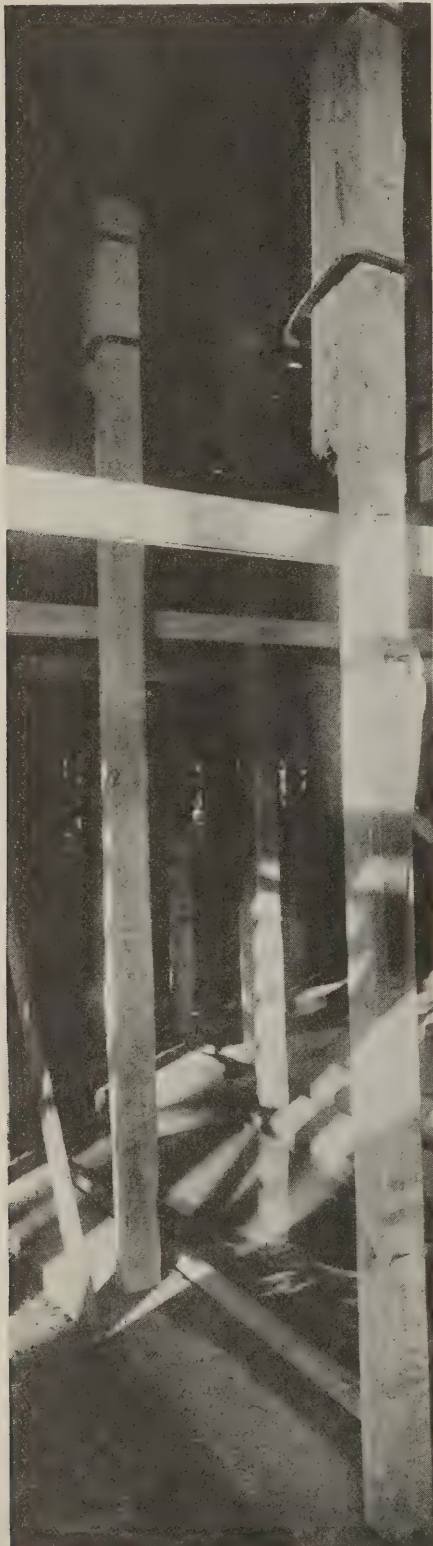
This sash chain has been extensively used in city office buildings, but the company has now decided to exploit its use in a much larger field of commercial building.

To Drive a Nail into Plaster

BEFORE trying to drive a nail into a plastered wall, first put the nail in boiling water until it is thoroughly heated. You can then drive it in clean without breaking or chipping any of the surrounding plaster. —Construction Lime News.

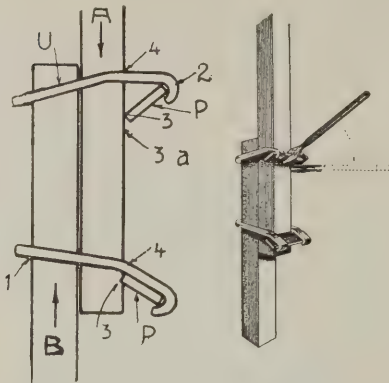
An Efficient Timber Clamp

A TIMBER clamp of simple and effective design is shown in the photograph and detail sketch as one of the more recent time and material saving devices introduced of recent months. The assembling and dismantling of scaffolding, shoring or



Schenk timber clamp. Note absence of wedges under shores

other temporary structures are claimed to be simplified, speeded up, and nearly all otherwise useless timbers or short lengths

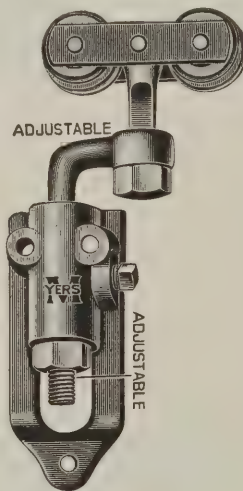


Detail of Schenk timber clamp

incident to the job are made available. The clamp is manufactured by the Schenk Timber Clamp Corporation, 501 Fifth avenue, New York.

Garage Door Hanger

A GARAGE door hanger of an adjustable type, opening the entire front of the garage, and operating on a tubular extensible track providing a combination as desired by rolling and swinging doors, is illustrated and described in a recent catalogue issued by the F. E. Myers & Bro.



Company, Ashland, Ohio. The accompanying illustrations show the principles of the system employed.

Curling of Asphalt Shingles

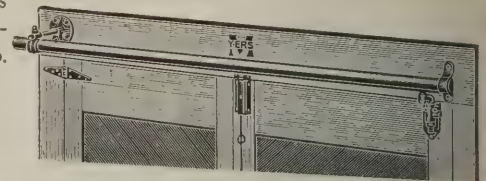
THE curling of asphalt shingles used for roofs is a difficulty sometimes encountered, and the Bureau of Standards was recently requested by the Federal Trade Commission to investigate the subject. During a recent trip to New York, one of the Bureau's representatives discussed this subject with roofing manufacturers, and it was found that their views agreed with those of the Bu-

reau; that curling is caused by insufficient saturation of the felt, saturation with a saturant containing large quantities of volatile material, and to improper laying.

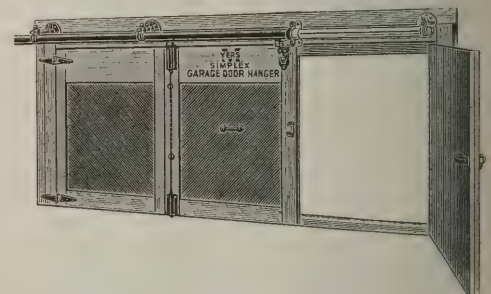
It is claimed that curling can be avoided by using at least 140 per cent of saturant and applying a thin coating of asphalt to the back of the shingle.

The White Convertible Level

THE superiority of the convertible level as an instrument of precision in a combination of level and transit is explained by literature from the David White Company, Milwaukee, Wjs., manufacturers of the White convertible level, on a patented system whereby absolute accuracy is obtainable whether using the instrument for horizontal sights in leveling and determining angles or in vertical sights for aligning stakes and plumbing uprights. This absolute accuracy is obtained by building the level bar and transit standards of one piece of steel-like bell metal, insuring as stated the greatest accuracy in the operation of taking vertical sights and keeping the transit standards in permanent adjustment besides giving additional strength to the body of the instrument.



Showing steel rollers and double adjustment features



Illustrating double adjustable tandem system for garage and barn doors

An Individual Temperature Control Valve

A TEMPERATURE control valve which is self-contained and can be applied to any radiator, old or new, without additional piping other than the supply and return, is placed on the market by the McAlear Mfg. Co., specialists in steam heating and power plants, 1901 South Western avenue, Chicago, who state that when the thermostatic member is set for the desired room temperature it automatically controls the opening and closing of the valve. The company issues a catalog illustrative and explanatory of its several specialties.

Announcements and Publications

Art and Religion, by Von Ogden Vogt, published by the Yale University Press, New Haven, Conn., is a work of a breadth of vision inspirational to all creative artists. The author is a regularly installed Congregational minister. His presentations comprehend a range of thought like a view from a great height, and the simplicity and directness of his explanations command that satisfaction that comes from a sense of being reliably aided and enlightened. The architect and artist will find valuable suggestions in this notable work. Price \$5.

"Built to Endure" is the interesting title of a notably worthy brochure issued by the Koehring Company, manufacturers of concrete mixers, locomotive cranes, graders,

bar benders and cutters, Milwaukee, Wis. The work is admirably illustrated in colors, showing the monumental structures of antiquity and on facing pages their modern prototypes. The illustrations reproduced in miniature indicate the style of the work, which intended to be promotive of the company's business, is at the same time promotive of confidence in the entire structural industry. It is a beautiful conception beautifully rendered.

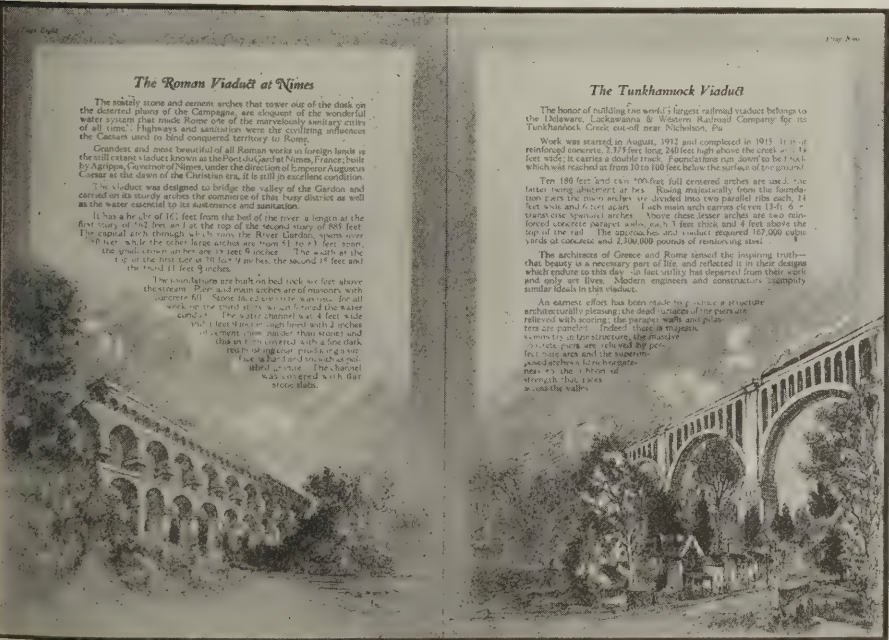
"School Shop Installation and Maintenance," by L. S. Greene, 100 pp.; 5¼x8. 73 illus. Index and appendix. While there are a great many books on the market about shop practice in schools there is very little about the installation of shop equipment in the school. With this in mind, the author, who is State Supervisor of Industrial Education for Florida, has prepared his book with a view to its use both as a handbook for teachers and in solving their actual problems of installation and maintenance and as a text to be employed in normal courses where teachers of manual arts are trained. Part I deals with Installation and discusses Power Transmission, Motors and Currents, Installation of Metal Working Equipment, Installation of Woodworking Equipment. Part II deals with Maintenance; its chapter subjects are: fitting edge tools, fitting saws, brazing band saws, belting, babbitting, adjustments of woodworking machines. There are 73 detail drawings and diagrams illustrating the text, which is simple and clear. Published by the Manual Arts Press at Peoria, Illinois, and retails at \$1.25 a copy.

"Farm Buildings," by W. A. Foster and Deane G. Carter; 377 pp.; 5¼x8; 331 illus. Index. This is another of the Wiley Technical Series for Vocational and Industrial Schools, and has to do with the location, planning, construction and repair of farm buildings. It has been arranged to serve a three-fold purpose, to act as a text-book for college students, a reference book for secondary schools, and a source of information to farmers, but in it the live, up-to-date carpenter or builder in a rural community will find much of interest and valuable suggestion for him in his trade. The material is simply presented and in a most readable style, and the subject is very completely covered. There are five chapters on the design, construction and equipment of the farm house and tenant house, with chapters on barn construction, barn framing, the building of silos, ice houses, poultry and hog houses, implement and machine sheds, garages, and other items of building on the farm. The uses of wood, cement and concrete, brick and hollow tile, as building materials are discussed, and there is a chapter each on building codes and fire prevention, contracts and specifications, cost estimating, and plan drawing. The book is copiously illustrated with photographic reproductions, detail drawings, and sketch plans, and cannot fail to be of great suggestive and informative value to anyone interested in construction in rural communities. Published by John Wiley & Sons, Inc., 432 Fourth Ave., New York City; \$3.00.

"Community Buildings for Industrial Towns," 94 pp.; 6x9; Paper. 75c. Community Service, Inc., 1 Madison Ave., New York City. The many inquirers of NATIONAL BUILDER for suggestions for designing Community Buildings will find much of interest in this little booklet. It is practical, informative, and to the point. The first of the four sections into which it is divided deals with the planning of the building. Sketch plans for three different types of building are given, one suitable for the small community; one adapted to the needs of a town of 10,000 to 18,000; and one suitable for a town of 18,000 to 30,000. There is a brief, comprehensive description of the arrangement of each building, an estimate of the approximate cost, and suggestions for equipment. A comprehensive list of gymnasium apparatus is included for both the smaller and larger types of building; and there are five pages of practical discussion, with illustrations, of the construction of the swimming pool, and some suggestions for the laying out of an athletic field where desired. Chapter II has to do with the operation of the building, its possible sources of revenue, and the expenses of operation and maintenance. Chapter III



Cover page of "Built to Endure"



Specimen pages of "Built to Endure"

tells of the various club activities possible, and is supplemented by a list of "ice-breaking" games in Appendix A, with a list of books on the subject of group entertainment. There is a tentative program for an annual picnic or field day, and typical weekly schedules for gymnasium work, with suggestions for features of an athletic meet. The organization of various kinds of clubs is also described. Chapter IV has photographic reproductions and descriptions of a number of successful Community Buildings in the East and South, and suggestions for a form of constitution and by-laws for the Community Building Association is found in Appendix B.

The American House, edited by Charles S. Keefe, architect; published by U. P. C. Book Co., Inc., 243-249 West 39th Street, New York, is a welcome contribution to the all too few creditable books on this very important and deserving subject. It is chiefly a collection of plates illustrating the best recent work of contemporary American architects classified according to these architectural types: Colonial, Georgian, Italian, Spanish, French and English, with a section devoted to interiors and another to doorways. "This collection of illustrations," states the foreword to the book, "has been made with the desire to present to the architect and layman, a series of illustrations of the best types of American houses. The illustrations indicate the high standard of our present domestic work and the progress that has been made in recent years. To a person not in close touch with American domestic architecture, it will be a revelation to compare the illustrations in this book with those in architectural books and magazines of fifteen years ago. Whether our house be large or small, it can be beautiful and a pleasure to ourselves, our friends and to the passerby. While our wants and our pocketbooks determine the size of our house; our own good taste determines its character. This is shown in the illustrations, and houses, such as these, will grow better as age adds its softening touch and they will be good houses as long as they endure. An attempt has been made to include examples of the various styles suitable for the living conditions in different parts of the country. While the colonial style seems to predominate, this is explained by the fact that more houses of this style have been erected.

Earl R. Maltby Co., Inc., North Tona-wanda, N. Y., manufacturers of Maltby Roof Products, announce the appointment of Forrest O. Poor, as Western manager with headquarters in the Leiter building, Chicago.

New Revised Edition of the Handy-Man Plumbing and Heating Encyclopedia—The unique combination of a practical book of details on plumbing and heating and a catalog of all the infinity of things pertaining

to that branch of the building industry, with both retail and wholesale prices, is one of the distinctions of the business system of the Hardin-Lavin Company of Chicago. Almost simultaneously with the issuance of the new edition of this work is the company's announcement of preparation for a substantial enlargement of their plant and the acquirement of the property adjacent to their factory for that purpose, a convincing indication of a satisfied and growing clientele. The Hardin-Lavin Company sell direct to contractors and builders and the Handy-Man book is prepared with reference to the needs of this particular class.

Exhibits of the Southern Pine Association.—Announcement is made that several new house models, finish panels, racks, posters and a variety of other interesting features have been added to the Southern Pine Association's stock of exhibit material, in preparation for exhibits which the association will conduct at a number of state fairs and building shows during the coming fall months. At present the association has exhibits scheduled for the following events and cities:

Central States Fair and Exposition, Aurora, Ill., August 18-26.

Oklahoma State Fair, Oklahoma City, September 23-30.

Tri-State Fair, Memphis, Tenn., September 23-30.

Mississippi State Fair, Jackson, Miss., October 16-21.

American Royal Live Stock Show, Kansas City, Mo., November 18-25.

Home Builders' Show, Jacksonville, Fla., in December.

The association also will stage exhibits at a number of points in Ohio, through arrangements with the Ohio Association of Retail Lumber Dealers.

A New Lime Stucco Bulletin

IN a handsomely printed and illustrated 48-page bulletin, No. 307, issued by the National Lime Association, Washington, D. C., the essential qualities, historical development and use of lime stucco is comprehensively set forth, with a description of modern properties, its application and specifications. The association announces that it has endeavored to bring together all the reliable information about lime stucco, both ancient and modern, and to present the best accepted practice in the making and the use of the material that can be determined from the search of literature and consulting the experiences of plaster specialists, engineers and practical builders, architects and manufacturers of lime and sand and technical men in Federal, state and institutional service. D. Knickerbacker Boyd, architect and structural specialist, has had a leading part

in the collaboration, and John J. Early, sculptor; Warren E. Emley and J. C. Pearson, of the Bureau of Standards, and Professor Alfred H. White, of the University of Michigan, reviewed the manuscript. Bulletin No. 307 may be safely estimated as the most comprehensive and authoritative publication on the subject of lime stucco as it is the most recent.

New Heating and Ventilating Reference Book

THE "Guide" of the American Society of Heating and Ventilating Engineers has just been published for 1922. This volume containing accurate reference data for the design and construction of heating and ventilating installations, will be found particularly useful by architects, engineers, and contractors. The information is compiled from the Society's transactions, the investigations of its Research Laboratory, and the practice of its members, together with a Catalogue Data Section giving essential and reliable facts on manufacturers' equipment.

The first section of 100 pages gives the standards adopted by the society, committee reports and technical papers, and a variety of heating and ventilating subjects.

The second or General Data Section of 100 pages, covers heat losses from buildings; transmission constants for building materials; data on boilers, radiators, chimneys; pipe sizes for steam heating; pipe sizes for gravity hot water heating; friction of water in iron pipes and elbows; expansion, steam and typical radiator connections; dimensions and capacities steam vacuum pumps; properties of air; psychrometric charts and tables.

The third and fourth sections give modern engineering and equipment practice and a directory of consulting engineers. The concluding or Catalog Data Section, illustrates and describes the various equipment manufactured for heating and ventilating work. The headings under which this material may be classified are: air conditioning, drying, electrical equipment, dust collecting, fans, heating boilers, special heaters, humidifiers, insulating materials, pipe fittings, pumps, radiators, registers, regulators for dampers, humidity, pressure, temperature, and water; separators, heating specialties, stokers, strainers, thermostats, traps and valves for air, back pressure, diaphragm, hot water, modulating, radiator, reducing, safety, thermostatic, vacuum; ventilators, water heaters and water treating apparatus.

The volume contains 360 pages, is adequately illustrated, and every department is cross-indexed. It is of convenient size, 6x9 in., bound in cloth and may be obtained from the American Society of Heating and Ventilating Engineers, 29 West 39th street, New York City, for \$3 per copy.

National Builder

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Volume 65 September, 1922 Number 9

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More Ideas and More Progress

YOU will find in this issue that more ideas have been added by taking out the detachable supplement and making room for several more plans and suggestions in the body of the paper, which it is believed will be found more valuable. This gives to you this month, instead of one detailed plan, complete plans of one apartment house and four dwelling houses.

* * *

This has been done at the suggestion of a number of subscribers. Whether these represent the majority remains to be seen. What do you think about it? Do you think this will give you better service than the detachable supplement? Some liked the detachable supplement because they could take it out and file it away for reference. Others say that this is not as valuable as getting several plans, such as the five in this issue, making a note of each plan as to its character and filing these as a reference index to the pages in "National Builder" itself.

* * *

If you will look over this issue carefully, from cover to cover, you will see that there is being recorded here from month to month the latest ideas, improvements, methods, and all that make a living stream of progressive movement in the building industry.

* * *

It is impossible for us to be sure of providing back numbers. Sometimes we have to watch carefully to reserve the necessary copies for our own use.

* * *

So we want to impress on you that you miss much more than the cost of the "National Builder" by not getting into action Now and subscribing at once. Two dollars for one year or three dollars for two years is a mighty small insurance premium for keeping you up-to-date.

* * *

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NATIONAL BUILDER

Volume 65

CHICAGO, SEPTEMBER, 1922

Number 9

The Situation

REPORTS from various parts of the country vary as to the effects of railway and coal mine strikes on the building situation. In New York City and the East generally shortage of coal is already a serious handicap to the manufacture of cement, lime and brick. Stocks of window glass are abnormally low and it is anticipated that fuel shortage will delay the fall opening of glass manufacturing plants. Consequently prices are rising and building work is falling off.

On the other hand in the South and in California, builders are looking forward to an unusually active season. Here, and in other sections of the country like St. Louis, Mo., where the opening of the season's work was long delayed, the demand for dwellings seems to remain as great as ever.

Plan Now for Winter Work

There is some danger that a combination of high prices, fuel shortage and railway freight embargoes will cause a considerable slackening of construction between now and cold weather. All the more reason exists, therefore, for a study of seasonal unemployment with a view to continuing operations in spite of cold weather, when fuel and railway situations are relieved.

"Until some satisfactory method to more evenly distribute throughout the year local construction and maintenance requirements for labor and materials, has been developed, it will be difficult to avoid inflating a busy construction period with work which could be done during a dull period," says a recent report of the New York Building Congress. "The present inclination of the American people, particularly with regard to construction, is to build everything all at once, or to build nothing at all. Considerable progress has been made toward alleviating this condition, and the public is gradually awakening to the fact that it contributes largely to its own high construction cost by virtue of its seasonal and intermittent demands on the available supply of labor and materials, thereby imposing a 'readiness to serve' charge upon the construction industry to meet the rush demands, to pay for much capacity of services and production equipment left idle at certain periods of each year."

Agricultural Outlook Good

This year will see one of the largest potato crops on record, a good cotton crop and a wonderful hay crop. The other major agricultural products, corn, wheat, and cereals generally are due for as large crops or larger than in 1921. The northern fruit crop is tremendous.

Building material producers and farm equipment manufacturers predict that 1923 will be a banner year for farm and rural development. In the Northwest a large volume of school, court-house, lodge building and similar construction is in progress and as much more is in prospect. Speaking

it is difficult to see how building trades mechanics can maintain present wages.

On the other hand increased costs of operation will likely prevent any reductions in building materials. Coal is such an important factor in the production of all the principal building materials except lumber that high prices for coal will offset any gains in other directions. The settlement of the coal strike on the old wage basis and the agreement of the coal operators to collect dues for the unions leaves the coal situation just about where it was.

Uncertainties Worst Feature

The most discouraging feature of the present situation is the tendency on the part of all concerned to temporize and delay the meeting of the real issues. The bituminous coal strike settlement will last only until next April when the same show may again be staged. Almost all building trades agreements will expire next spring. Only the railway shopmen's case seems likely to be definitely settled, and if the railways win this there is considerable reason to believe they will handle the wage issues of their other employees in somewhat the same way. These unsettled conditions will certainly have a tendency to keep prices up.

Others predict a continuation of the rise in prices on the ground that we have or will soon again have too much paper currency (expanding credits) both in this country and abroad. The editor of *Engineering and Contracting*, who is a well-known economist, "looks to see average wholesale prices rise 30 per cent, and they may even go 50 per cent above the present level, or not far below the peak of 1920. We have all the money machinery with which to produce such an inflation, and we have more gold on which to base inflation than we had when the peak prices of 1920 occurred."

Probably no one is wise enough to say how much of the recent increase in the cost of construction has been caused by the great demand for construction and how much has been caused by economic conditions described in the quotation. Perhaps the most significant thing in connection with the returning high prices is the recent announcement by the United States Steel Corporation of a 20 per cent wage increase.

Plans With This Issue

I*n place of the usual insert sheet showing the details of one house, this issue of NATIONAL BUILDER contains complete plans of an apartment house and four dwelling houses. These are as complete as the usual large inset sheet but are reduced to our regular page size. How do you like them?*

of the present demand for building materials in the rural districts a representative small city dealer in Minnesota said: "The dealers have noticed an unusual thing about this year's business which is that the farmers are giving much more attention to the improvement of homes than in the past. The usual demand is for materials to go into the construction of barns, whereas this season the demand has been for materials for home building."

Labor Situation Unchanged

The great demand for building trades labor has made wage scales a minor consideration. Present wage scales of building mechanics are undoubtedly higher than for the same grade of labor in other industries. The hourly scale that the railway shopmen refused to accept is generally less than the present scale in the cities for hod-carriers. The railway shopmen seem to be beaten, on the wage issue at least, and

A Snug Little Building Construction Organization

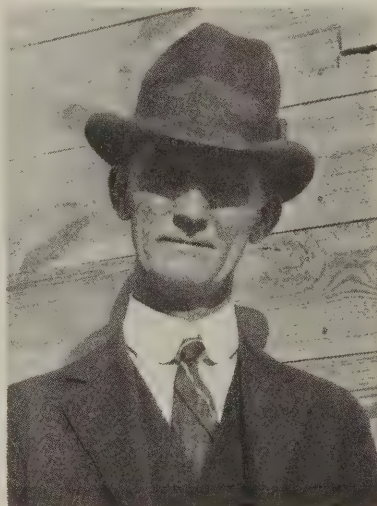
R. L. Waide, of Houston, Texas, is Owner, Manager, Designer, Supervisor, General Foreman and Bookkeeper of an Efficient, Reliable, Building Organization

A TYPE of rugged, honest, self-reliant, self-taught, conscientious building contractor is R. L. Waide of Houston, Texas. He was born in Mississippi and is a good example of the native American of Dixie Land. An older brother was a country builder and contractor and Mr. Waide's first construction experience was in working for this brother. However, his native independence soon asserted itself, and he early decided to branch out on his own initiative.

Like most other contractors, he has experienced all the ups and downs of this uncertain game, but he has met them smiling, with the same fortitude he fought off an early death from rheumatism. He banked his all on honor, honesty and good workmanship, and is now beginning to realize on this steady investment in reputation.

Mr. Waide's business, also, is a good demonstration of the fact that it is at least a debatable question whether a large organization with great resources of money, men and talent, or a small organization with the close, personal management of the proprietor, is the most efficiently working. For ex-

this tremendously large organization. What a large organization gains from volume of



R. L. Waide, contractor, Houston, Tex.

output and economy in purchases of raw materials it often loses in wasteful and in-

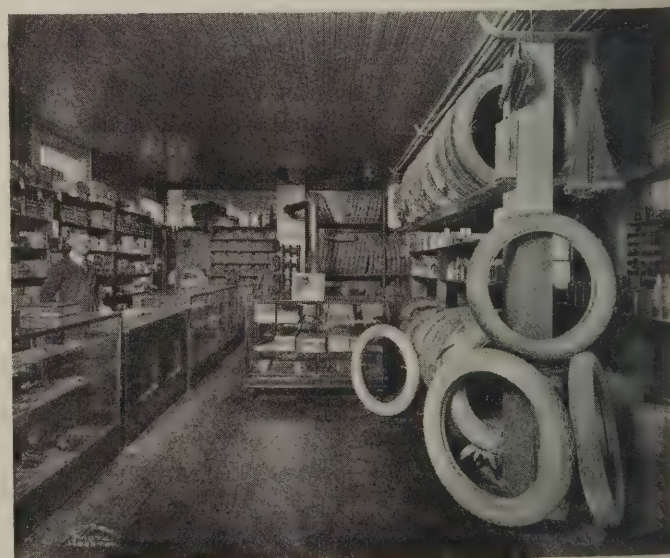
one-manager organization profits from having no "overhead," and if the manager is a "live-wire" also profits much from closer and more intimate supervision of the work and the better feeling and good-will on the part of the workmen, who thus really know the "boss" himself and not merely his high-salaried representative.

As every reader knows, the building business, big or little, above all others, requires close supervision and a high order of executive ability and where a local builder or contractor has these qualities and is able to acquire a thorough knowledge of the other branches of the building business, he never will have cause to fear competitors, no matter how large their organizations.

Mr. Waide has graduated from the school of barn and house building in the country to a specialty in the better grade of residences and commercial buildings in the city. He has but one scheme of operation—cost plus 10 per cent; and he always has all the work he can personally attend to. He is often in the unusual position of being sought after and solicited to take work; and not



Harrisburg filling station and store



Interior of Harrisburg store

ample, some economists contend that small, personally managed competitors of the United States Steel Corporation can manufacture more efficiently and cheaply than

different management, divided authority and scattered responsibilities. The "overhead" becomes the most important factor in cost of production. On the other hand a small,

infrequently is in the unique position of having to turn away such work, because of his inviolable rule not to undertake more than he can personally handle *and conscien-*



Geo. L. Glass & Sons' store, Houston

tiously do well. By persistent devotion to these principles he is now in a position to pick his clients rather than seek them.

Mr. Waide takes considerable pride in the fact that he is "the only white-collared" man in his organization. He not only makes his own designs, writes his own specifications, keeps his own books, but superintends two or three jobs simultaneously—this being the limit that he will have under way at one and the same time. Two of the buildings shown herewith, the automobile accessory store and warehouse for George L. Glass & Sons, and the bottling works for Green & Green, both in Houston, are not only fair samples of his work but both being under construction at the same time represent Mr. Waide's limit of construction work for the time being.

Pride in his workmanship seems second only to Mr. Waide's pride in keeping within his original estimates. He says he has never exceeded his estimate and he seemed, in his interview with one of the editors, to be particularly happy because in one of the buildings under construction he was quite sure of making a substantial saving. When it is considered that the saving thus effected was wholly his client's and resulted in reducing his 10 per cent commission by just so much, one can appreciate the "sportsmanlike" attitude Mr. Waide has toward his work. In other words he regards his work as a real game of skill, and having set up a standard of cost that he has pledged his client and himself to keep within, he seems to feel all

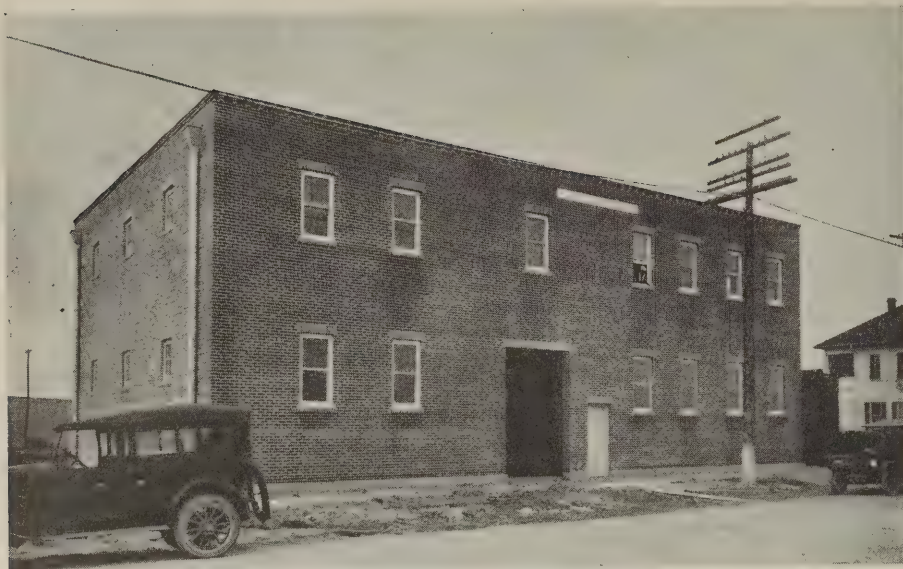
the thrill of a winner in a competition, if he can materially reduce that cost.

His skill in handling "Southern darkey" labor and his cleverness in getting results was shown by a little incident that happened while the editor was in Houston. There was a car of brick to be unloaded and it was

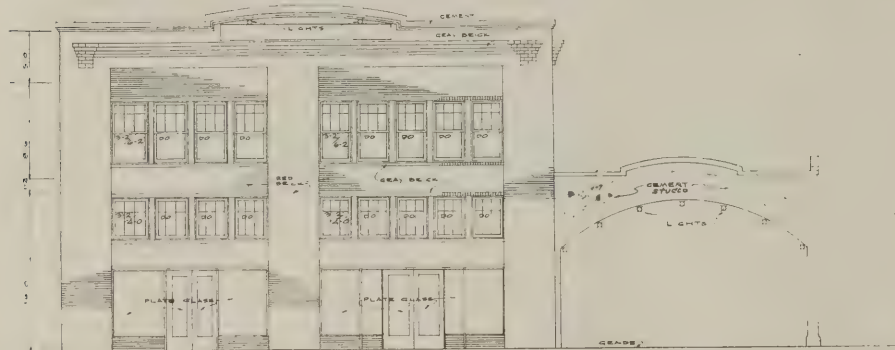
obvious if the work did not proceed faster there would be a demurrage bill to pay on the car as well as an expensive delay at the building. Mr. Waide simply told the squad boss that if he got the car unloaded before a fixed time that night there was a couple of dollars in it for him, and the gang could



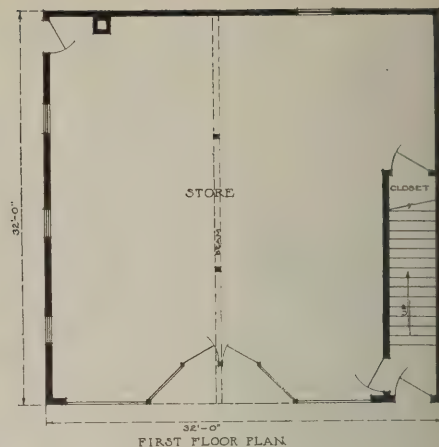
Interior Geo. L. Glass & Sons' store



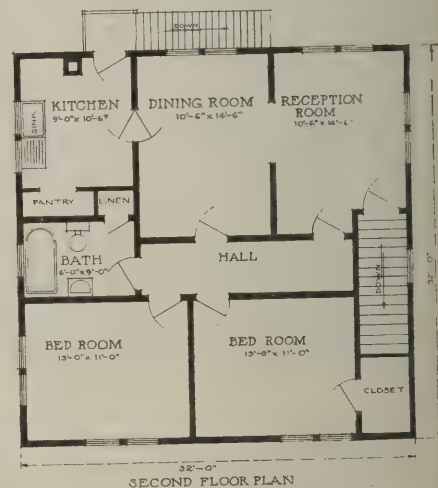
Bottling Works of Green & Green



Front elevation of Geo. L. Glass & Sons' store, Houston, Tex.



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Floor plans of Harrisburg store and filling station of Geo. L. Glass & Sons



Placing the concrete foundations for Green & Green Bottling Works



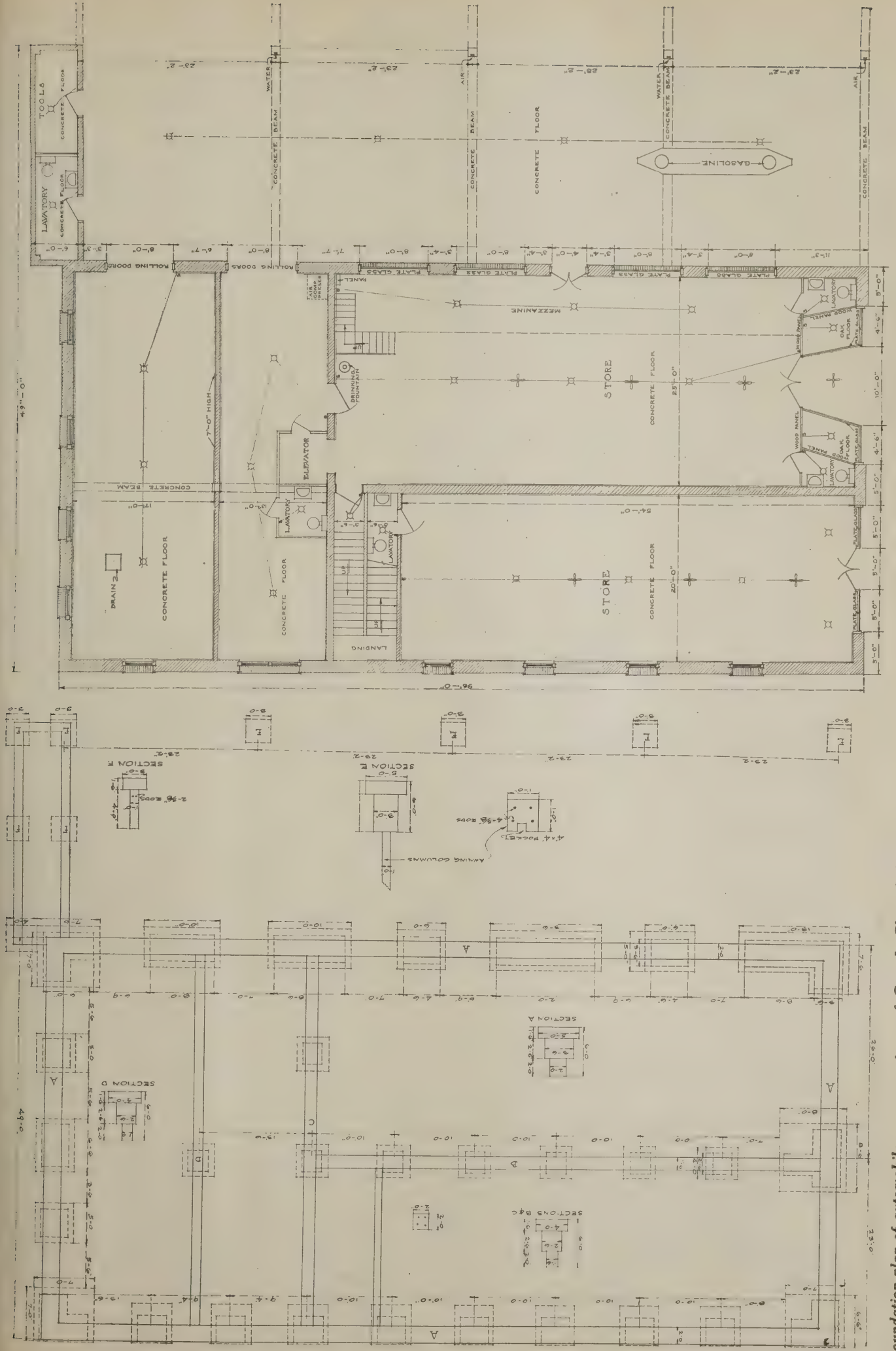
Use of 2-in. floor joists for concrete forms



Cross-ties and braces made of joist bridging

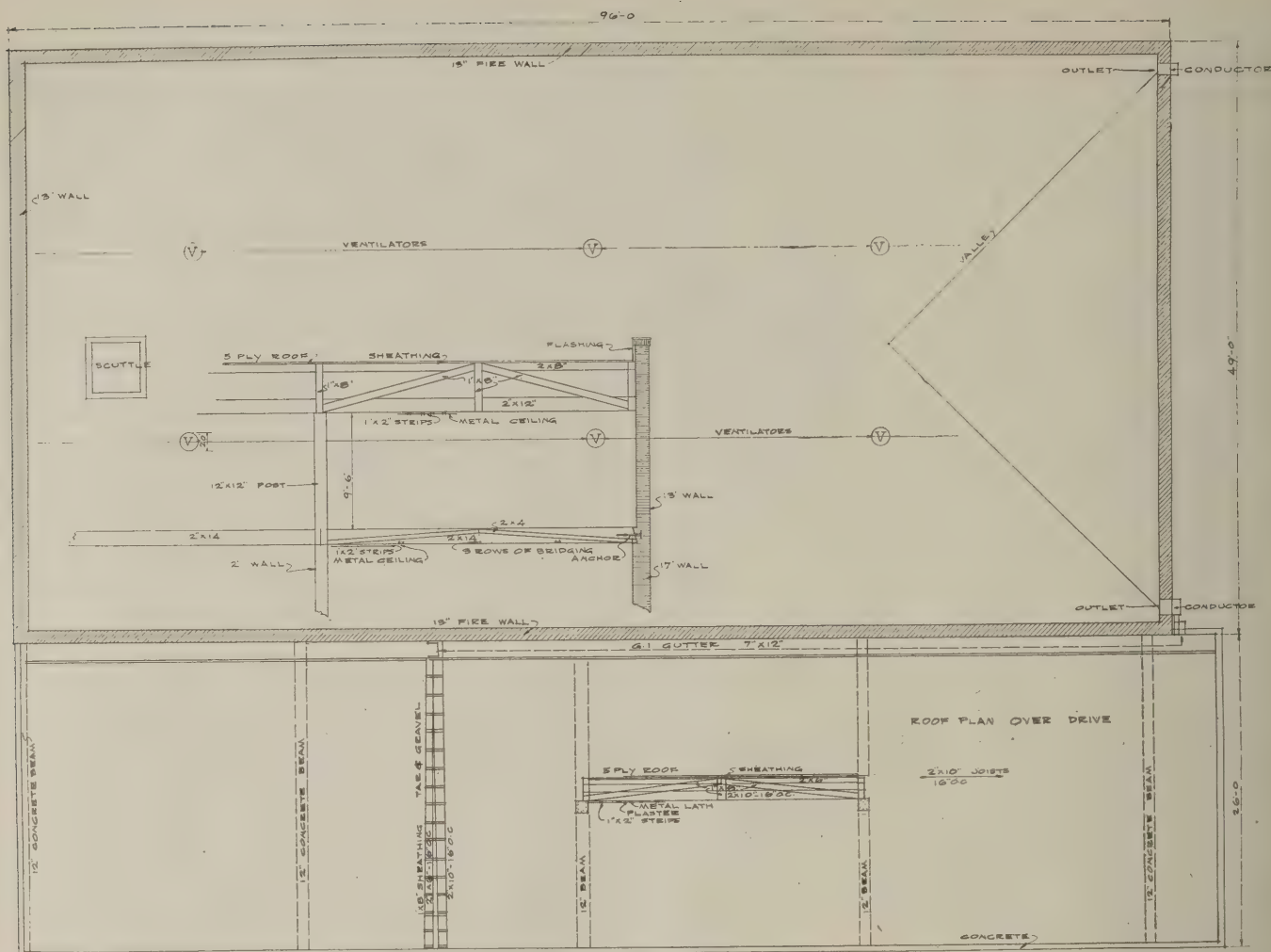


Covered curing bin for lime putty

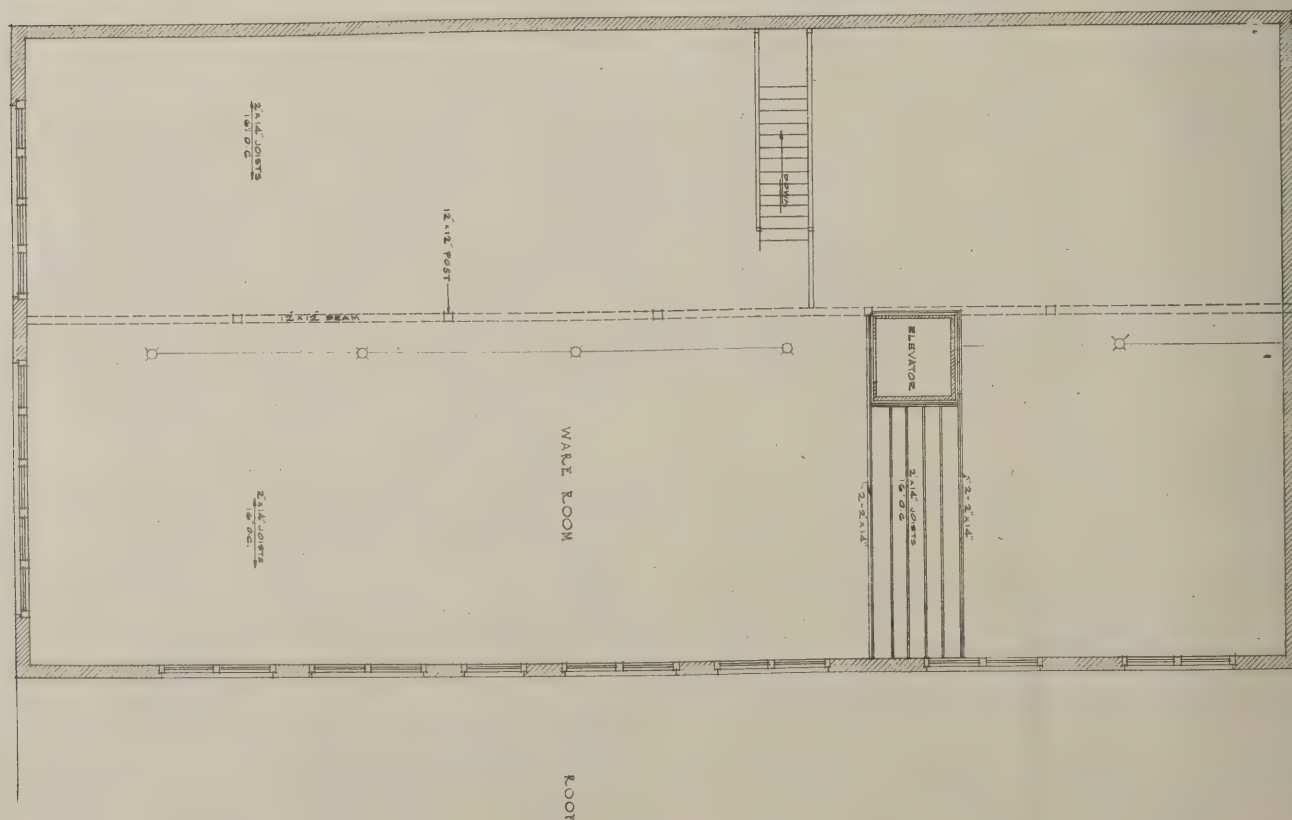


Foundation plan of automobile accessory store of Geo. L. Glass & Sons, Houston, Tex.

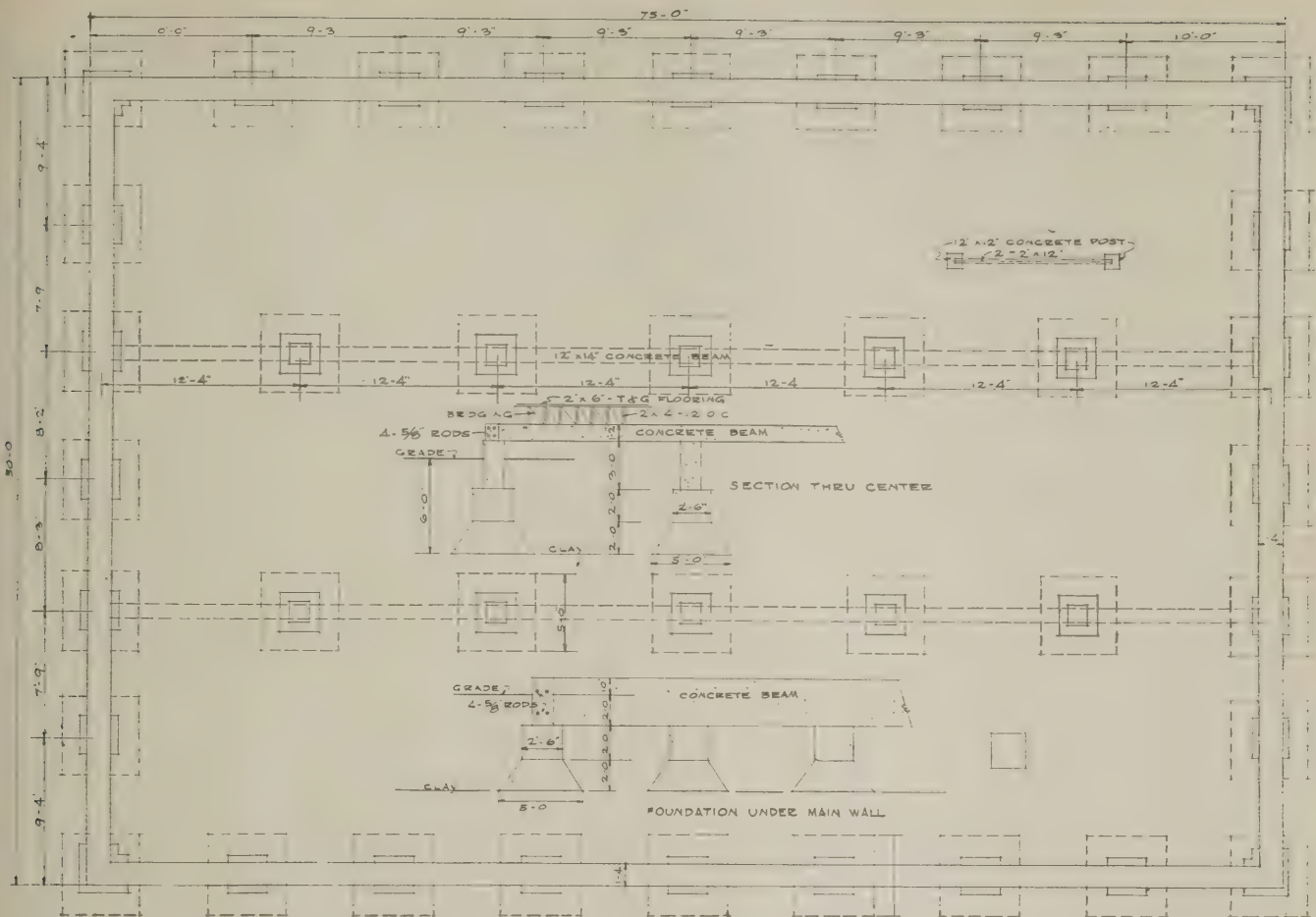
First floor plan of the automobile accessory store of Geo. L. Glass & Sons, Houston, Tex.



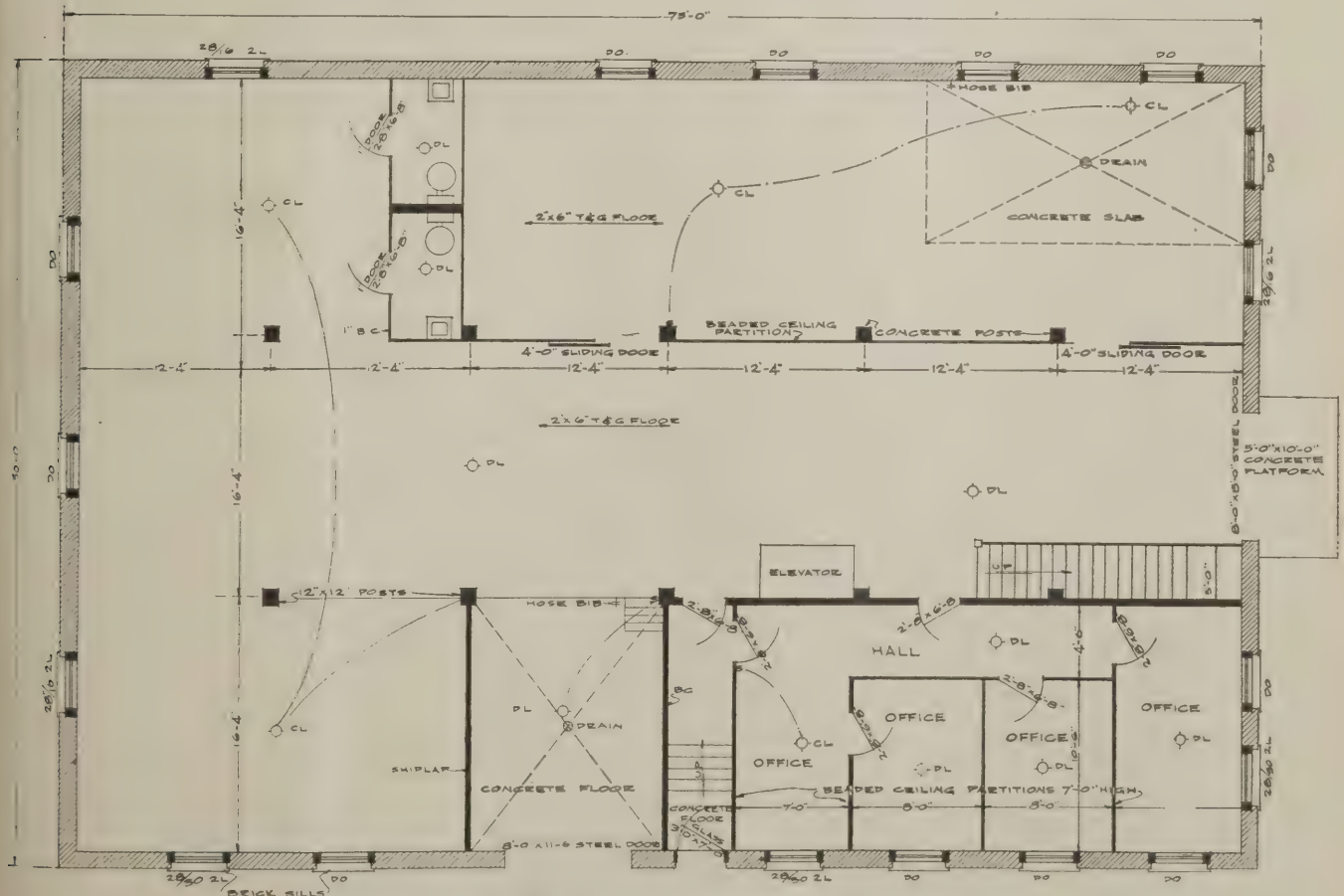
Roof plan and structural details of Geo. L. Glass & Sons' store, Houston, Tex.



Second floor plan of the automobile accessory store of Geo. L. Glass & Sons, Houston, Tex.



First floor plan of Green & Green Bottling Works, Houston, Tex.



Foundation plan of Green & Green Bottling Works, Houston, Tex.

knock off and call it a day as soon as the job was done. He stayed long enough to organize the unloading operation, the placing of the different workmen, etc., and then left them to go to it. The result was the gang boss got his two dollars and the gang got nearly a half-day vacation; but what is more to the point, they seemed to get as much enjoyment unloading that car as they would have had at a picnic—as darkies will when you know how to make them!

Two Automobile Accessory Stores

Two of the photographs and two floor plans herewith show a road-side automobile gas and oil filling station and accessory store at Harrisburg, near Houston, Texas. This was designed and built by Mr. Waide for Geo. L. Glass & Sons, of Houston, who were so well satisfied with Mr. Waide and his scheme of working that they soon commissioned him to build their new store in Houston. This is shown in detail.

This was an original design of Mr. Waide's, based on Mr. Glass' years of experience in the automobile accessory business. The building contains a garage and repair shop, a store for all automobile accessories, a covered filling station, and on the mezzanine or balcony and second floors, offices and store room for many thousand dollars' worth of stock. The contract price of this building complete was \$27,000.

Bottling Works

The third building shown in the views and plans is a carbonated water (or soft drink) bottling works for Green & Green, Houston. Here again is an original design, without frills, representing the joint product of manufacturer, who is to use the building, and the builder who builds it. The contract price of this building complete was \$15,500.

Incidentally the construction views of this building show one of the many ways Mr. Waide has devised to save cost. The forms for the concrete foundation girders are made wholly of the 2-in. timbers to be used later as floor joists. The bracing and ties used to hold the forms in place are the cut and ready-to-use bridging to be subsequently placed between the floor joists. Likewise every structural member in the form work had its ultimate use in the building itself.

Another example of his workmanship and thoroughness is the lime-curing shed erected on this job. Mr. Waide believes in the time-honored and time-proved formula of making lime mortar. He mixes up the putty weeks in advance of its use and allows it to "cure" thoroughly in a shed protected from the weather. When the bricklaying commences, the lime putty is removed as needed and mixed with the sand. Most contractors know that this makes a superior mortar or plaster, but unfortunately few nowadays are willing to take the time and trouble to thus make and cure the putty.

Mr. Waide's specifications are just as complete, and according to form, as if drawn

by any architect to protect his client from the wiles of an unreliable contractor. Both he and his client sign them as a part of the contract. No outside compulsion could replace the pride and joy he takes in living up to his own specifications. Likewise, what-

ever defects there may be in his designs for want of a more thorough technical education seem amply compensated for in his accurate and comprehensive practical knowledge and thorough appreciation of good workmanship.

What Makes a "Good House?"*

By Roy Childs Jones, A.I.A.

Assistant Professor of Architectural Design, University of Minnesota; Chairman Sketch Committee, Architects' Small House Service Bureau, Northwestern Division

SOON after I started to practice architecture, following more than six years of strenuous training, a dear but tactless aunt of mine asked "if architecture did not consist of making blue prints?" Experience has led me to believe that many people regard our profession from about the same point of view.

The only blue print I ever made in my life was done on the back porch, in a wash tub—with a result that has made me perfectly content ever since to send my drawings to the commercial blue-printer.

No, the trained architect tries to serve his clients with ideas, and not processes. The drawings and blue prints, spectacular as they may be, are to him not an end in themselves, but only a means to an end.

Architecture Defined

There is, among many definitions of architecture, one that seems to me particularly apt. It is this: "Architecture is putting into building certain qualities—namely, logic, strength, and beauty."

Do these words seem too high sounding when applied to small homes? I do not believe so. And the basic idea behind The Architects' Small House Service Bureau is just that. We are trying to make it possible for the American home builder to get all these qualities in his house.

Let us translate these three words, "logic," "strength" "beauty," into familiar terms.

What Is a Convenient House?

You have probably seen, or even lived in, houses that you called "convenient." Then again you have, without doubt, known an abomination that you called "inconvenient." In the latter kind Mrs. Homebuilder may have had to traverse three rooms and six doorways to get from the kitchen table to the front door when the postman brought the morning's mail. Or all the goings and comings between basement and kitchen and bed rooms had to be carried on in full view of a caller in the living room. Or else there was a bedroom with no wall space for a bed to rest its head, a kitchen without a place for a broom, or a noble reception hall

with no place for a hat or coat to hang.

In this same kind of "inconvenient" house Mr. Homebuilder found that all his best efforts with the furnace were defeated, because of a front door that opened up the living room to all the vagrant cold winds blowing down the street, or that a roof-pitch adapted to California, being built in Minnesota, was so flat that all the melting snow backed up under the shingles and leaked down on his more or less innocent head. The whole family may have got cross and fretful over a door that opened in everybody's way or over living rooms dull and cheerless because poorly lighted or faced away from the sun and air instead of toward them.

All these things that you call "inconvenient" or "impractical" come under the heading, "logic." Probably 60 per cent of the architect's effort, when he makes the design of your house, goes into getting a plan and section that will eliminate all these things we have been talking about, and include, on the other hand, all those hundred and one things that make a house really livable.

To make a five or six room house absolutely "logical" requires about as much concentrated gray-matter as to design a state capital.

Recipe for Low Cost

To get a house dimensioned and shaped and planned so that every room is as big as it needs to be, but no bigger; so that stairs not only begin in the right place on the first floor, but end in the right place on the second; so that you don't bump your head going up these same stairs; so that the front door doesn't admit the visitor directly to the family group around the hearth or dining table; to arrive at all these things without kinks and jogs and wriggles in partitions and roofs that complicate construction and increase costs—all that is what an architect means by "logic" in a design.

To summarize—"logic" means adaptability to conditions of site and family life, convenience of arrangement, simplicity and economy of construction. I ought to stress control of costs is possible. The nearest that word "economy"—because it is right here, in the plan and section, that the great-

*Reprinted by special permission from "The Small Home," monthly service bulletin of the Architects' Small House Service Bureau of the United States, Minneapolis, Minn.

that anybody has been able to come to an infallible recipe for low costs is in simplicity and straightforwardness of plan and section.

The architect has always to remember what his clients many times do not—that all the fascinating little angles and projections and jutting roofs and porches are expensive. If you insist on them you must pay for them. And this payment may not always appear as an actual addition, but may be absorbed in cheapening or slighting some more essential but less obvious construction.

House Must Stand Up

So much, briefly, for the "logic" of house design. As for "strength," you will know at once what has to be thought about in that connection. Houses must stand up. They ought to stand up a great deal longer than they generally do. These slap-dash, hurry-up times tempt us constantly to weak and flimsy materials. No good builder likes to build that way; no good architect likes to design that way. We try in bureau houses to indicate methods and specify materials that will make your house a valuable investment for many years to come. All this requires patience and understanding on your part—patience to spend perhaps a little more time and money to see that really good materials and methods are used; understanding to realize that strength is not on the surface, but in the things covered up and unseen.

"Beauty"

"Beauty" is such a misunderstood word that I hardly know how to talk about it. It has to be appreciated rather than demonstrated. It does not mean the same thing to all of us. Many people think it has to do with something quite outside of ordinary life, being expounded by "long haired men and short haired women," and attained only by wild-eyed, flowing-tied devotees.

To most architects, however, beauty means that quality of a building that gives us a feeling of pleasure when we look at it and live in it and especially as we *continue* to look at it and live in it. Many things catch our eye temporarily. Some catchy feature, some ornate elaboration may have a strong but momentary interest for us. Sometimes, too, we only like something just because we are used to seeing it.

Must Have All Three

Just one thing more. What the architect tries to keep in mind always is the *combining* of the three qualities we have been talking about in his designs. Logic, strength, beauty—you can have any one without the other two, or any two without the other one, but you won't have a good house. How many practical, well-built houses there are without an atom of beauty to them! And, on the other hand, how many smug, pretty little honeymoon cottages that wouldn't survive a dozen years.

The Architects' Job

A house is the product of many hands and minds. The owner needs certain accommodations; the lumber dealer, the brick dealer, the manufacturer supply the materials; the carpenter and the mason supply the craftsmanship. The architect conceives his job to be that of coordinating, through his design, all these needs and materials and skill into a better arranged, better built, and better looking house than could otherwise be built.

Colonial Still a Model

Mrs. Homebuilder of the nineties may have thought mutton-leg sleeves very beautiful when everybody wore them. But what does Mrs. Homebuilder of 1922 think of them when she comes across some of them in an attic trunk? It's an extravagant process to build houses as we buy clothes, just because they are the fashion of the hour. Just as there are clothes that are designed with certain inherent qualities that make them good looking for a long time in spite of the temporary changes of fashion, so

there are houses that will look well for fifty or a hundred years in spite of what Tom, Dick, and Harry builds. Our Colonial houses are still models for us after two centuries.

And these inherent qualities that make a house permanently beautiful, might be called naturalness, simplicity, and proportion. They do not mean ornamentation, or jig-sawed brackets, or uselessly projecting eaves, or false rafter ends, or porch columns two feet thick when six inches would be strong enough. Good taste means generally restraint—not putting on things that just don't naturally need to go on. Beauty in houses means generally the simple, natural grouping, in good materials, of just walls and roofs and windows. Then if there can be a few little touches of interesting detail to add charm and variety, some shutters at the windows, a latticed porch, a flower box, a bit of terracing and planting to tie the house to the ground—that is about as near as I can come in words to telling you what I believe a beautiful house means to most architects.

Weatherproof Windows in St. Louis School Buildings

DISCUSSING the economy of heating various types of buildings and the leakage of air into them from various sources, at a recent meeting of the American Society of Heating and Ventilating Engineers, E. S. Hallett, chief engineer of the Board of Education, St. Louis, Mo., said:

"There seems to have been no effort made in building to get a standard wall or

outside air to zero. We have probably the most improved windows that have ever been built in our school buildings to make them airtight."

The details of the window and casing that Hallett thinks so much of are shown herewith. Mr. Hallett further describes them as follows:

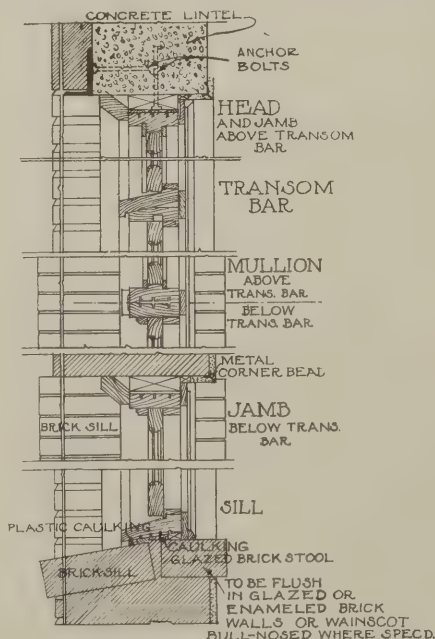
"These windows are the casement type using the Whitney, Hoffman or similar hardware in which the windows spring into place. These windows have proven drop tight with a hose playing full on the window from the outside for sometime.

"The frames are caulked and the sub-sill is made tight with plastic caulking. It is certainly worth while building windows of this class in view of the great economy of fuel that results from their use.

"Before the introduction of ozone and the conservation of heat in the air it was of little moment to have leaking windows, but now we are furnishing the reconditioned air and the loss of heat is of great importance."

Cracks in New Floor

MAKE a putty of common glue 2 parts in 14 parts of water, stirring in 4 parts of plaster of paris and 2 parts of dry litharge. The glue is best prepared by soaking it in the water until perfectly soft, putting the vessel containing it in another vessel containing hot water and further heating until the glue is dissolved. The other ingredients may then be stirred in.



standard window. In St. Louis we have gone the limit to reduce the infiltration of

Apartment Houses With a Minimum of Waste Space

Tenement-House Project in New York City, Designed by Andrew J. Thomas and D. Everett Waid to Be Good Investment at Rentals Within the Means of the City Working Man's Income—The Same Principles and Methods Should Be Applied to Professional House Building

A DECENT place to live for the family with an income of \$100 per month or less can hardly be said to exist in a city

more fortunate class of people, few of the necessities of a modern habitation.

The problem of providing decent living

building a structure that will show a profit with a minimum of rental per unit—the problem of cutting construction and operat-

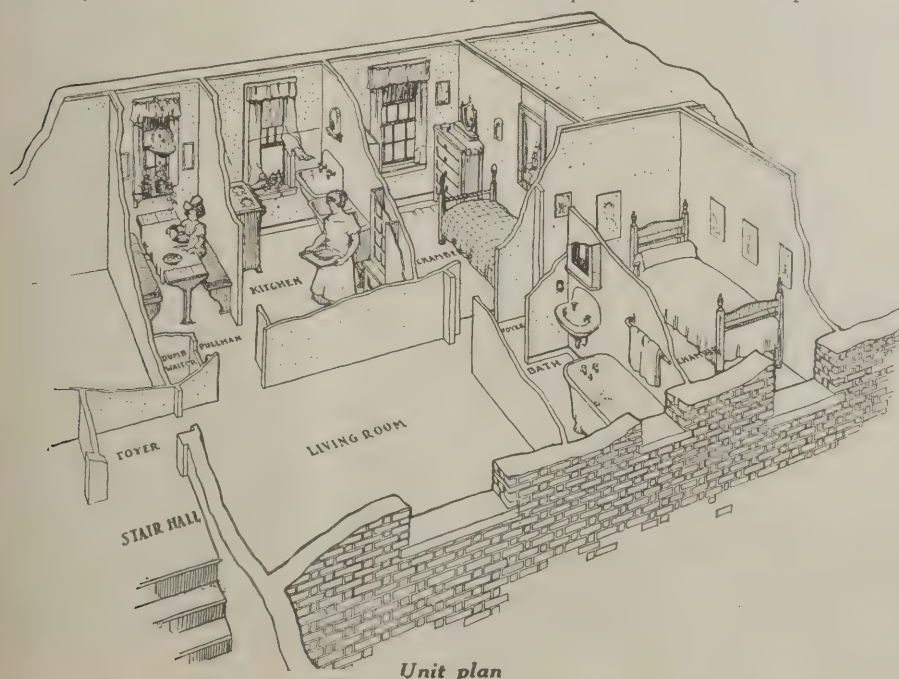


Tenement house project, Metropolitan Life Insurance Co., New York City

like New York. The ordinary tenement house in such a city contains none of the comforts, and in the estimation of the

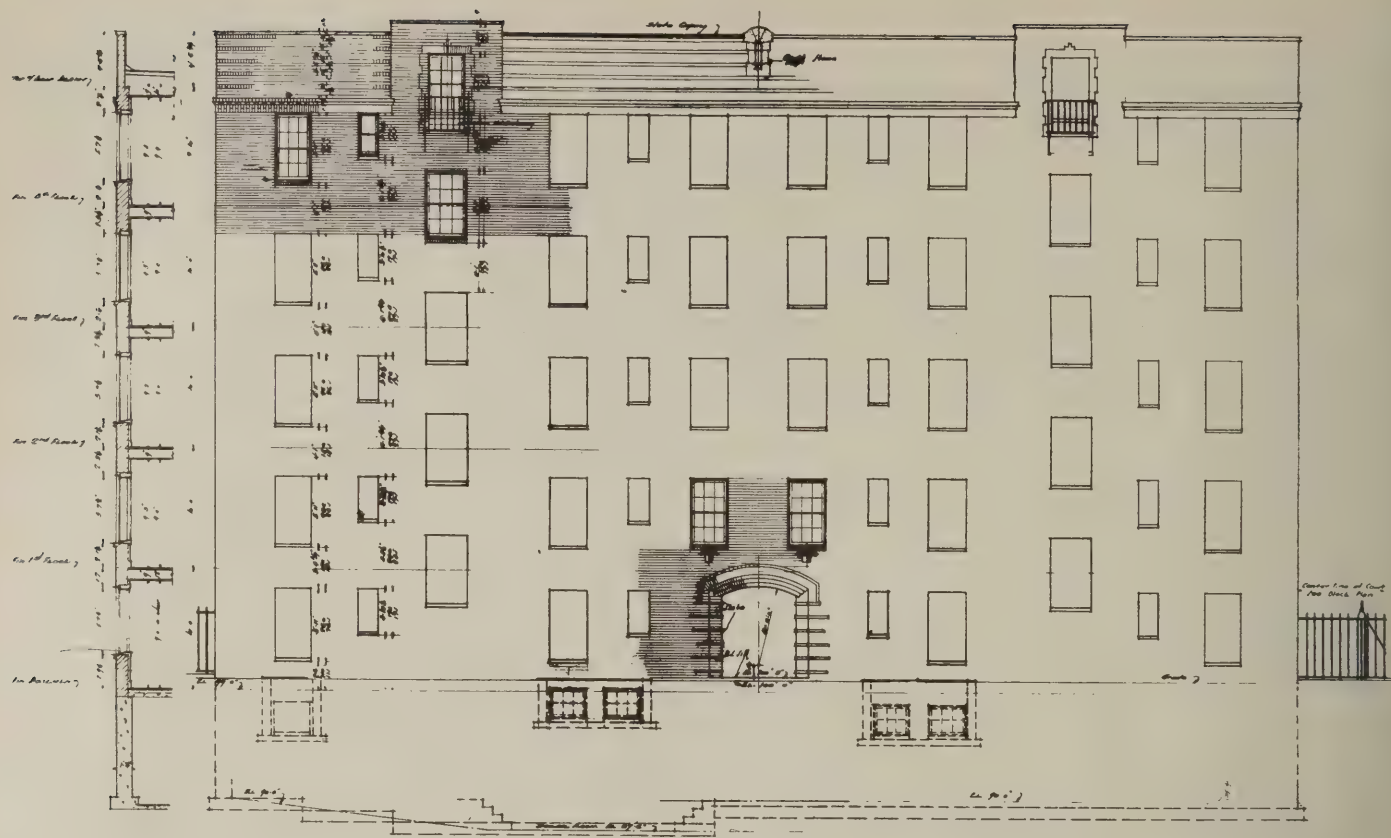
quarters for the poorer people in a large city is a business problem and not a philanthropic one. It is the problem of

ing costs to the minimum consistent with the ends to be attained. To accomplish these ends without entirely covering valuable building lots with the structures, and without building so cheaply and flimsily as to destroy the life and the appearance of the structure inside and out, required long study by two of the foremost housing experts in the country.

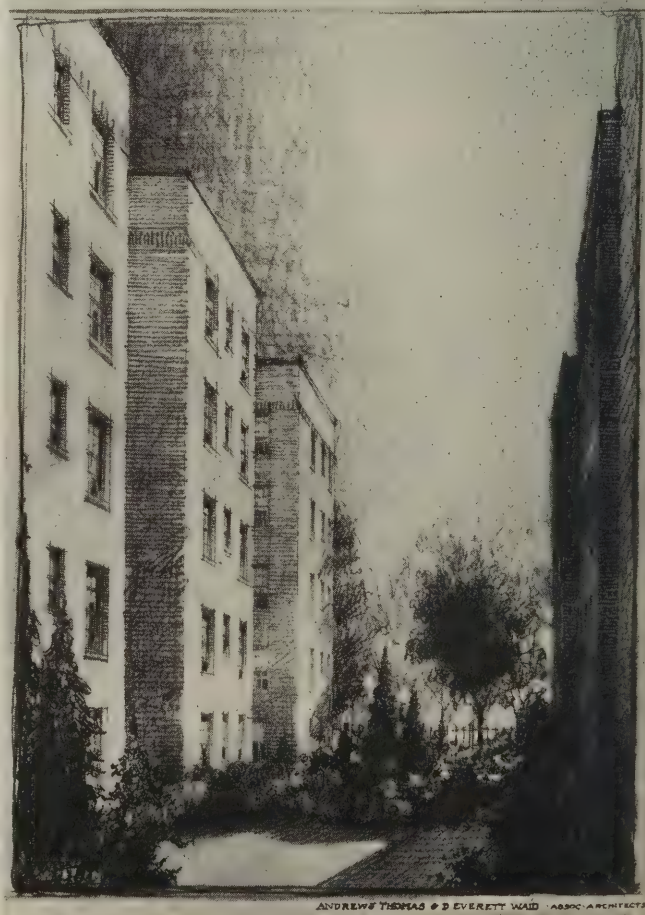
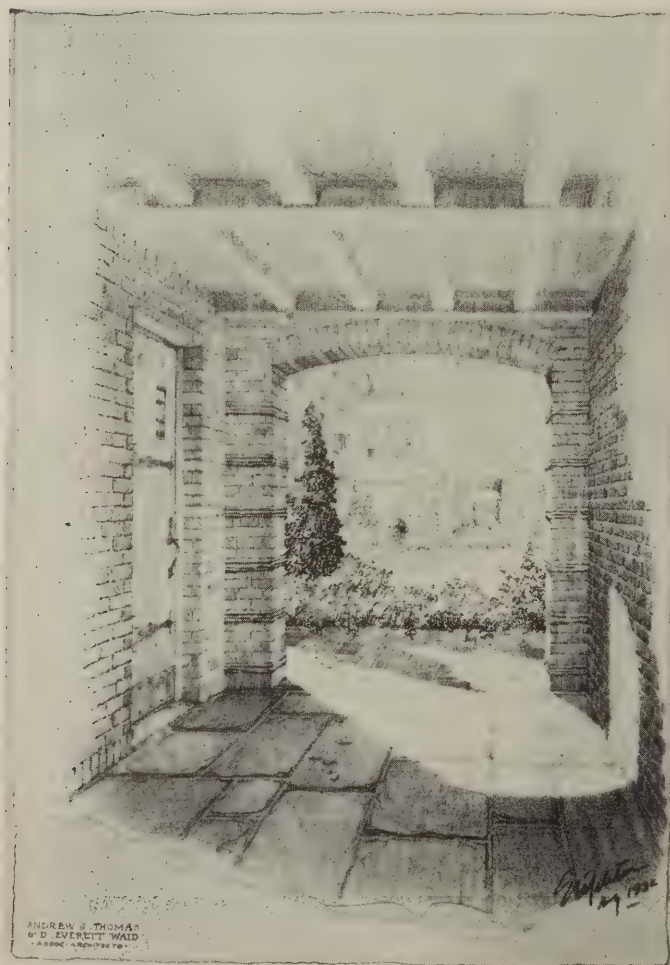


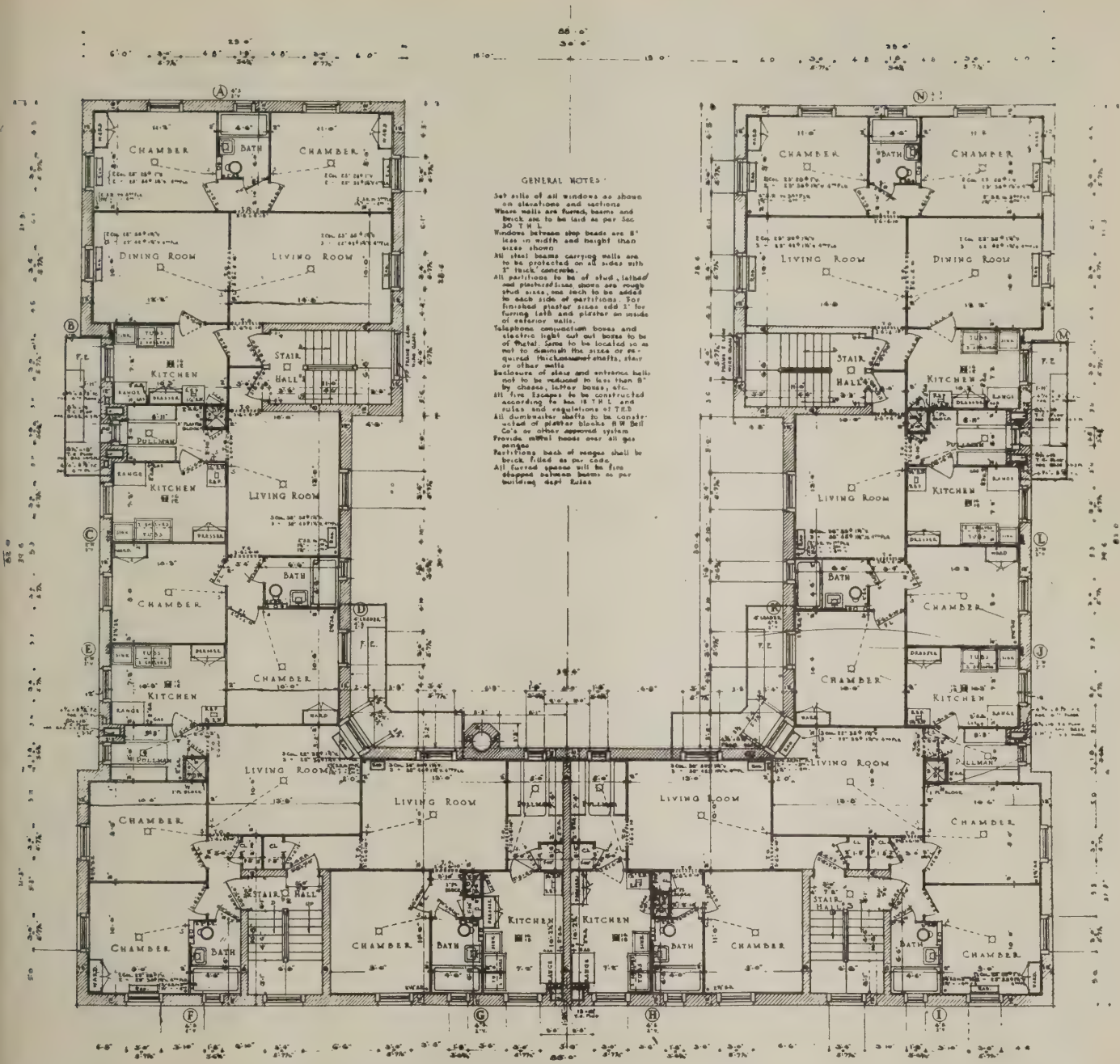
Unit plan

The occasion for this study is the housing project about to be started by the Metropolitan Life Insurance Co. in New York City, which will comprise 50 buildings, each housing 39 families, a total of 1950 families, occupying 8250 rooms. The study was made and the designs produced by Andrew J. Thomas and D. Everett Waid, associated architects, of New York City. Readers of NATIONAL BUILDER will be the more interested in these designs from the fact that they could have worked out only by an architect with a most comprehensive knowledge and appreciation of the *business side of architecture*. Mr. Thomas is such a man and he gained this knowledge and appreciation of business as a real estate promoter, or professional builder, before he took up architecture as an art.



Front elevation



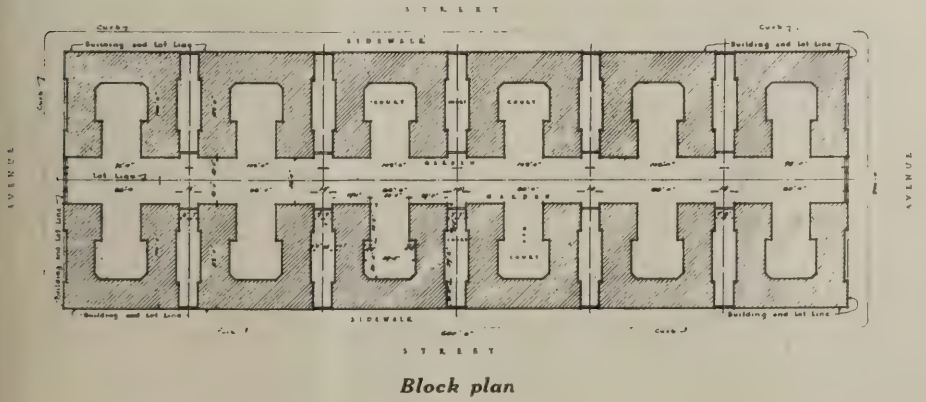


Plan of first, second, third and fourth floors

Space-Saving Floor Plans
What will chiefly interest architects and professional builders in other cities is the

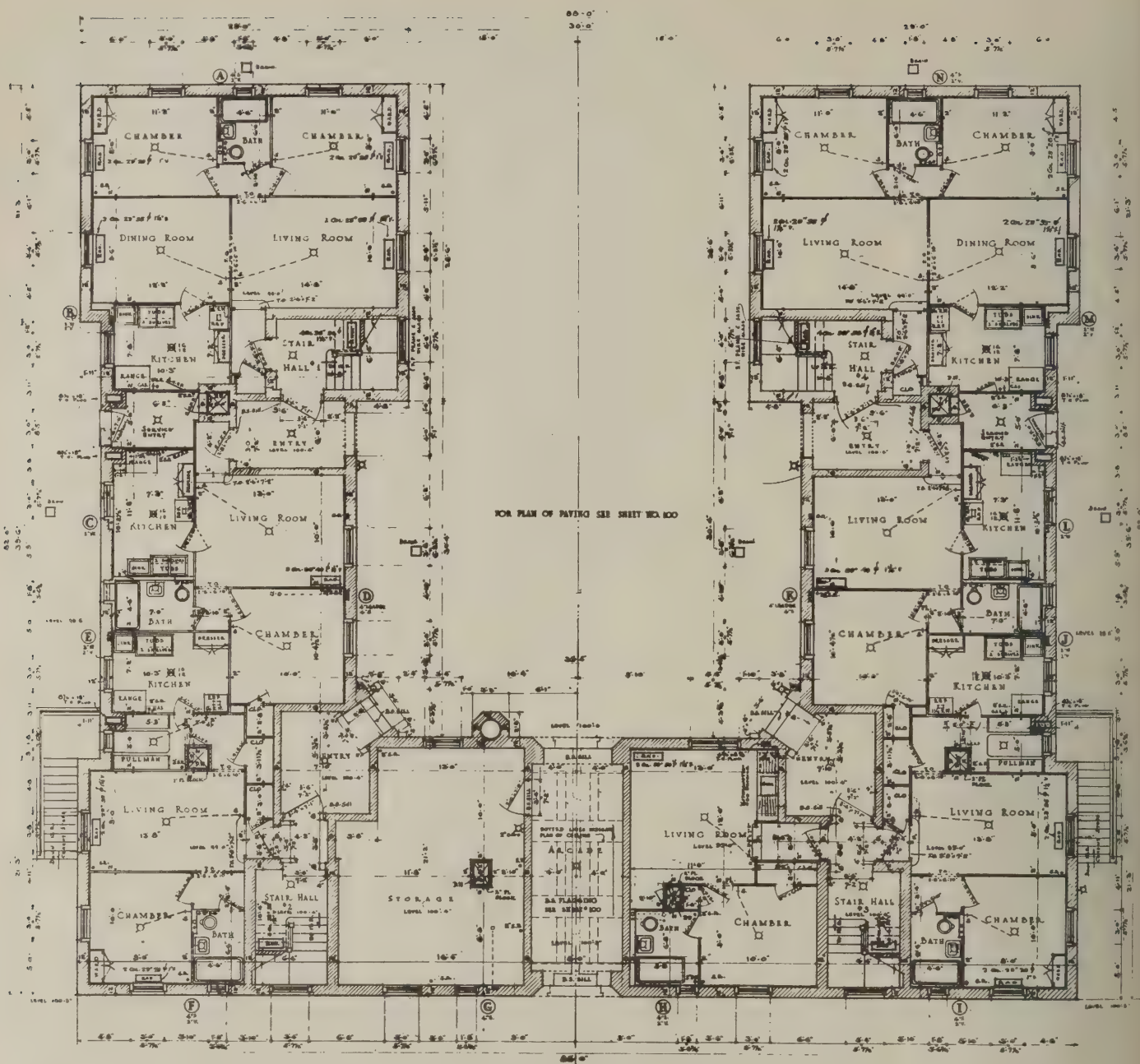
economy of these designs as exhibited in the floor plans. These absolutely eliminate waste space and thus provide for housing

as many people per building or per acre as the value of the land requires, but leaving at the same time space on the lots for courtyards and a passage between buildings, wholly lacking in present buildings of a like nature.



Block plan

Economies in Large Scale Operations
But the economies of the design do not end there. The *American Architect* says: "The economies which have been worked out in the design extend from the main essentials to the smallest details of architecture. More than anything else, the large scale of operation creates the greatest savings. The benefits of large scale operation and organization are just as great in housing as in any other form of production. They extend to design and construction,



Basement plan

that is to say, the use of materials, and the buying of materials, the systematizing of erection, and—equally important—the maintenance and operation of the houses after they are completed. . . . In these economies, the repetition of one unit fifty times permits the design of that unit to be perfected with great care, and in a manner which would not be possible, because too expensive, if a single unit only were to be built.

"Concentration of space, compactness of details, the fine openness of the plan, the careful consideration of every brick and every piece of timber and trim, the use of stock details, and the careful working out of the mechanical features of heating, plumbing and electricity, where every foot of piping and each valve has been calculated as to cost and efficiency—these are

some of the problems solved and ends achieved. As examples, the excavation work has been almost eliminated by placing the heating plant along the fronts of the building, requiring only one long trench on each street. Windows are generally of one size.

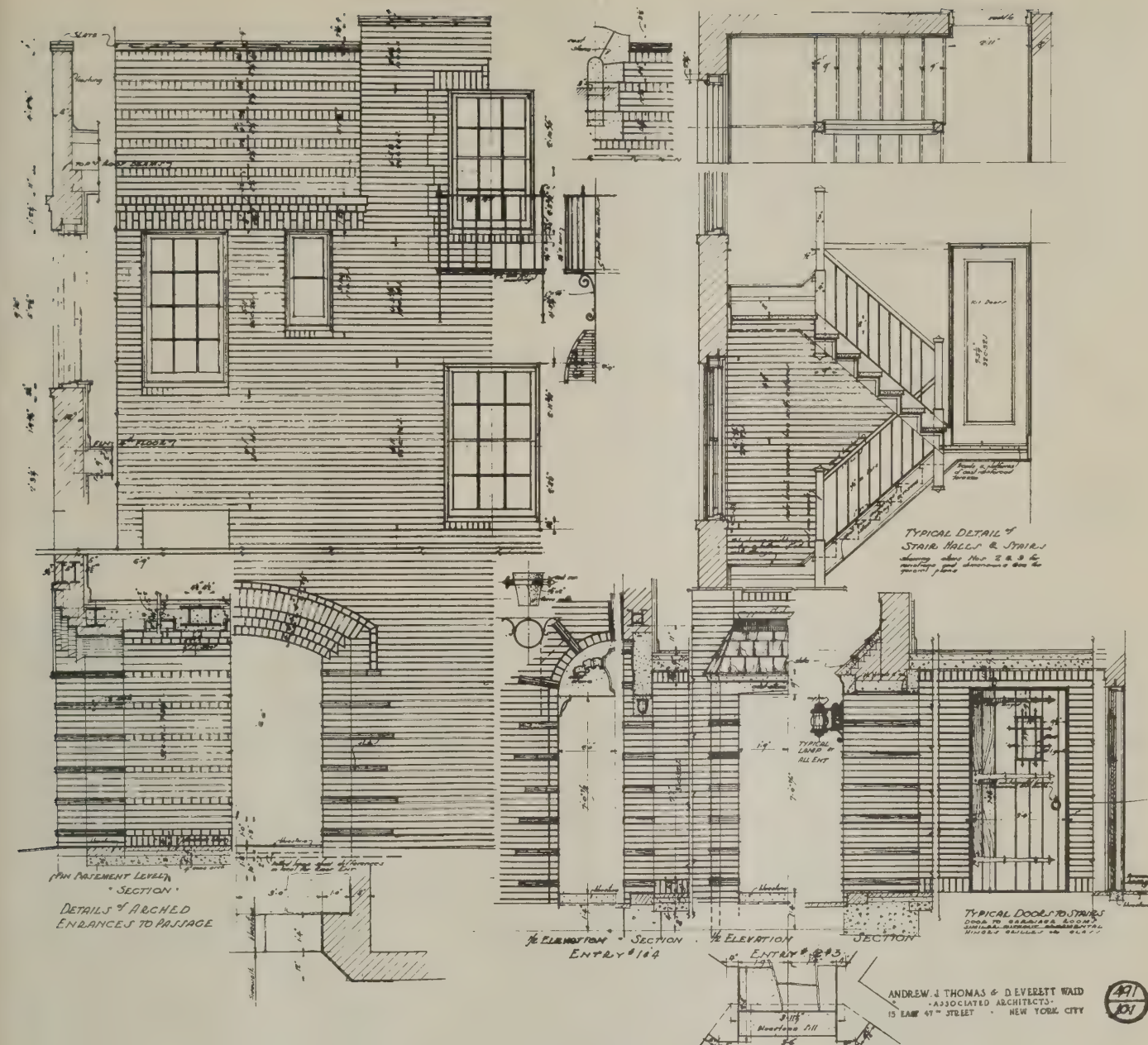
"Great as these benefits are, however, they are not as important as the advantages gained by big scale planning of a city block as a whole—probably the highest point housing economies can reach.

Space Saved for More and Better Rooms

"Because of this concentration of space in the apartments themselves with elimination of non-rent paying space in the form of public corridors, the plan of the buildings has been opened up to give the maximum of sunshine, of circulation of air and

of cheerful outlook. Each unit stands free, and as the picture shows, dividing the usual solid street wall into twelve buildings. Together they occupy approximately only 50 per cent of the area of the block. This type of design, together with the U-shaped plan of each unit, makes possible three prominent features.

"The first of these is large interior garden, about 36 ft. wide by 600 ft. long, extending through the center block, affording a fine outlook over green lawns and good planting. This garden area is preferable to the hot, dirty and noisy street. Second, is the series of twelve U-shaped courts, opening into this great garden and thereby creating cross gardens, so to speak, each about 154 ft. long by 40 ft. at the widest point. And thirdly, there are the passageways between buildings at intervals



Typical details

of 100 ft. into the interior garden. These passageways have numerous advantages: together with the courts, they bring outside light into the buildings and they permit the planning of a large number of corner bedrooms and create splendid cross ventilation, in the individual apartments. They also permit the fire escapes—those disfiguring features which encroach on the sidewalks and ruin the appearance of New York City streets—to be placed so as to be almost out of sight. Furthermore, they are important from a fire risk standpoint, as they cut down the hazard by breaking up the solid building mass with open passages along the street.

"The typical arrangement is shown in the accompanying perspective of an apartment interior. It shows a triple division of each apartment into living room, kitchen and dining facilities and bedroom portions—an

aid both to operation and to privacy. There are only two apartments to a stairhall, aiding further to the privacy, and each living room is separated from the hall by a small foyer. The kitchen part is separated from the living room, and contains the latest improvements in domestic equipment. A gas cooking range with hood, a sink and two wash tubs with white enamelled metal cover, hinged to swing up against the wall when the tubs are in use, and serving as a drainboard for the sink at other times; a dresser, a refrigerator and a dumbwaiter are the principal features. All is arranged to save the housewife steps, and a little space is provided, screened off from the rest of the kitchen, for eating.

"The chambers, together with the bathroom, are screened off from the living room. All the interior details are simple but in good architectural taste. The rooms

are of good size for this type of work, well above the minimum sizes allowed by law.

"Although a few of the apartments are larger or smaller, the Metropolitan Life Insurance Co. has adhered to the standard of the four-room apartment for the great majority. This is a most progressive decision, because it repudiates the two- and three-room standard, which has been adopted for much housing since the war, as being definitely below the American standard of living.

"Still another great advance in living standards is the mechanical features. Although steam heat, hot water and electricity, are not usually provided at these rentals, they could be included in the plan because of the savings made in other ways. What this means in the cost of living of the single family may be realized when it is

considered that only a little more than two tons of coal will be required to heat one apartment, while six or more tons would be needed to heat the five-room individual dwelling."

The Same Methods Would Improve House Architecture

The above quotation from one of the leading architectural journals of the country is really, if indirectly, one of the best endorsements for the professional housing builder ever issued. It emphasizes the economies in large housing developments,

built up as a single operation. It is for just this reason that a prospective house buyer can often get a much better value in purchasing a single unit in such a development of an honest real estate promoter or speculative builder, than he can in having a single house built especially for him.

The weak part of many big housing projects, however, is that they do not receive the same careful architectural study and investigation that Mr. Thomas has given this project, although the economy of such a study should be obvious. If a professional builder constructs 100 houses

per year, at an average cost of \$6,000 per house, and by careful study of a single unit, or a few units, by an *expert house architect* can effect economies of only \$100 per house, the total saved—\$10,000—would more than pay for a very thorough and comprehensive study by a real expert. And there are not only the economies to be considered, but the houses themselves would show the touch of the expert just as do these city apartments, which really cost no more in the last analysis than the disgraceful and hideous ones now generally built for this class of tenants.

Attractive Doorways

By Charles Alma Byers

HEREWITH, in photographs and drawings, are shown three interesting doorways, of widely different character, worthy of studious consideration. Incidentally,

they come from southern California.

The first of these entrances (Fig. 1) is of Colonial design. Across the entire front of the house extends a 7 ft. open porch,

or terrace, which is floored with brick, while its foundation walls, as well as the steps directly on the front and the steps at one end that rise from the automobile drive-

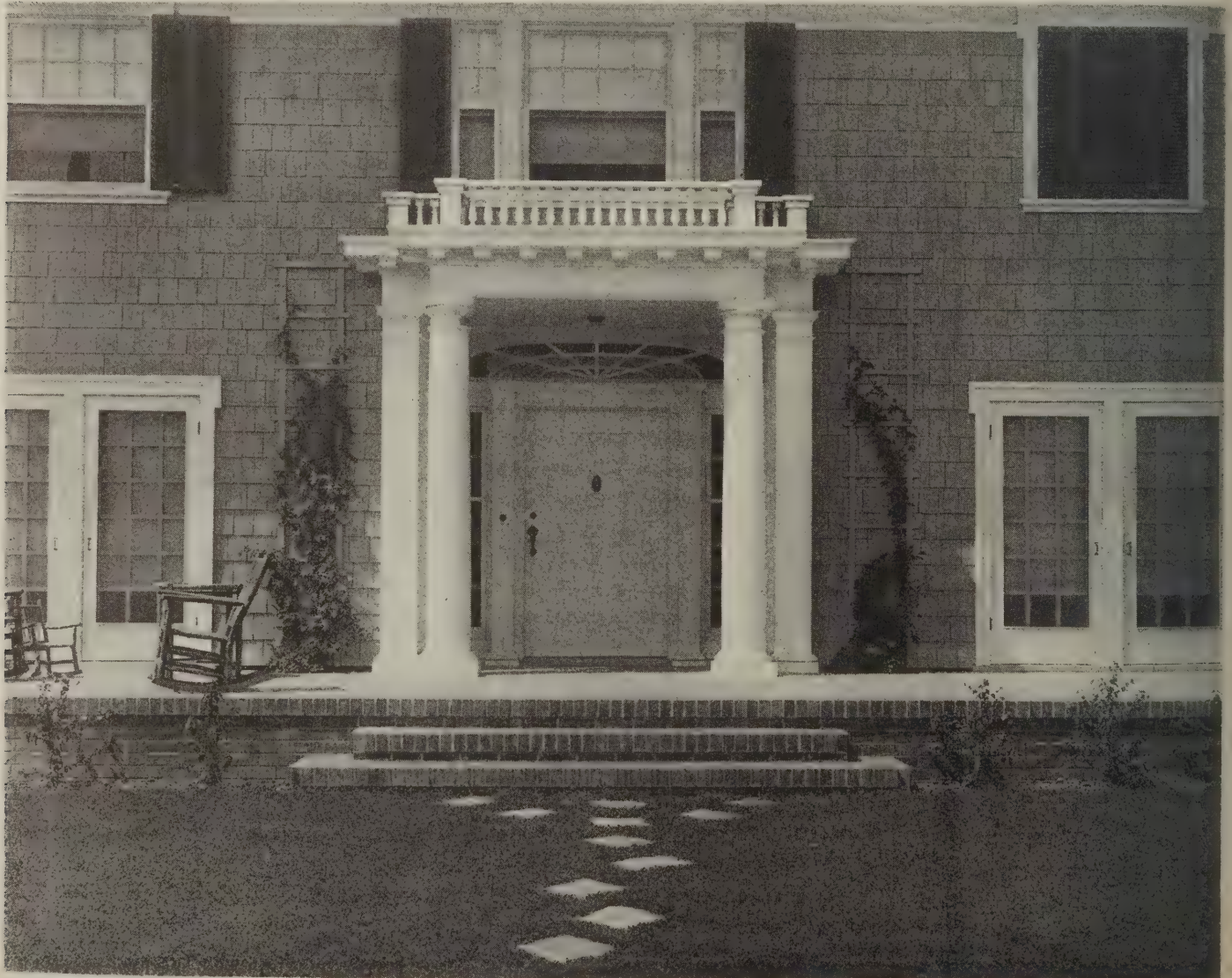
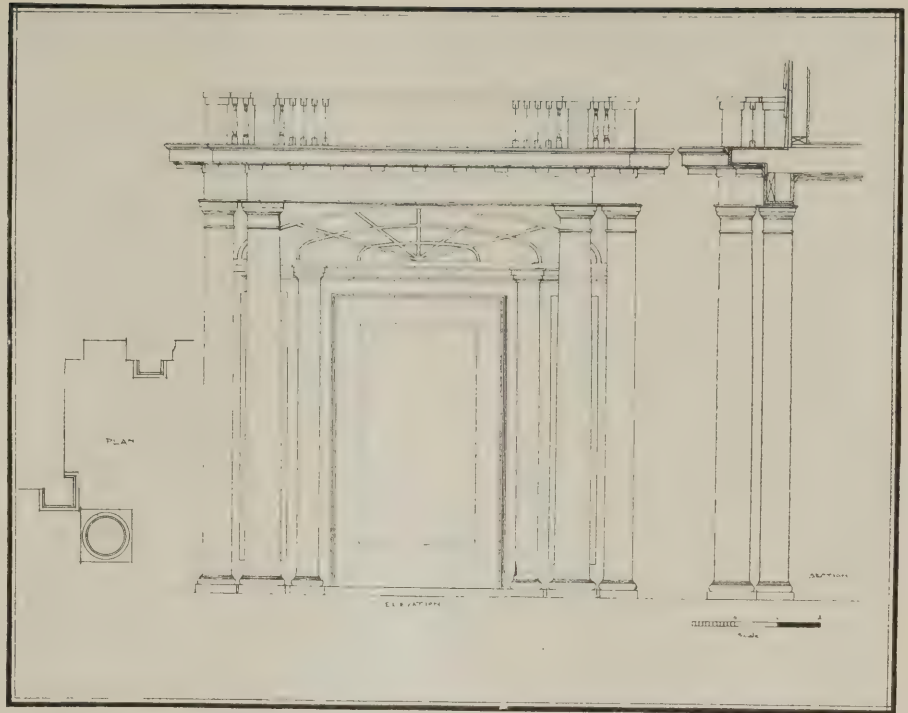


Fig. 1—A colonial doorway

way, are likewise of brick. A pair of French windows opens on the terrace at either side of the main front entrance, and midway between each of these pairs of windows and the entrance feature is a simple little rose-ladder, or trellis, draped with a tracery of climbing roses. The rose-bushes spring from small squares of earth imbedded in the terrace flooring at the bases of the ladders, and are kept well pruned, to prevent their growth from becoming too heavy.

The entrance feature itself, with an overall width at the top (including the overhangs) of 11 ft. 10 in., is of dignified and pleasing design. The doorway, with its fan-transom above and its glass-paned panel at either side, is set in a shallow recess; and a tiny and attractively railed balcony protrudes from overhead, with a maximum extension from the main wall line of 2 ft. 6 in., supported by a pair each of round columns and square pilasters, both of wood. The pilasters, resting on 10 in. bases, are naturally built up, but the round columns, possessing bases 12 in. square, are of the



Detail of colonial doorway

Koll lock-joint type. Other dimensions, as well as general designing and construction details, may be learned from referring to the accompanying drawings.

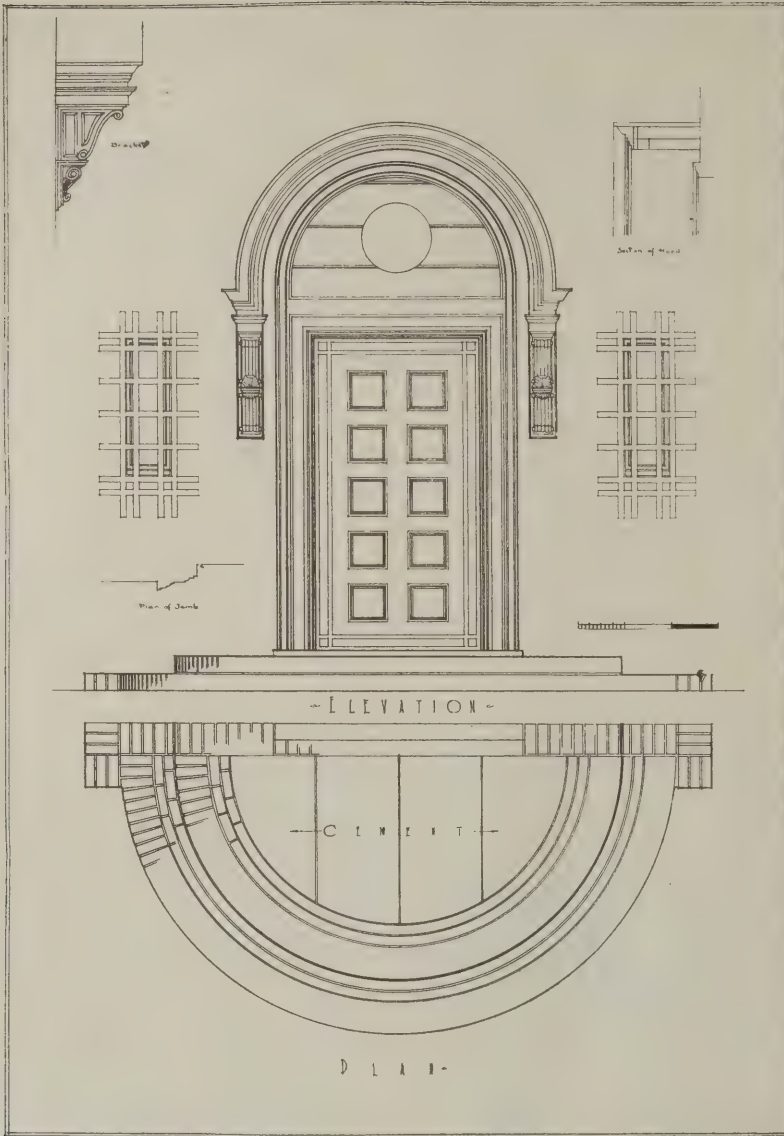
True to the Colonial style, the door is equipped with both an old-fashioned latch and knocker. The lighting fixture consists of a plain, frosted-glass globe in the ceiled extension overhead. The shingled walls of the house are painted French gray, and the trimming, including the entire entrance feature, is done in white. The red brick work and the green shutters of the second-story windows, together with the green vines and front-bordering shrubbery, therefore produce very effective color contrasts.

Entrance to a Stucco House

The second entrance illustrated (Fig. 2) is of still simpler design, but of quite unusual style. Used in conjunction with a house of extremely plain cement walls, as in this instance, it also seems most appropriate. The door itself is of paneled mahogany, and over its top, as will be observed, extends a circular-headed hood, while the stoop is likewise of circular design. The manner in which the door casing is extended upward to embrace the wall space within the hood, and especially the cross-paneled and plaque treatment accorded this over-door space, constitutes a particularly interesting bit of detailing; and, effecting a sort of medallion-like embellishment for this circle of wood, there is suspended on chains from the center of the hood ceiling an artistic and appropriate lighting fixture, with a flame-shaped electric globe. Also worthy of notice is the small lattice-covered window at either side of the doorway, which windows naturally add greatly to the entrance's general ap-



Fig. 2—Entrance to a stucco house



Detail of entrance to a stucco house

pearance, while the potted shrubs beneath them not only help to give balance to the arrangement but also lend a decorative touch of color contrast.

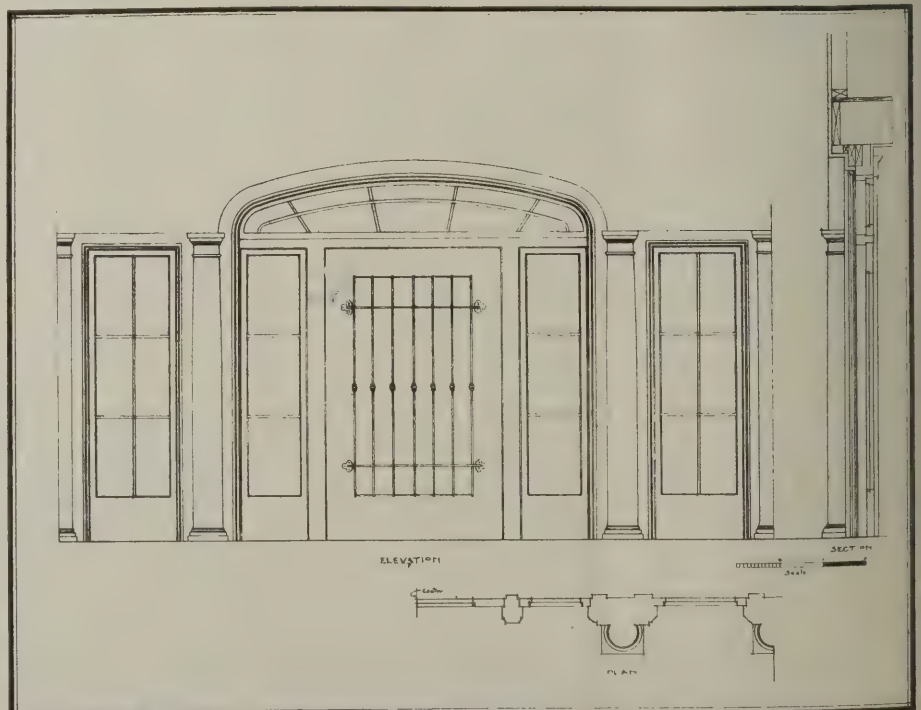
The hood proper is constructed of cornice-moulded tin, and the brackets by which it is supported are of cast cement. The hood has a maximum outward extension of 22 in., and the brackets, on centers, are spaced 6 ft. 2 in. apart, while the center wood disc is 18 in. in diameter. The stoop, constructed of cement and brick, virtually forms a half circle, with a radius, measured to include the step, of approximately 6 ft. The lattice work which covers the small side windows is constructed of $\frac{1}{2} \times 1\frac{1}{2}$ in. material, which is painted white—as are also the cast brackets, tin hood, door casing and the exterior of the house in general. The drawings should be referred to for other dimensions and details.

A Formal Type of Entrance

The remaining entrance (Fig. 3), be-

longing to a large two-story house of cement-stucco exterior, is deeply recessed and quite imposing. Although the doorway and the windows at either side, because of the thickness of the walls, are set in even farther, this recess is approximately 5 ft. deep, while its width is 16 ft. 4 in. To give still greater depth to the loggia-like entrance porch, there is an outward extended area, about 4 ft. in depth, enclosed by a low, well designed railing. The railing sections are of cast cement, and the rather massive proportioned corner and portal piers are of concrete and cement construction, interestingly paneled. The porch is floored with dark cement, and directly to the outer edge of it curves the cement-paved automobile driveway.

The main front door is set with a single large pane of glass, finished with iron grillwork, and at each side of it is a narrow or panel window composed of three panes of glass, while spanning the group above is a broad fan-transom. Also, at either side of this main doorway there will be noticed a smaller door of glass, and in each of the side walls of the recess is a window. Koll lock-joint columns, engaged, are introduced at each side of the entrance doorway and also in each corner of the recess. These, to match the stucco walls and the cement enclosure, are painted white. The woodwork that enters into the doorways is of mahogany. A pair of large bay-trees in tubs, as well as the dwarfed arbor-vitæ potted in each of the corner urns, helps toward maintaining the formal appearance in the front of the house, and the iron balconies at three second-floor pairs of case-ment windows are enhancing details.



Detail of a formal entrance



Fig. 3—A formal entrance

Exhibition of Fire Resisting Material and Apparatus

MANUFACTURERS of fire-resistive materials and of fire-fighting and re-tarding apparatus, for the first time, will have the opportunity of taking part in a fire prevention exposition to be held October 2 to 7 at the Twenty-second Regiment Armory, New York City, where will be shown, by exhibit and demonstration, what a vital part in the fight against the great annual fire loss is played by fire-safe materials and apparatus.

The exposition originated with the fire prevention committee of the National Association of Insurance Agents as part of its program of fire prevention activities. It has been endorsed by the National Fire Protection Association, the National Association of Credit Men, by President Frank G. Reynolds of the International Association of Fire Engineers, the National Board of Fire Underwriters.

Fire Costs \$1,300,000 Each Day

The problem of reducing the terrific strain on business caused by preventable fires, that seem to be increasing each year, is one that has long engaged the attention of these organizations. At the present rate of burning, property worth \$1,300,000 is being destroyed each day. This is a financial burden which is borne by business men, for the fire insurance companies, contrary to general belief, do not bear this loss—they simply pay out \$1,300,000 each day that has been paid in to them in premiums by the public.

So great has the strain on business become that on June 26, this year, at the request of these organizations, Governor Ritchie, of Maryland, called a conference of the governors of New York, New Jersey, Maryland and Virginia. This conference adopted a motion to present the matter of fire waste and conservation to the Chamber of Commerce of the United States and on July 12 a conference of representatives of the four associations named above and of the American Institute

of Electrical Engineers, Railway Fire Protective Association, American Institute of Architects, American Society of Mechanical Engineers and of the Boy Scouts of America was held at Washington.

At the Washington Conference the Chamber of Commerce of the United States was asked to undertake the responsibility of educating organized business men to the huge annual tax caused by fires. President Barnes of the Chamber accepted this responsibility and plans are now under way for a national citizens' fire prevention campaign.

To Educate the Public

The peak of this year's effort will be reached during National Fire Prevention Week, October 2 to 7, and the first fire prevention exposition will be its greatest educational feature. It is purposed to show, by means of the exposition, the latest ideas in fire-safe construction and also to demonstrate to the public the proper appliances to be used in fighting and preventing fires.

The Garden City Company of California

By G. E. McDonald

READERS of NATIONAL BUILDER will remember the Garden City Company of California as the designers and builders of the French type of cottage and the English type shown in the April, 1921, issue of our magazine, pages 20 and 30 respectively.

This company is comprised of two broth-

ers, Walter S. and Pierrepont Davis, having "Davis" settings to complete the design. This effort toward proper planting is noticeable in the case of the two cottages before referred to. While the lots are small and the photographs were taken before the vegetation had much of a chance to make headway, the English

close-growing shrubs, and the terrace of the French house, with its vines and hedges and pool, is delightful.

This individuality and independence in design has been adhered to in the planning of the company's offices and studio at 3215 West Sixth Street, Los Angeles, pic-



Office and studio, Garden City Co.



Reception room, Garden City Co.

ers, Walter S. and Pierrepont Davis, collaborating with their father, Henry R. Davis, a veteran architect of Baltimore, now retired and living in California.

The houses designed and built by the Garden City Company are strikingly individual, and many of them are enhanced by furnishings and decorations designed especially for them by the builders. Travel, study, and perhaps a natural aptitude have enabled the Davis brothers to grasp the good points in the various types of foreign architecture, to combine them with modern ideas of comfort and convenience, and to evolve from these elements an essentially modern American home. A series of houses has resulted, of unusual design, possessing charm, taste, and distinction, and without a trace of the grotesque or bizarre. Where the builders have been permitted to exercise their gifts as interior decorators as well, the effect is especially consistent and pleasing.

One feature of the home architecture of France and England which impressed our boys in overseas service was the delightful and inevitable little garden plots which encompassed the dwellings. This feature has been recognized and developed by the Garden City Company, and their work in landscape gardening is becoming well known for its character and quality of appropriateness. Owners of beautiful and artistic homes become quite insistent on

cottage shows evidence of an intelligent binding to the landscape by means of



Walter S. and Pierrepont Davis, builders, engineers and architects

tures of which are shown here. The main entrance opens directly into the offices. A reception room, of which the interior is shown, occupies the right wing. The drafting rooms are located in the basement which extends under the entire building, opening out on ground level at the rear, where the lot slopes down. A gas furnace supplies heat to this building, which exemplifies in every way the Garden City Company's ambition for convenience and efficiency combined with character and good design.

Discoloration of Indiana Limestone

THE U. S. Bureau of Standards issues the following:

In order to eliminate the brown stains which frequently appear on new limestone masonry and which are thought to be due to the mortar, tests have been started to determine the effect of using colorless waterproofing materials on the limestone at points where it comes in contact with the mortar. The indications are that if water can be prevented from leeching through the mortar and entering the limestone that stains will not occur. The tests indicate that the greater part of the stain can be prevented by this means.—Federal Trade Information Service.

National Builder Style Sheet



No. 1—For the house that must set up high off the ground, or that has a high foundation, its apparent height can be lessened and the foundation lines obliterated by planting shrubs around it. These shrubs will soon hide the basement windows



No. 2—A charming design as it now stands, but one that will be even more beautiful after the shrubs have grown and nature has added her softening touches. The entrance porch is an interesting detail



No. 3—Another Spanish type of bungalow. The architect has skilfully avoided the use of shoulders on his chimney, with happy results. The awning-covered porch is an idea adaptable to any climate. The walls give it unusual privacy



No. 4—A very pretty house, because of its simplicity and good proportions. It is doubtful if the false eyebrow dormer helps the design any, but it is well handled



No. 5—An effective use of wood in a bungalow of unusual design. The balustrades around the French doors permit privacy within. The closely cropped roof is a refreshing contrast with the heavy overhang so often seen today



No. 6—In developing houses of this type, California is doing much to compensate for the less attractive "California bungalow" which was in great vogue several years ago. The little attic window is a delightful detail



No. 7—Often too much liberty is taken with the gambrel roof house, with the result that its real beauty is lost. Here is an unusual design showing skilful handling. This house was built in Cleveland, Ohio



No. 8—It is unfortunate that this house is not perfectly symmetrical, for otherwise it is very attractive. The walls are covered with shingles stained a gray-green



No. 9—A new Cleveland house showing unusual roof treatment



No. 10—Perfectly straight horizontal and vertical lines and an absence of mouldings characterize houses of this type, which are frequently seen in the suburban sections around Chicago. The stucco of this design is buff and the woodwork is stained dark brown



No. 11—Compare this house with the plans on page 41. Here the coat closet is omitted and the entrance is in one corner of the hall. The porches make considerable difference in the two houses



No. 12—Because of its simple plan and plain exterior, this little house can be built at very small cost. The wide siding painted white, and green blinds make an attractive exterior



No. 13—This house and No. 7 on page 36 are almost identical in plan, yet they differ considerably in exterior appearance. Here the shutters add a touch of color to the exterior



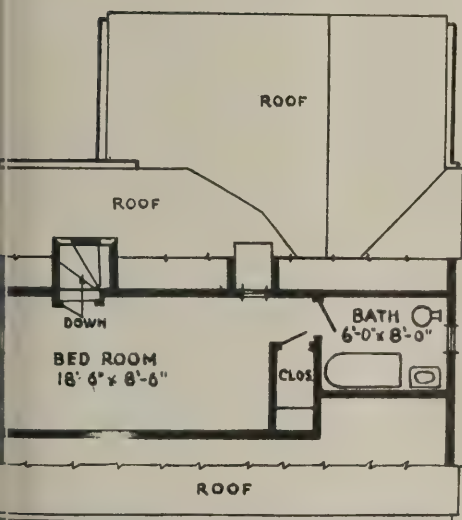
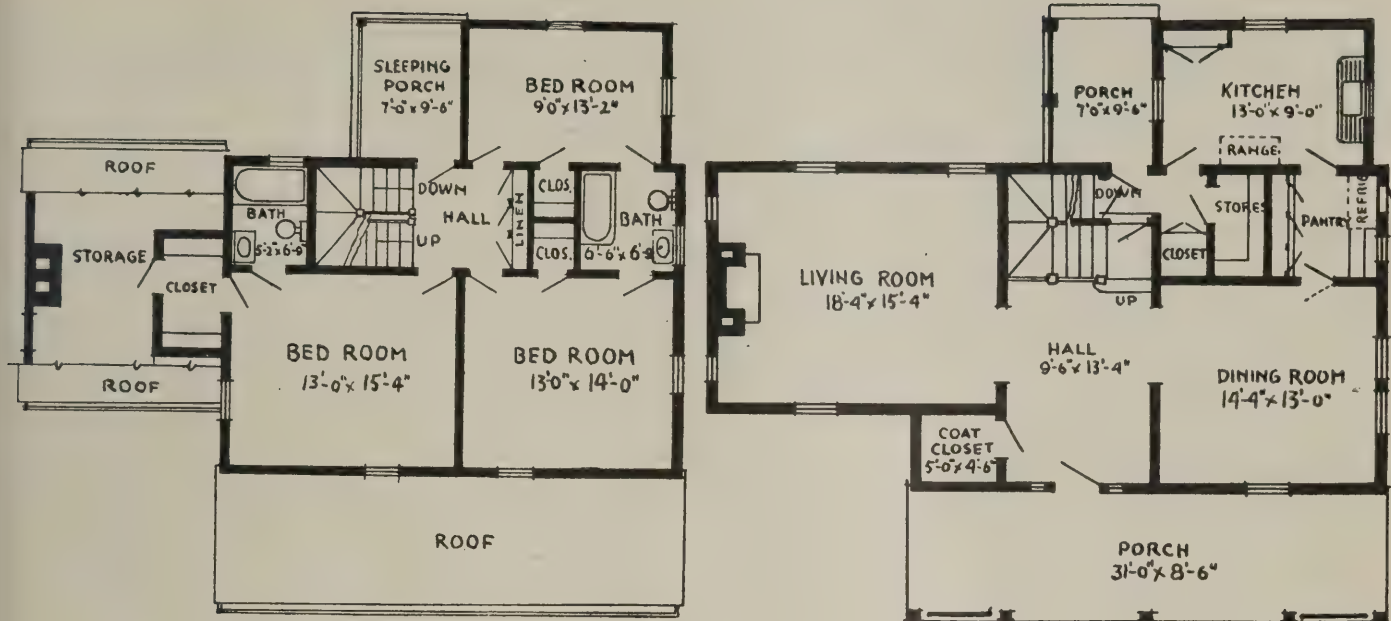
No. 14—A small house in New Haven, Connecticut, with shingled sides and porch and chimney of native rocks. The shrubs and vines do much to beautify this home. Note the setting of the doorway particularly



No. 15—This house and the one below are similar in plan. The proportions of the dormers are good and the treatment of the roof in both cases excellent



No. 16—Much of the attractiveness of these houses is due to the fact that they nestle close to the ground. The horizontal lines of the wide siding emphasize the effect



Plans of House No. 11, page 38, built by the Garden City Development Corporation, Long Island

Enterprising Builder Tells Us About Hi-a-le-ah

MONTAGUE HAMM, renewing his subscription to NATIONAL BUILDER for two years, writes:

"Hialeah is a new town 7 miles northwest from Miami, Florida, on the edge of the once Everglade swamp. One and a half years ago it was a cow pasture—a part of the Curtis-Bright ranch. Today we are a live young town with about 250 houses of a very good class.

"Miami grew 440 per cent in ten years. We, of Hialeah, are setting our mark for 20,000 in five years. With a moving-picture studio development and the back country with its rich soil just coming under cultivation, the development of the sugar business, etc., we are a going town.

"The Penn Sugar Co. is spending \$35,000,000 in the development of lands, mills

and refineries 8 miles northwest of here. About a year and a half ago I bought several lots for \$2400. I have refused \$9800 for them. They are worth more.

"We are attracting a good substantial class of citizens, Arthur Pryor, the bandmaster, Glenn H. Curtis, the aeroplane manufacturer, and others. Mr. Curtis built a \$30,000 house here last year, yours truly being superintendent of the job. We believe in Hialeah and its future. You had better plan to come this winter—no coal to buy here."

That Mythical Family of Five

THAT "average American family of five" has long been made the basis for figuring on taxes and cost of living, church attendance and schedules of needed clothing. Now comes Elliott Frost, director of the industrial management council of the Rochester (N. Y.) Chamber of Commerce and tells the psychologists of America at an annual meeting, that there is no such thing.

Now the phrase "the average American family of five" carries two implications, each contrary to the fact, to-wit: (a) that the average American family consists of five persons and (b) that in this family there is one and only one wage-earner. As to the former, the 1920 census shows 4.3 persons to a family, considering "family" as a social unit. To call it five is therefore 16 per cent inaccurate to begin with. Still more important, however, is the other implication, namely, there is but one wage-earner among five persons. The fact is that the average is two. The proof of this is simple—divide the total population (approximately 105,000,000 persons) by the number gainfully employed in this country approximately 41,610,000 persons) and you

get 2.52 persons per wage-earner—not five. This family of 2.52 persons might properly be called the "average American economic family." Labor's claim that it consists of five instead of 2.52 persons, is therefore about 100 per cent inaccurate.

If further illustration, disproving this "five-in-a-family" slogan is needed, take figures for an individual city. Rochester, N. Y., for instance, in 1920, had a population of about 296,000, 134,088 of whom were registered as wage earners. This means that 45.3 per cent of the city's population of men, women and children were gainfully employed; or, to, phrase it in another way, it means that on the average each worker helped to support 1.2 persons beside himself, or 2.2 persons altogether, and not five as labor claims.—*Paton's Monthly*.

Fake Brick Is Menace to Life

WARNING to home builders against forms of substitute brick as a menace to human life is contained in a report submitted by Prof. R. H. Danforth of the Case School of Applied Science of Cleveland, after several laboratory tests. Prof. Danforth says he has found imitation brick made of sawdust and cinders bound together with various types of cementing substances.

Prof. Danforth states that he recently tested "brick" made of cinders and lime. His finding was that an average pressure of only 682 pounds was necessary to break one in half when supported at the ends, a real brick requiring an average pressure of 2,252 pounds to break it. The imitation brick also showed such an affinity for water that they absorbed over 28 per cent, and two specimens out of six swelled and bulged and developed cracks during immersion.

The Problem of Co-ordinating Local Building Activities

Should the Building Supply Dealer Be a Builder or the Builder a Supply Dealer? Whose Business Is It to Supply Plans and Sell the Client? Who Finances Building Operations? Where Does the Local Architect Come In?

PROBABLY the most interesting phase in the development of the house-building industry in the last few years is the spread of the "plan service" idea. A score or more years ago house building was in one of two classes—houses designed and supervised by architects, and houses built by carpenter-builders from their own plans or from no plans at all. It does not necessarily follow that the houses in the second class were not well designed, for there survived a type of builder who had much practical knowledge of architecture, as well as of construction. Many of the old colonial houses, now so much admired, were designed by carpenters rather than architects. And in that day the line between the architect and the builder was not so sharply drawn.

However, in the last few decades conditions in the house-building industry have radically changed. The old-time master-builder-architect is still with us, but apparently he is not so important a factor as he should be, nor as he formerly was. The demand for builders of houses to sell, and the growth of the ready-cut mail-order house industry have had the effect of discouraging knowledge and skill on the part of the master builder.

With the establishment of large manufacturing organizations and of national trade associations to promote the use of certain products came another distinct turn in the house-building industry. To display their wares to the best advantage required good designs—good architecture. So to promote good design of houses various manufacturers and trade associations have had made and distributed, either free or at a nominal price, thousands of house designs. Coincident with this development there have grown up plan-service agencies by the hundred. A few of these are operated by architects for the good of the profession, many are operated for profit, and many more are operated as promotional agencies for the sale of lumber or some other building material.

Practically all of these plan services have been intended to reach the individual who wants to have a home built. They are sold to the prospective individual home owner through the popular magazines, the daily

newspapers and the building material dealers. Practically none of these services is intended to help the builder directly, nor to reach the house-building or house-buying public through the builder. The builder is, therefore, in danger of becoming gradually less and less of a factor in the building industry. He is often asked to put together material belonging to someone else, selected by some one else, and according to plans

world get into, but one of the hardest to achieve lasting reputation and success. Builders have often bid against each other and shopped around among building-supply dealers for the cheapest stuff, regardless of either business or moral principle. They have depended largely on material dealers and mill men for making estimates of the cost of their work. For these reasons the business life of many builders has been short, and the standing of builders as a whole has depreciated.

Lumber dealers having a large investment in plant and stock, as soon as they got together in their trade associations, quickly recognized that it was not *good business*, nor even a safe business proposition, in many cases, to depend for orders largely upon contractors, or builders, of this type. They were too unreliable as customers, too great a risk as debtors, and their business methods tended to put a premium on poor materials and cut-throat competition.

Quite naturally the lumber dealer decided that the thing for him to do was to find the prospective home buyer *first* and *sell him* the materials rather than the contractor. To do this it became practically necessary for him to sell houses instead of a few loads of lumber, so dealers are becoming plan distributing agencies and experts on building information, while builders are sinking lower and lower in the estimation of building material manufacturers and dealers, as well as with the public.

Results of Building Supply Dealers Selling Houses

Some of the results of this turn in the house-building industry have been to encourage the "jack-leg" carpenter and the "jerry builder;" to cause lumber dealers to go into the building business either openly or as silent partners of some builder; to cause many of the larger and more responsible builders to go into the building-material business, and to limit the use of many materials or brands of material through their distribution by exclusive agencies.

Another result has undoubtedly been to give the public the benefit of better designs and at small cost, and to develop a demand on the part of the public for better looking

Your Suggestions Will Help!

CAN you, our reader, answer the questions proposed at the top of this page? The editors of *National Builder* are earnestly studying this problem and need your assistance—suggestions from your own experience. Subsequent articles will offer some specific suggestions on how architects, builders, and building material dealers may work in harmony to achieve greater prosperity and better building.

with which he had little or nothing to do. How true this is may be judged by the literature used by a contemporary building trades journal to sell its plan service; for here is a journal ostensibly serving builders—soliciting their subscriptions and support—which under other names or guises appeals to lumber dealers in the following vein: "The customer is drawn to your office for all building information. *You cut out the contractor and carpenter who have only labor to sell.* You deal direct with the man who pays the money."

Why the Builder Has Lost Prestige

Builders as a class have lost prestige and influence in the house-building industry because many have gone into the business with insufficient knowledge of architecture, lack of skill in construction, lack of sufficient capital to properly finance their operations and want of business and executive ability. It is one of the easiest businesses in the

houses. But that the houses are any better structurally is questionable; there is reason to believe that the inferior class of builder encouraged by these methods does not put into such houses either the same skill or the same interest that the old time master-builder-architect did. The public is more apt to be sold on a picture than on a substantial house.

What the results of a continuation of these building methods will be would be hard to prophesy. Dealers can not go into the building game and expect to retain their building competitors as customers for materials. They can not turn jobs over to a few, favored contractors, or builders, and expect the good will or trade of the others. They can not continue indefinitely to sell the public pictures of houses, when the house itself fails to come up to the purchaser's expectations. They can not expect to encourage a high grade of builder if they relegate him to the class of a foreman carpenter.

On the other hand builders can not hope to compete with material dealers in selling houses unless they are as well posted on all the various phases of the building business as are the dealers; unless they can give their clients as good house designs as the dealers, which means they must have some real knowledge or appreciation of design and architecture; and unless they have capital to properly finance their work, or character or reputation to establish financial relations with those who have money for such purposes. So long as builders devote the most part of their energies to chasing jobs, cutting bids and trusting to luck, and throat-cutting competition with one another they can hope for neither profit, nor sympathy from the building-material manufacturer or dealer.

The foregoing represents a synopsis of the answers to a questionnaire sent to a hundred representative architects, a hundred representative builders and a hundred representative building material dealers.

What the Dealers Say

The dealers say: "Why should the dealer with thousands of dollars invested let the carpenter run his business for him?" "The dealer should be supreme." "The outcome of the present activity on the part of the dealer to sell houses rather than materials will tend to eliminate the type of small contractor as a business man. We believe by giving out guaranteed lists of materials and furnishing plans and blue prints, not to mention assisting in the financing of homes, the material dealers will assume a dominating position, and only the most reliable and most efficient contractor will survive. The small type man, uneducated as a general rule, and risen from the ranks of the carpenters, will be restricted to becoming nothing more than a boss carpenter, who will handle labor only, on the job. We believe, too, judging from our own experience, that in this way a great many

irresponsible men, new to the business, will be given an opportunity to run jobs for labor only, because they will not have to assume the responsibility of paying for the materials or even of landing the job for themselves, or doing anything more than merely bossing a gang of men on a small job."

"Very few live retail lumbermen now operate other than as retail lumber stores, or retail building-material stores; and they are rapidly getting away from the idea of selling 2x4's, flooring, etc. Why should not the lumber office in the town be the place where the prospective home owner—whether it be the husband or the wife—can go and get ideas about homes, see pictures of homes and home comforts. It has only been in the past few years that a lady would think of going into a lumber yard, and yet it is from this same lumber yard that should come the material that makes her home."

"I do not believe that the dealer should actually engage in building contracts instead of a building contractor, but I do think that the dealer should know enough about building and building conditions so that he can, if necessary, take an occasional contract and carry it forward to conclusion. I am rather opposed to the retail dealer in building material getting into the general contracting business. We have found in the smaller towns where our managers are able to sit down and help the contractor make out his estimates and check over his bills that the contractor appreciates it very much, and to that extent we should work with him." "Our experience with the smaller contractors leads us to believe that the reason many of them fail in business is due to the fact that they do not know how to keep adequate records to show them whether they are making or losing money."

What Builders Say

"The dealer will probably find out that there are many things outside of his own business that he does not know." "The dealer who sells houses rather than materials will be short-lived." "I think the contractor will buy direct. I am doing this to some extent already." "One dealer here, because he couldn't get all the trade, brought in an inexperienced man as a contractor. The contractor built two houses and that finished his career here. He cased off the entire house before plastering." "I think a contractor ought to handle his own roofing and paint. I handle them and sell a lot. A contractor could well afford to handle all his own materials."

What Architects Say

"Local building material dealers are not anxious to sell materials or building equipment they do not carry in stock." "If the dealer begins to sell houses the contractor will buy materials from the producer or wholesaler, and not patronize the local dealer at all." "It is certainly time for a

war on prices. The dealers are all together, and as there is practically no competition in building materials, building work is being retarded." "I do not think it is possible for the dealer to continue selling houses and co-operate with the other factors in the building industry; I am a great believer in specialization."

"The dealer will either have to take up contracting exclusively and get out of the dealer business, or remain a dealer and quit doing a contractor's work. Local contractors will not compete with the dealer for a job and then purchase materials from him." "The present activity of the dealer in selling houses rather than materials will eventually help the architect because the dealer's houses are apt to be poorly designed and constructed." "If dealers persist in selling houses the architect and contractor will have to throw their business elsewhere." "Builders will establish their own co-operative material yards." "Merchants aren't mechanics and it takes a mechanic to build a house." "We have not heard of dealers being at the mercy of contractors in this state; the contractor is at the mercy of the dealer, as a rule." "My idea is that the architect and the contractor should work together to organize new building supply companies on a fair price, co-operative basis."

Some Kind of Co-operation Needed

Enough has been quoted from letters of architects, builders and dealers to show that there is a woeful lack of co-operation, or even of understanding, in many instances. Enough has been quoted to show that dealers have given the matter far more thought and investigation than have architects or builders. Dealers are not blind to the disadvantages of present tendencies, but they are organized to meet these problems collectively and compare notes with one another. They are making strenuous efforts to become experts on all matters relating to building.

The average architect and builder is content to say: "It can't be done." He neither bestirs himself to find out whether it can be done nor to perfect his own knowledge of those parts of the building business in which he may be weak. The average dealer has a very keen appreciation of modern merchandizing—the value of an attractive office and salesroom, of aggressive salesmanship and of progressiveness generally. The average builder is content to carry his office in his hat and wait for his prospective client to take the initiative. The average architect is more or less indifferent to the small house business anyway.

Hopeful Signs from Many Quarters

The conditions described in the foregoing are by no means universal. Wherever the old type of conscientious, skilful, business-like contractor still exists there appears to be little or no conflict, providing the dealer is also a good business man.

There are many evidences of real, hearty co-operation and mutual understanding and good will.

An Iowa dealer writes: "In the first place the plan service which we use covers the small type of home only. We took the matter up with several of our architect friends, who advised us to go on with this service, as this type of house was not a desirable business for them, because of its low cost. You will note the co-operation which existed in this instance between the dealer and the architect. We find them always ready to reciprocate on matters which do not materially alter their plans, or change the effect desired by them on their work. The contractor is *our game*. He is one of our best assets and I do not know of any case where he has not received every possible consideration from the dealer. It is true that some of them are not honorable in return, ship materials direct where possible and always 'holler' for a better price. On the whole, there seems to be a very good feeling between all concerned here."

A Wisconsin dealer writes: "We are operating eleven yards. The largest is in a city where we have three firms of architects and four or five firms of contractors. We have found it mutually satisfactory to work with our local people, and have turned down plan service after plan service, which has been offered us, that would in any way take business away from these local people. However, we have found in the case of one or two plan services, which we have taken on, that we have been able through them to be of some service to the local architects. In some of our smaller yards we have found it an advantage to be hooked up with some good plan service, and have offered the use of it to the local contractors, who are, of course, not architects. And we know of several instances where this has been a great advantage to them. We have always contended that there should be the highest degree of co-operation between the architect, contractor and building material dealer, for the party undertaking any building project has enough troubles of his own without having to bear the burden of an inharmonious feeling between these three."

Another Iowa dealer writes: "We make it a point at all times to secure for architects and contractors any materials we do not happen to carry in stock, if it is reasonably worth while to do so. By that I do not mean that there must be a profit in the transaction itself. We do it as a matter of service in a good many instances. As far as the architect is concerned we find as a general rule he is not interested in making plans for a small moderate-priced house. He, therefore, does not resent our interest in supplying these plans directly to the home owner. We have established in our own organization a limit of \$12,000. If a proposed house will cost more than this amount we suggest to the

client that he can secure better service for the kind of house he wants directly from the office of some good architect. As far as contractors are concerned, we work along lines like this: Mr. Brown, prospective home buyer, is interested in one of our moderate-priced houses; we draw for him a plan selected from one of our stock plan books, together with any changes necessary to suit his needs. After he has approved these plans—for which, by the way, we make a charge of \$50, together with a charge of \$25 for the specifications, with the understanding that if he buys his materials from us the payment he has made for the plans will apply on the material bill—we call for bids from various contractors, particularly those from whom the owner himself may want bids. We generally try to limit the number of bidders so that there will not be so many bids that the low bid will be forced down below a figure that we know will allow the successful contractor to make a profit. These bids are sent to our office and opened there by the owner himself. He makes the decision as to which contractor shall build his house. We hold no strings in this connection and do not insist that he give it to any one particular man. It has happened in the last three occasions that bids of this kind have been accepted, the awards went to contractors who did not normally buy from us. Naturally for these particular jobs the materials had to come from us, and we found that this was another way of making new friends in the contracting trade."

A New York state dealer writes: "We prefer to sell the bill of material rather than the complete job, ready to move into but sell the house complete if necessary. We prefer to sell the contractor, but do sell to the owner when he hires carpenter work by the day. We try to hold the trade of the better class of contractors, who want to furnish good work and material, by giving them service and quality, rather than price. We let the low price contractor alone, as he is not to be depended upon, for he will buy of you on price today and the other fellow tomorrow at a lower price. If you deal with good contractors let them have the building end of it; but if the contractors are not so strong, it is well to take on this end of the business, especially on speculative building, and larger jobs that local contractors are not able to handle."

Conclusions

NATIONAL BUILDER has no sovereign remedy to suggest for the solving of these problems—or to answer the questions presented in the title to this article. The object here has been to present the problems so fully and completely that every reader may understand them. The solution rests with our readers. It is largely a local problem in every case and presents no other difficulties in its solution than is

found in creating harmony and good will in any human enterprise. Plan service by retail dealers in itself is not the bone of contention, and the earnest and honest endeavor of retail building supply dealers to know as much as they can about the building business is not only laudable but can not fail to be of great value to the building industry.

The trouble rests with the way in which dealers use their plan services and is a result of such pernicious activity as that mentioned of a contemporary building trades journal, which attempts to profit by playing both ends against the middle. The dealers who are really successful and prosperous are those who work for the best interests of the building industry, who work with and not antagonize its other factors. Likewise NATIONAL BUILDER has no ax to grind by knocking one factor at the expense of another; it realizes that there are four distinct factors in the building industry, the owner, the contractor, the architect and the dealer. And, as already quoted, the owner has troubles enough, as it is, without the burden of an unharmonious relation among the other three. NATIONAL BUILDER stands for fairness and service to all.

Tests of Floor Oils

Government Agency Sought to Ascertain Darkening Effects

A STUDY of comparative darkening effects of different floor oils was made recently under the direction of the United States Department of Agriculture over a period of six months. Three types of mixtures were tested. The first consisted of equal parts of motor or engine oil and kerosene; the second was made up of one part boiled linseed oil to three parts of turpentine; the third was a widely advertised commercial oil. Separate mops, kept in separate wrappings, were used for the tests, and mopping was done about once a week. A five-room occupied apartment was used as the basis for the experiment.

The floors, which were of pine, were very old and dark from many coatings of shellac and varnish. Before the experiment was started they were scrubbed with a strong solution of washing soda until they were of a light shade. After using different oils in different rooms it was found that the floor oil consisting of one part boiled linseed oil to three parts turpentine was the most satisfactory. This oil seemed to have a cleansing effect on the floors to which it was applied. It retained a high gloss and did not darken to any extent the floor on which it was used.

The commercial oil used in this experiment darkened the floor to which it was applied more than did the linseed oil mixture, but retained more of the gloss than the mixture of motor oil and kerosene, which also darkened the floors.—N. Y. Times.

Architectural Service Especially for Contractors and Builders

Henry W. Grieme, Architect, Cleveland, Ohio, Is Building Up a Large Practice Among Professional Builders by Selling Professional Advice and Plans; He is Also an Important Link Between Home Buyers and Reliable Builders

APPARENTLY many architects are yet unwilling to admit that there is a class of building in which a demand exists for their services as *designers merely*, or as design experts, and not necessarily as arbiters between laymen clients and contractors, nor necessarily as supervising architects of

the question whether this is or is not the right way to build houses; or whether it is more desirable to have every individual house designed and supervised by an architect for the person who is ultimately going to pay for that house. The building construction industry here faces a condition

ing them the kind of service that they not only seem genuinely anxious to buy, but apparently sincerely appreciate. That man is Henry W. Grieme.

Mr. Grieme's early training, education and experience have been such as to give him a broad and liberal point of view as



Clifton apartment house, Cleveland, Ohio, designed by Henry W. Grieme

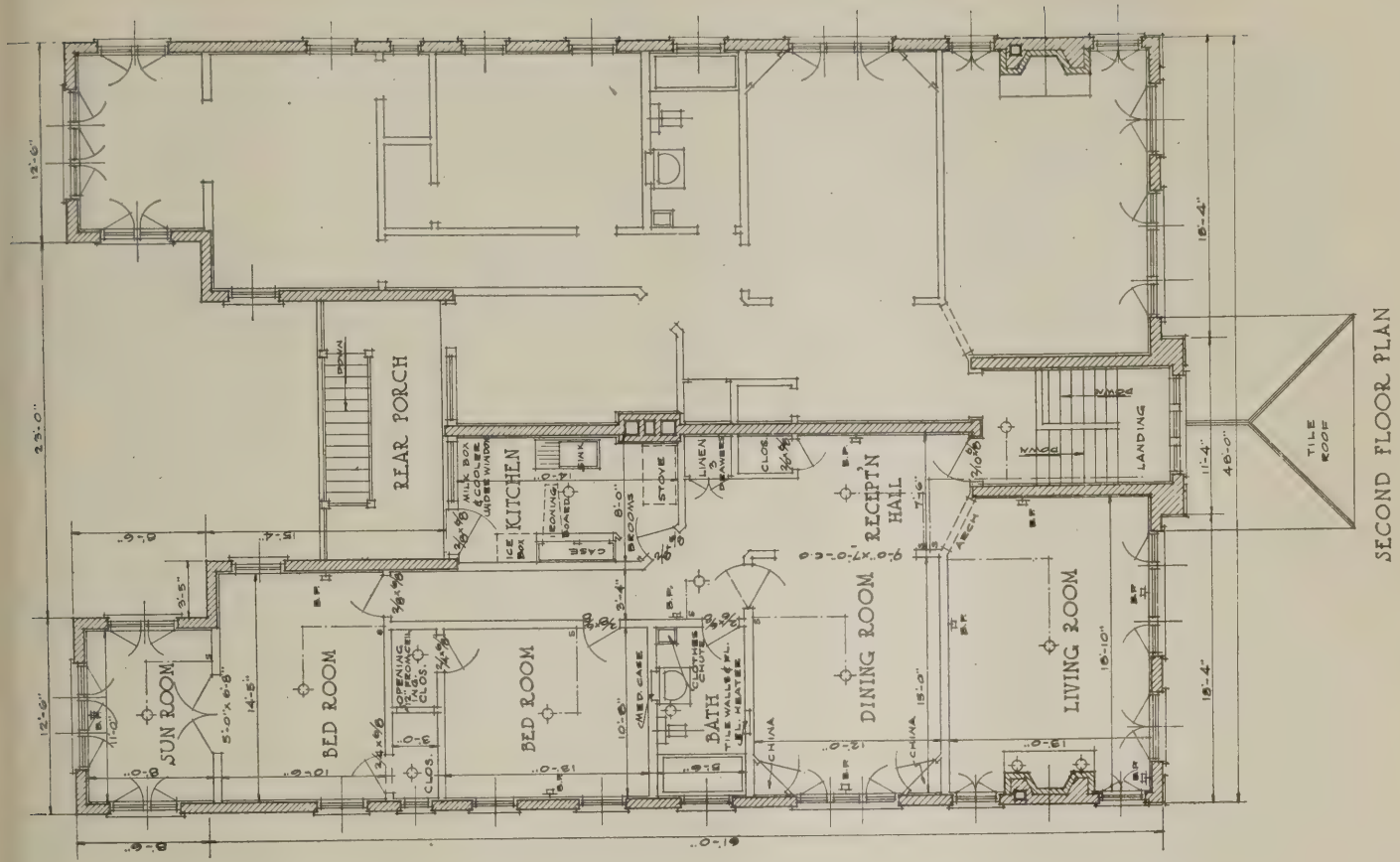
the work they may design. That class of construction is, at present, largely house-building, where houses are built as manufactured commodities to sell the buying public on exactly the same business principles that automobiles or furniture are built to sell.

It does no one any good to quarrel over

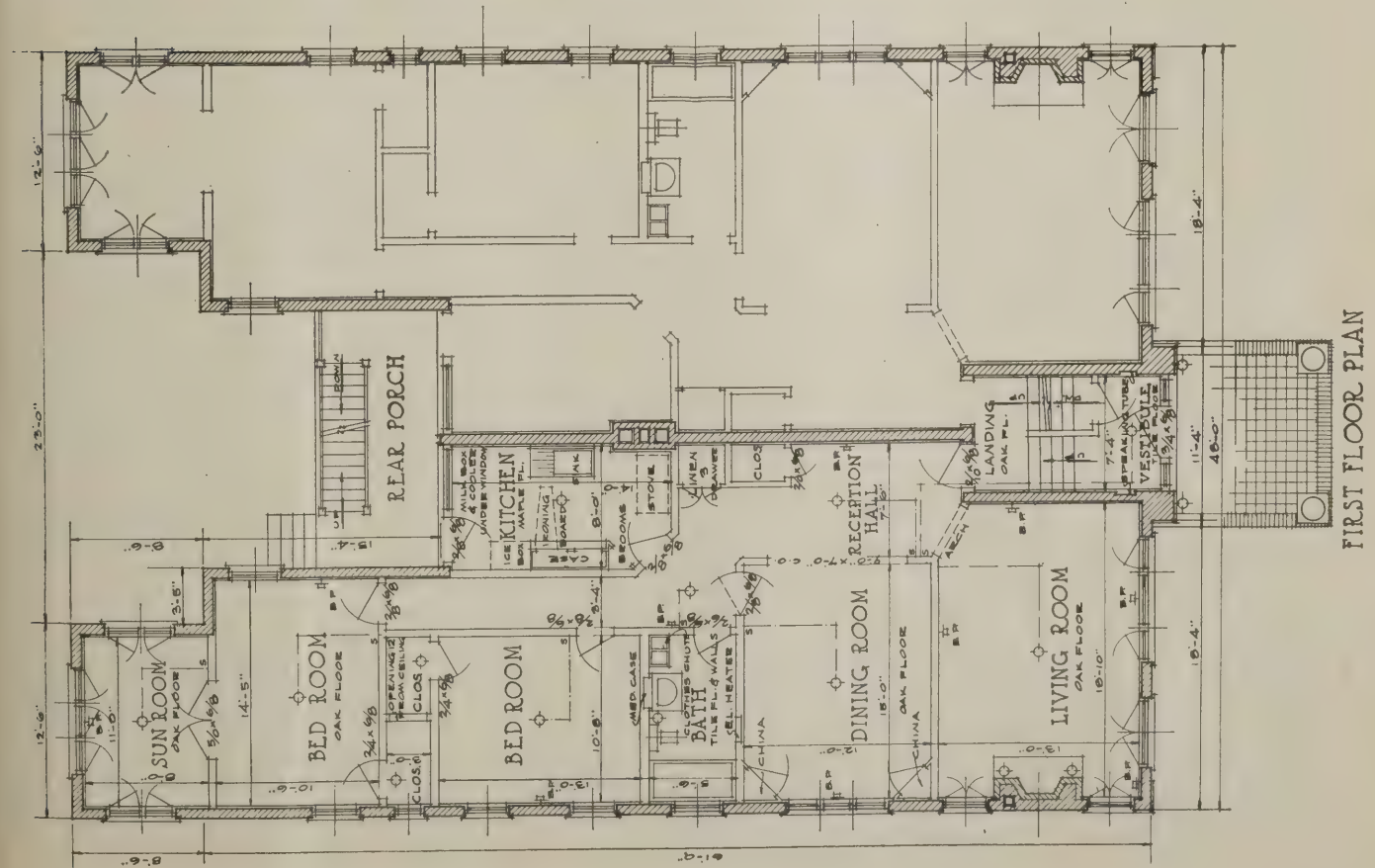
and a fact and not a theory; and the real problem or issue at the moment is how to assure the public good houses under these existing conditions.

At least one architect, who has faced this fact fairly, feels that he is rendering the building construction industry a real service by meeting builders on a level and giv-

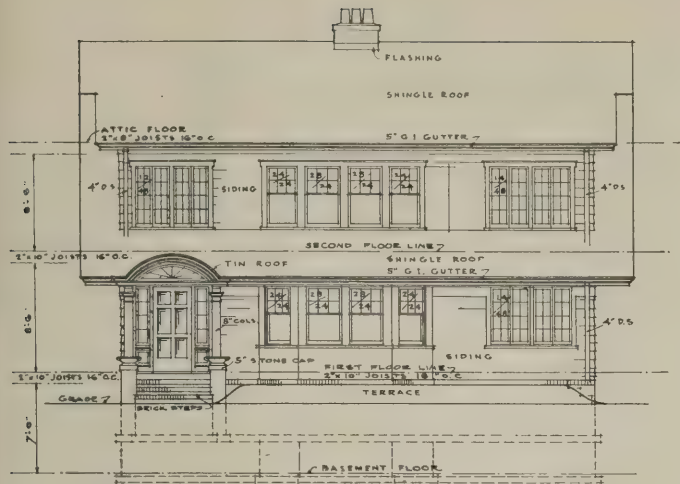
well as a comprehensive knowledge and understanding of all the various factors in the building industry. He was born in Amsterdam, N. Y., where his father was in the lumber and building material business, in addition to serving his community as an architect and builder. Henry W. Grieme graduated in architecture at the University



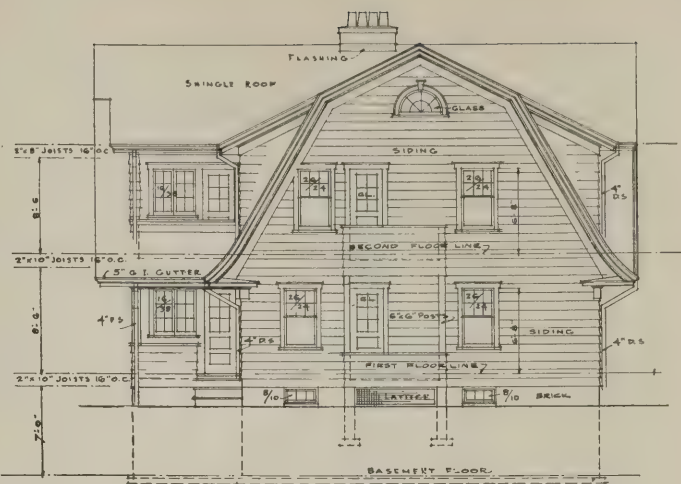
SECOND FLOOR PLAN



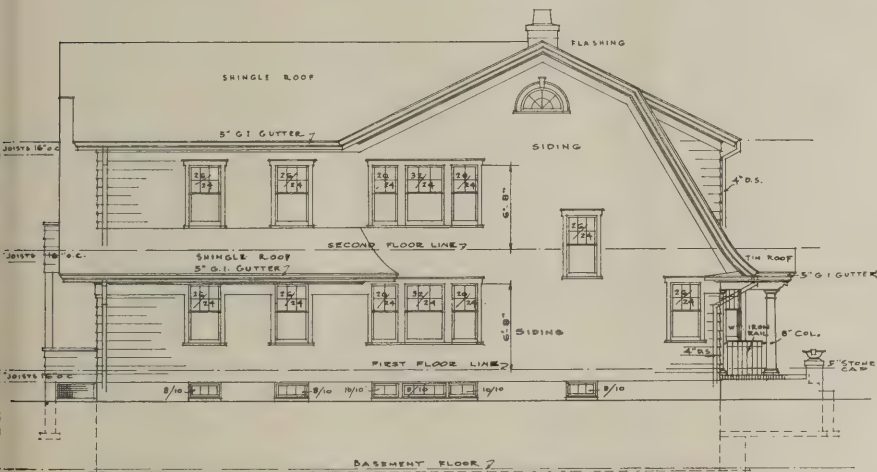
FIRST FLOOR PLAN



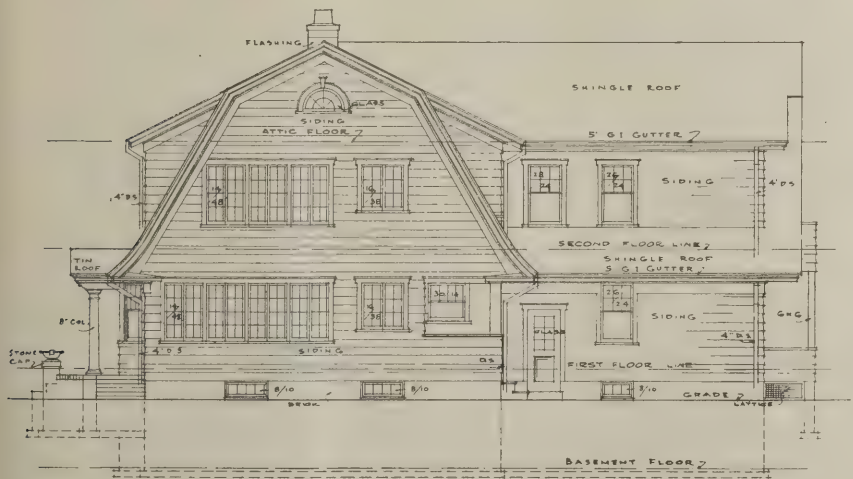
FRONT ELEVATION



REAR ELEVATION



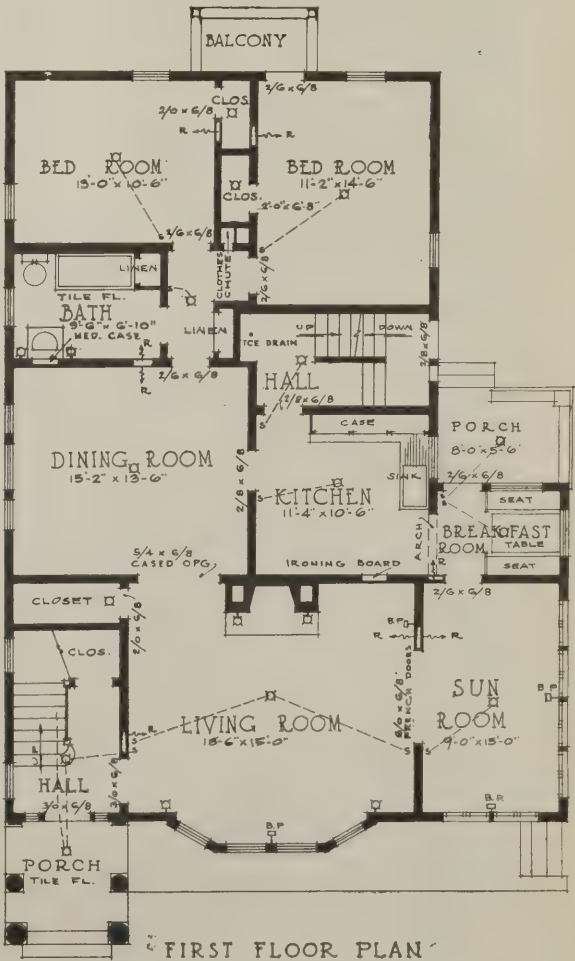
LEFT SIDE ELEVATION



RIGHT SIDE ELEVATION

as a result has developed an enormous volume of business in which he deals with builders and contractors practically exclusively.

Of course, many builders take pride in making their own plans, and some of the larger operators employ architectural draftsmen; but a surprising amount of house building is done with no plans at all other than rough pencil sketches made on the spur of the moment. Mr. Grieme's business is to fill the need of builders for complete sets of working plans, not from

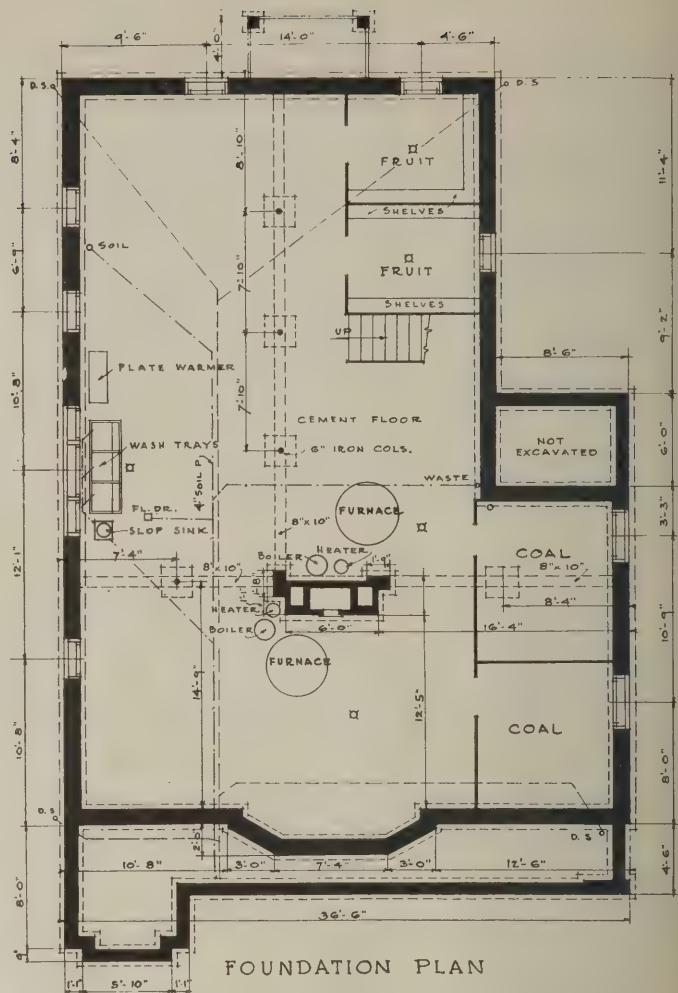
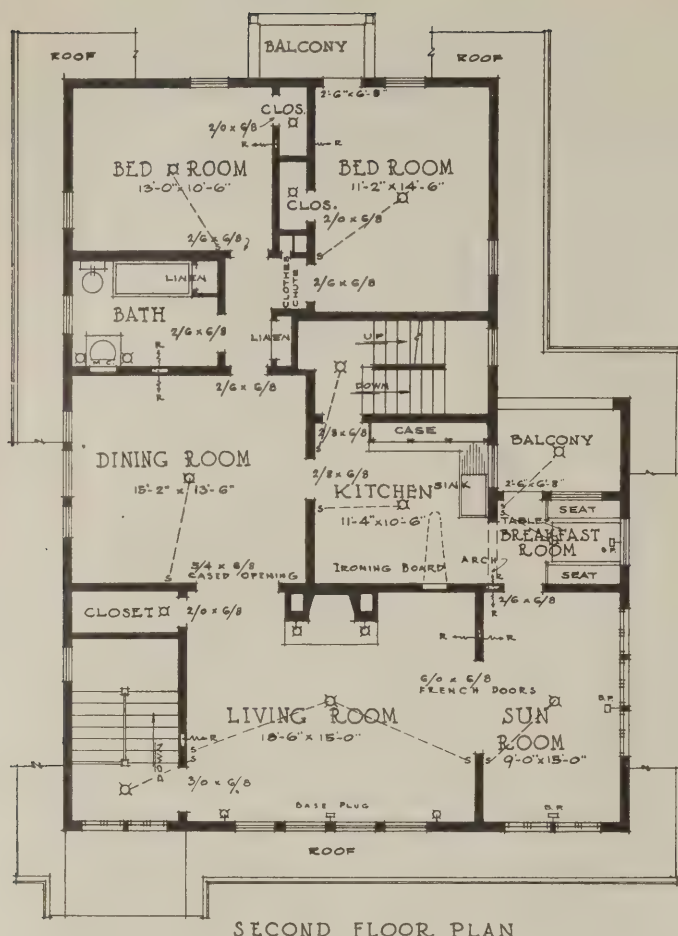


FIRST FLOOR PLAN

of Illinois and for a long time was associated with his father in Amsterdam, where he had ample opportunity to become acquainted with all phases of the business of building. While practicing there he was a member of the American Institute of Architects.

Mr. Grieme went to Cleveland about five years ago; and doubtless, like other architects, with a fresh point of view, was struck by the large amount of house building that goes on in a great city, with which

architects have no contact whatsoever. His own experience as a builder, and with builders, had convinced him that houses erected by builders without design or plans were not thus built for want of an appreciation of plan and design so much as for want of common ground upon which architects and builders could meet in building work of this class. Consequently he studied the needs of builders and



stock designs, but based on their own ideas and their own needs. With this plan service he sells not only blueprints but professional advice and counsel.

In his work he has built up a file of several hundred designs, which are carefully indexed and made accessible. A contractor comes to him and outlines his project for one, two, four, a dozen or a score of new houses. He knows approximately the type or kind of house he wants; or he may ask Mr. Grieme's advice on that phase of his problem. In any event from Mr. Grieme's sketches and his file plans, the contractor is able to place an order for the designs he wishes made up.

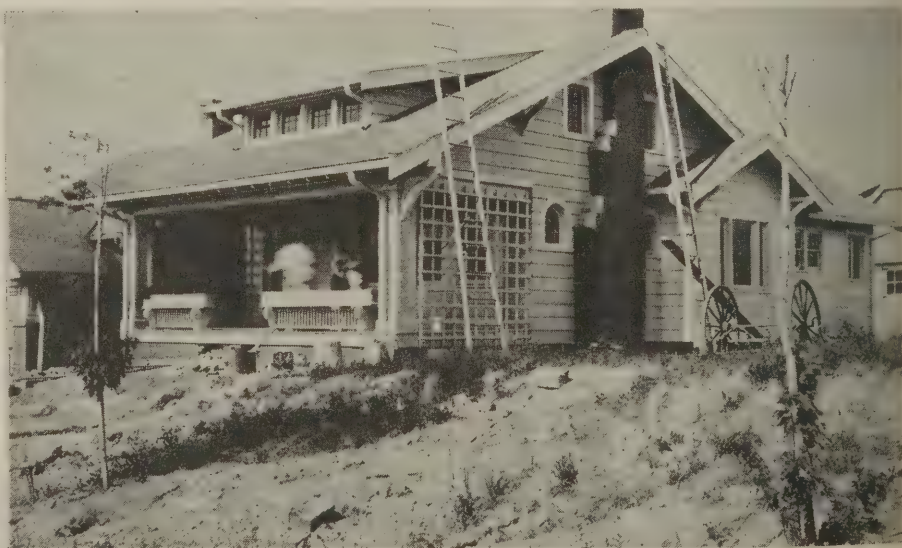
The work of making the working drawings then becomes largely the work of architectural draftsmen trained in Mr. Grieme's methods. It means merely the development of his sketches, the alteration of various features in an existing plan, or the combination of various features from two or more desirable plans, or the introduction of new features into an existing plan. By this method Mr. Grieme is able to give special and individual plan service for fees from \$5 to \$50 per set of plans; and to get them out on as short notice as 24 hours.

Neither Mr. Grieme nor any other architect would pretend to say that this is the

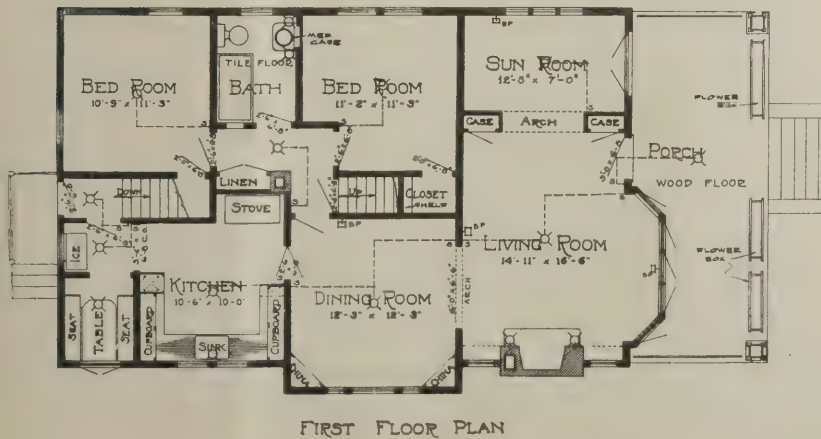
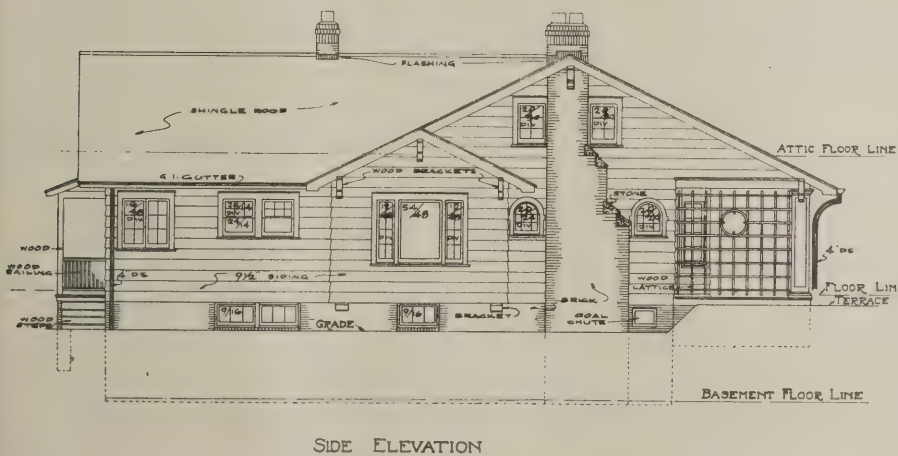
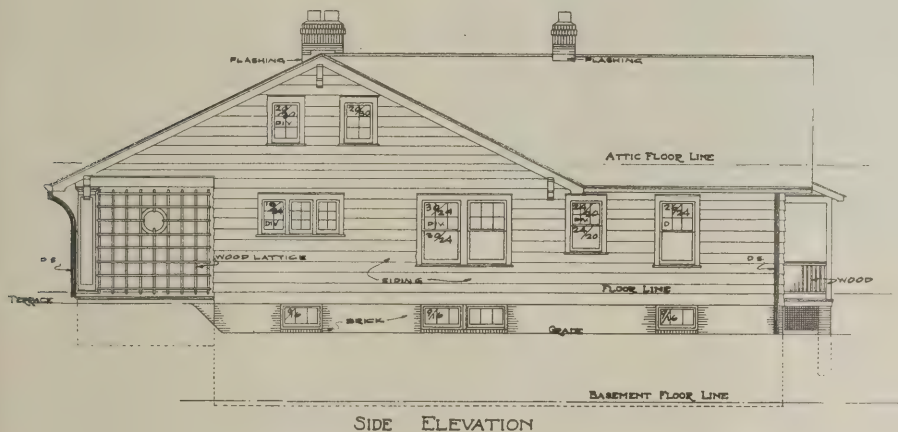
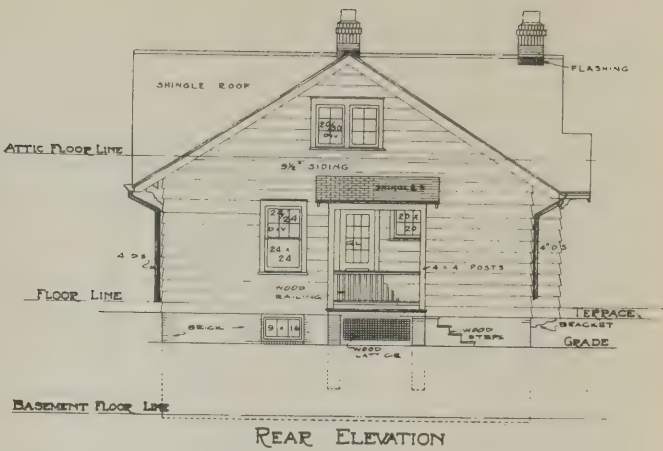
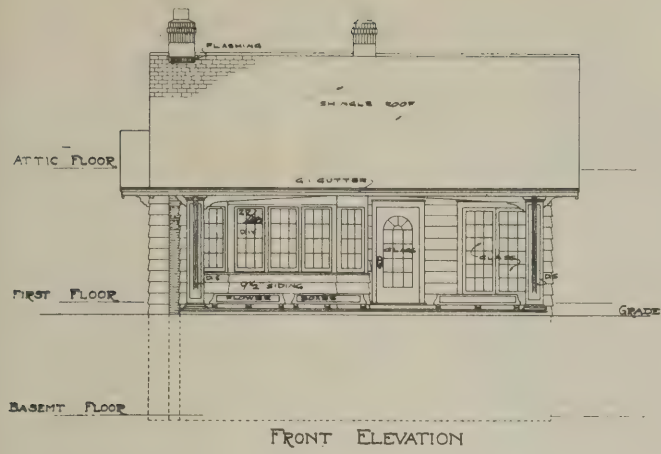
acme of architectural service, or that the results are all that could be desired. But Mr. Grieme does believe that he has initiated a distinct step in advance in having sold at least some part of architectural service to a group in the construction industry which has hitherto held largely aloof from all architects. That his step was successful as a business venture no one who

has been in his office, and seen the volume of work under way, could deny.

Again, Mr. Grieme feels that he is in a position to give, and actually does give, a kind of architectural service to a part of the public which probably otherwise might never have the benefit of any architectural service whatever. These are people of limited means who want to build small, cheap



Bungalow designed by Henry W. Grieme for the Putney-Brant Co., builders



houses. Mr. Grieme allows them to select from his files such plans as appeal to them most and then makes such changes in the floor plan or design as they desire. A new set of plans is then prepared according to their specifications, or wishes tempered by his judgment. Mr. Grieme then calls in some builder he knows from previous experience is honest and conscientious. He brings his client and the builder together and the result is that the client gets a set of plans prepared according to his individual needs by an architect and he gets his house built by a builder who very likely is honorable enough to give as much for value received, as some other less reliable contractor might be compelled to give under an architect's supervision and orders.

Some architects proceed on the assumption that a contractor or builder has but one object in life, and that is to make as much money as he can, as quickly and easily as he can. Mr. Grieme's own experience has proved to him that there are honest and honorable men working as builders, as there are in every other occupation, business and profession. Such men do not require the supervision of an architect to insure an honest job, although they may have need of his services in an advisory or consulting capacity; and this is the kind of service that Mr. Grieme is attempting to give builders in a broad, generous spirit.

Some Samples of Mr. Grieme's Work

In order to illustrate the character of the work Mr. Grieme is doing, as well as to show details of some recent Cleveland residential work, five typical plans are shown herewith.

Four-Apartment Building

These plans show a modern city apartment building of the better class, each apartment having five rooms, with bath, and a rear sun parlor. This building cost about \$25,000 and represents a splendid investment for a business or professional man—in this case a physician. The apartments rent for about \$150 per month. The design is interesting as embodying many of the most desired fea-



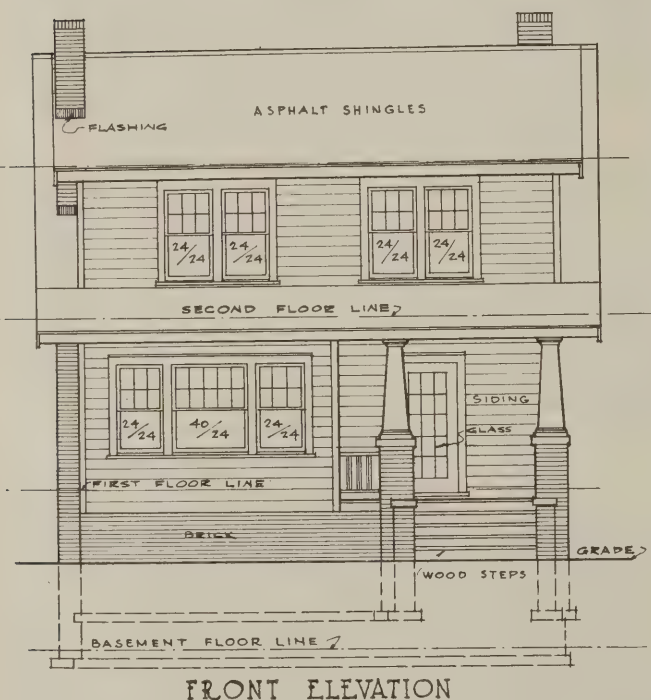
Working man's cottage designed by Henry W. Grieme (Plan No. 468), for R. R. Broccia, builder

by the kitchen was made large and light and airy, on the theory that the housewife had to spend most of her time there. But the tendency of the present times, in the cities anyhow, is certainly in the opposite direction and the modern kitchen is universally occupied the least possible amount of time.

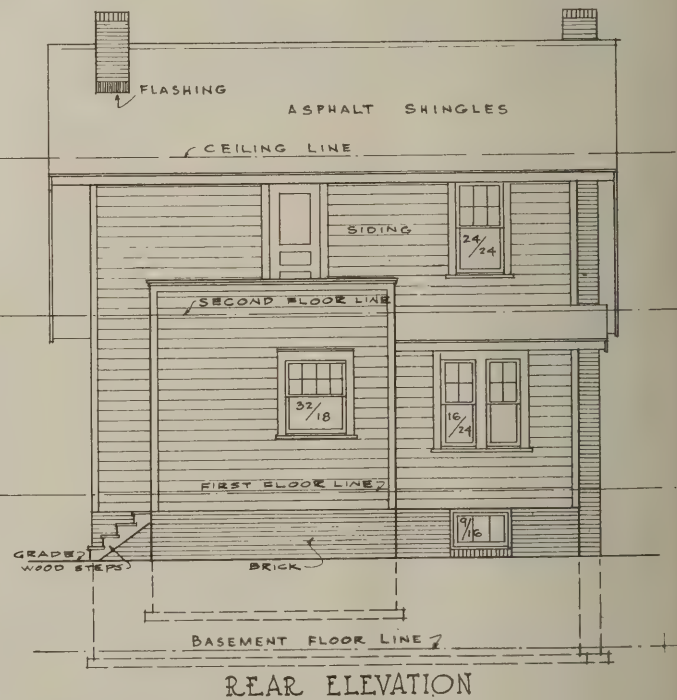
The breakfast alcove, on the opposite side of the kitchen, opening on to a small porch on the first floor, and to a balcony above, is quite interesting and attractive. Also the relation of the breakfast alcove to the sun porch, or room, adds attraction, particularly if the sun room has an easterly exposure. Used as a conservatory, or fernery, as sun rooms often are, its proximity to the breakfast room is particularly pleasing.

These apartments also have large living rooms, with fireplaces, and the layout of the rooms as a whole is such as to give long vistas and thus the impression of spaciousness.

Judging by Cleveland conditions and practice, these two-family houses are still good investments for the family which wants to have a first-class home of its own and yet realize something on its investment. The design shown costs about \$8500 to build



FRONT ELEVATION



REAR ELEVATION

tures in a city apartment—a large front living room with a fireplace, a spacious reception hall, a centrally located kitchen, and a comfortable living room or emergency bedroom with a rear exposure. The rear of the apartment is so designed, with the back entrance stairs in the court, that these rear rooms are not one whit less attractive than the front living rooms.

Two-Family House

These plans show a modern two-family house, the character of which is far better

concealed from the outside than in the old familiar type. The city of Cleveland offers many excellent examples of two-family houses, which are so designed as to resemble a high-class single-family residence, as well as have many features and advantages that the older style of "two-decker" did not have.

The floor plan herewith, like that of the apartment house, shows the kitchen placed near the center of the apartment and the rear exposure used to better advantage for light and airy sleeping rooms. In times gone

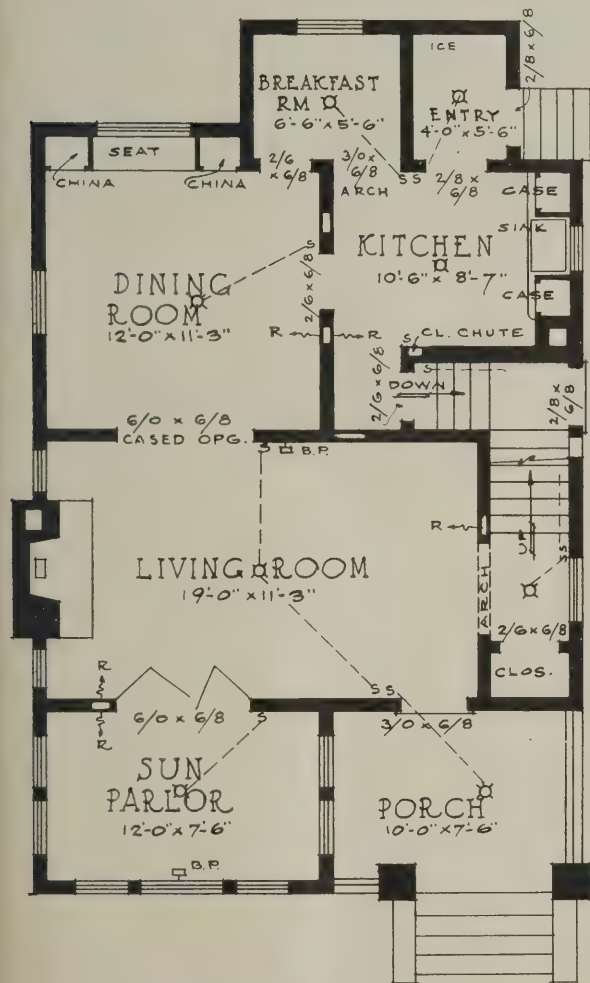
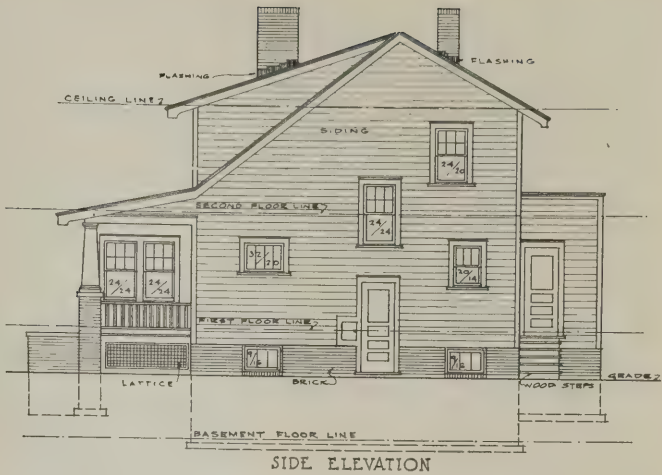
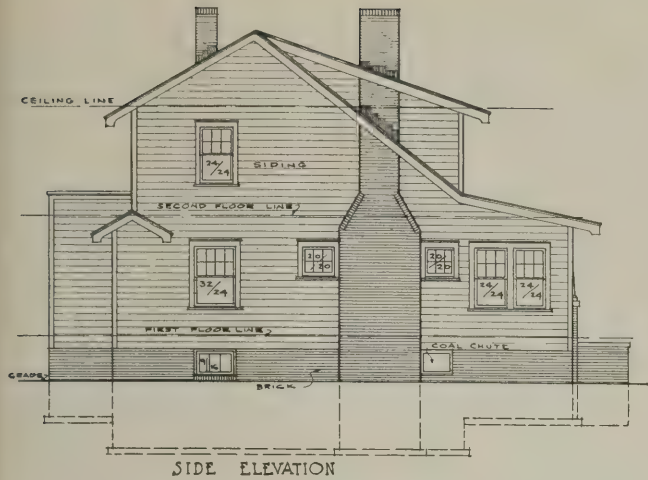
under present conditions in Cleveland.

Bungalow Design

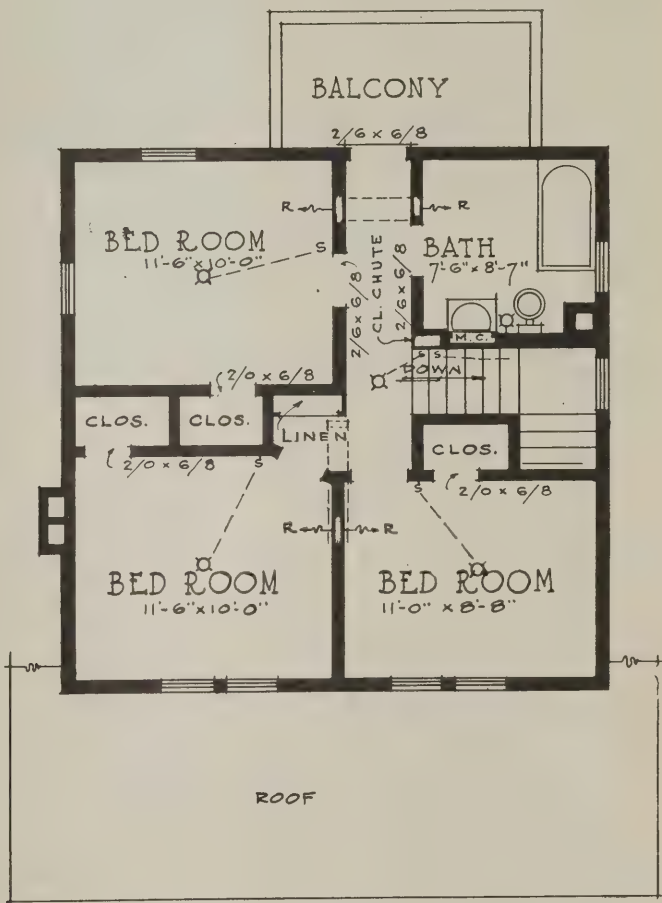
The bungalow plans herewith show a design with all the living rooms on one floor, but with an attic and provision for one room there if desired. The kitchen, breakfast nook and dining room layout here is also interesting.

Working Man's Cottage

The fourth set of plans show a cottage that can be built for \$4500 or less. Mr. Grieme



FIRST FLOOR PLAN



SECOND FLOOR PLAN

has designed a large number of these for a Cleveland builder who builds extensively in the western industrial part of the city. Naturally this house is designed for utility and cheapness of construction rather than beauty, but it nevertheless has all the special features of a much more expensive house—sun room, large living room, breakfast nook, etc. This same floor plan is built with several exteriors and is proving very popular; doubtless because it has all those features, even though in a small compass, that hitherto have been found only in dwellings of a

more pretentious type or of a different class.

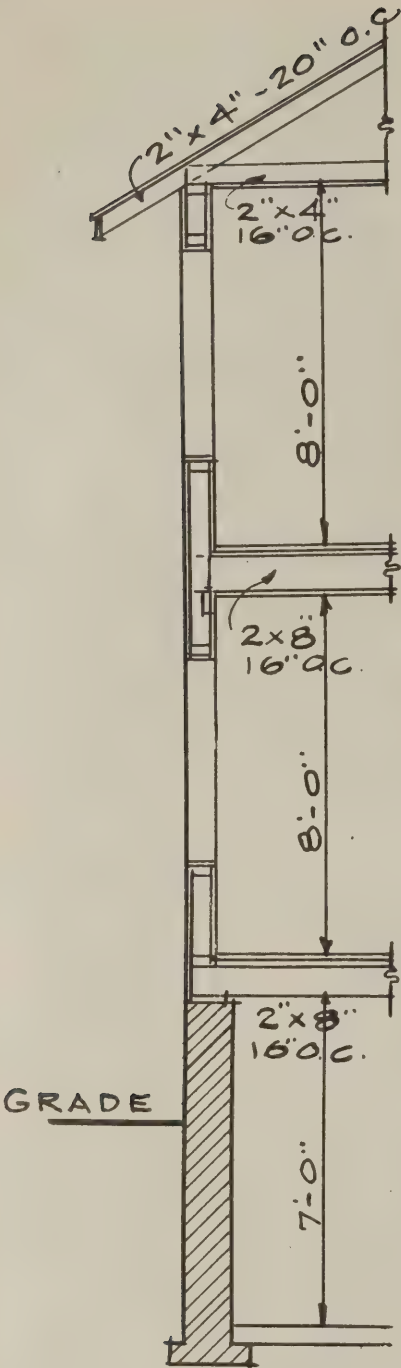
High Class Residence

The residence shown herewith is in the \$18,000 class. These plans illustrate many of the up-to-date features demanded in the better class of Cleveland residences—breakfast room with built-in cupboard, or sideboard, sun room with open porch, very large living room, telephone booth, first-floor wash room and toilet; the second floor has two baths and a sewing room with a “dressing room”—or maybe room to keep dresses—

opening out of it, in addition to three spacious bedrooms and a maid’s room.

The exterior views and the elevations show the rolled-edge shingle roof (imitation thatch) which is becoming a regular fad in Cleveland. It appears to be applied to houses of any and all design, irrespective of its appropriateness.

A CONTENTED, willing laborer is worth 50 per cent more than a dissatisfied compulsory worker.—*Kil-o-grams.*



SECTION

Safe Wall Loads

QUITE frequently the building codes state that the safe load for walls shall be a certain number of tons per square foot. The following table gives the equivalent loading in pounds per square inch for the most commonly specified loadings:

Tons per square foot	Pounds per square inch	Tons per square foot	Pounds per square inch
18	—250	8	—111
15	—208	7.2	—100
12	—166	7	—97
11½	—159	6	—83
10.8	—150	5	—70
10	—139	4	—56

—Construction Lime News.



Working man's cottage of another design but same floor plan as preceding

The Adaptability of Fir

By Arthur F. McCarty

EVERY builder and carpenter in the country has noticed the growing scarcity of yellow pine and the increase in the stocks of fir dimension in the yards of the lumber dealers. In the ordinary bill of lumber for the frame of a house today much more than half is apt to be delivered of the wood which grows in the great Northwest. The same change in the conditions regarding finish, inside and out, seems to be about here.

The change from the use of one wood to another sometimes involves a change in the method of construction, and this is the case in a slight degree in changing from yellow pine dimension to fir for framing. In the first place, grading is not quite so strictly maintained in the matter of fir, and in the second place a knot in a fir 2x4 affects the strength of the piece to a greater extent than with pine; and in the third place, fir is not of an equal stiffness with yellow pine of the same grade.

This calls for more rigid standards of doubling of studs; for a 2x10 instead of 2x8 for floor joists over ordinary spans; for better bridging and bracing. A slight increase in the cost of a house frame may ensue.

On the other hand, however, fir may be used nearer the ground than pine with perfect reliance upon its freedom from rot; fir may be used in nearly all places where cypress has always been thought necessary,

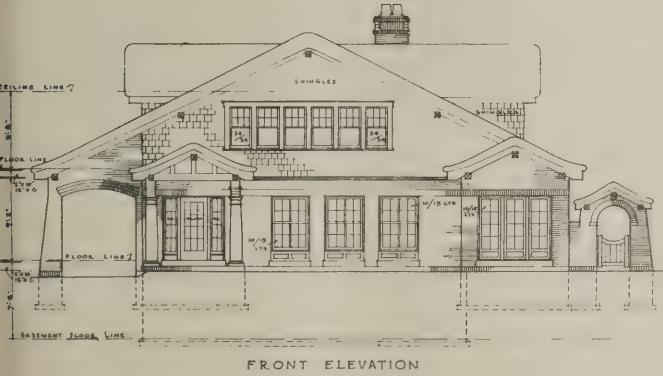
for fir, in lasting qualities when exposed to weather, dampness and the contact of the soil, very nearly equals cypress in resistance to rot. Fir sills, therefore, are admirable, even in framing those bungalows whose foundations do not rise above the surface of the ground. In such parts of a building fir is vastly superior to yellow pine.

For many years we have been using fir for the floors of porches, while demanding that nothing but cypress be used in framing and trimming the upper parts of the same porches. The writer, for one, can see no reason for paying the high prices for cypress for barge-boards, porch brackets, dentils or any of the multifarious parts of the modern porch detail. In most yards may now be found a grade of fir called "fir finish" in either boards or dimension. This lumber is clear and straight grained, dressed four sides and can hardly be excelled for the purposes described. Fir is free from resin as compared with pine, stands up well under paint in hot climates and where exposed to burning sun, and does not rot. Its cost is much less than that of other woods safe to use under these conditions.

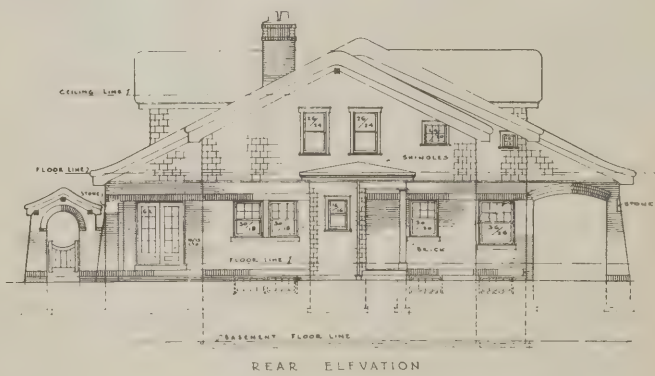
The foregoing may not be very new to many builders in all that great middle section of the country in which the transportation lines of yellow pine and western fir cross and mingle. But I have little doubt that there are vast numbers of carpenters



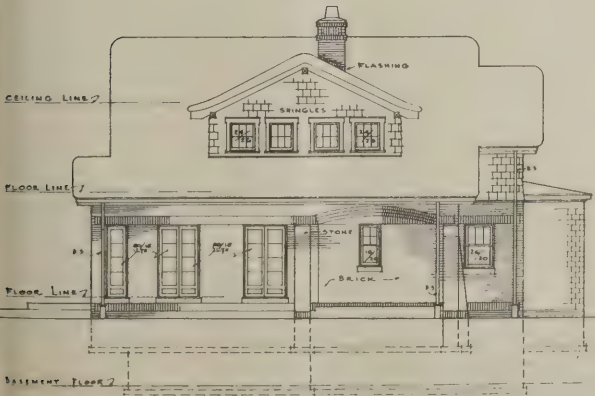
Residence of Dr. J. W. McDill, Cleveland, Ohio, designed by Henry W. Grieme. Carl F. Huletz, builder



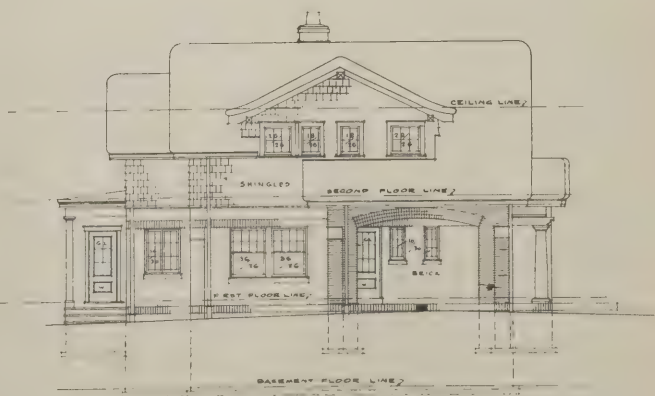
FRONT ELEVATION



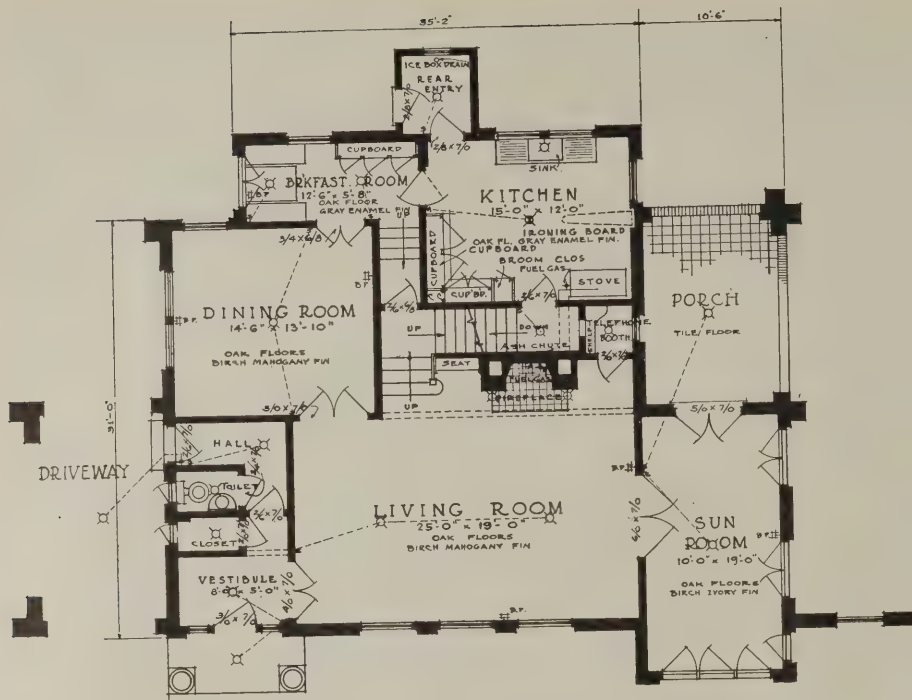
REAR ELEVATION



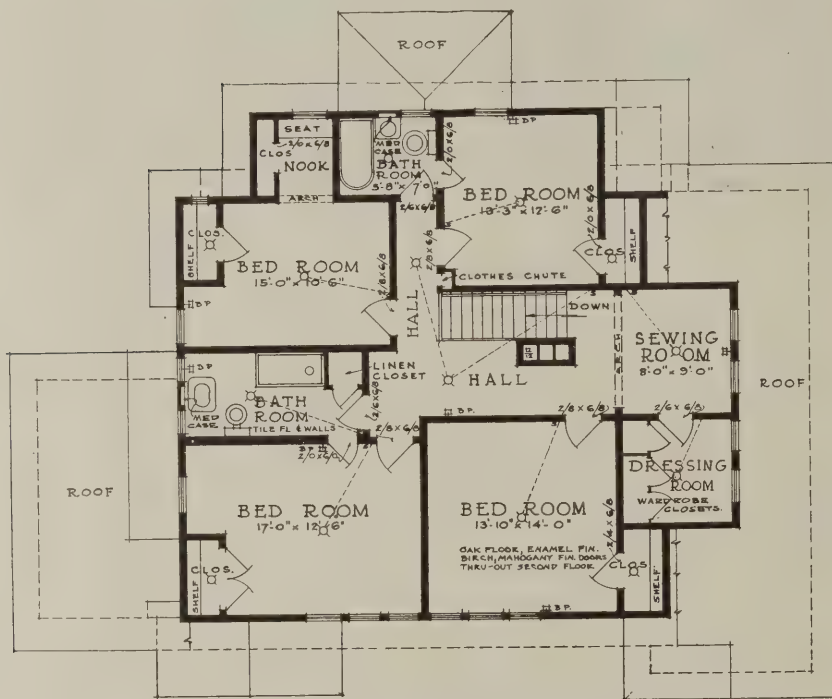
SIDE ELEVATION



SIDE ELEVATION



FIRST FLOOR PLAN.



SECOND FLOOR PLAN

who have not become familiar with the use and value of fir as an inside finishing wood. To all those thousands who have known of no intermediate step between yellow pine, for door and window casings, and oak, let me earnestly recommend for your consideration this western wood named fir.

In my building operations (putting up houses for sale) I encountered the fact that while yellow pine is a really beautiful wood and splendidly adapted to inside finish, it is regarded as very common; it has little or no character in all the great middle part of the country where for many

years it has been standardized, as it may be called, as the cheapest reliable wood to be had; its grain and appearance have become so well known that it has no distinction. So to tell a prospective buyer that a house is finished in "hard pine" is equivalent to saying that the house is but an ordinary one. I began to look about for something to take its place at no increase in cost. At that time (five years ago) there was but little fir in the yards of my town, which is Salina, Kans. But I had seen some of the wood, dressed for finish, and was struck by the beauty of the grain, so I in-

sisted on being supplied with fir for the inside trim of the first two bungalows I erected. This included fir doors, two-panel, the panels rotary cut veneer, such as have since become very common.

When I got that material, I began to experiment with various stains and finishes. I was immediately impressed by the strange resemblance of many of the pieces to flat grained oak, and the more I stained and varnished or waxed, the more beautiful were the effects I was able to produce. The result achieved in the first two houses was such that I could easily have sold them as having oak trim; almost every person who saw them thought the wood was of the hard, high-priced kind, but it seemed to make little difference to them when I told them the wood was "Douglas fir." The point is, it was a new and different wood from what they had always been used to, as a result of which my houses had distinction.

I have never used any pine finish since. I have bought my fir finish for less money than the pine would have cost. I have created houses of greater individuality and richer beauty. The different rooms are of almost endless variety; the stains have ranged from silver gray, through all the shades used on oak, to the walnut and mahogany shades. But fir is not adapted for an imitation of walnut or mahogany—the grain is too pronounced.

These factors are against the use of fir for inside finish: It is a soft wood, softer than yellow pine, but harder than white pine, and I do not use it for door jambs, substituting yellow pine; the grain is "involved" and mighty hard to dress, requiring a plane bit of razor sharpness, or, better, planing mill machinery; it cannot, as yet, be found in every yard, while yellow pine stock casings are carried everywhere throughout the Middle West, and when fir is obtainable, it is apt to be in dimensions that require cutting up and milling.

The price of fir finish is almost always and everywhere less than that of yellow pine, and taking that fact into consideration along with the other advantages leads directly to the use of fir for inside finish. When the Western mills get to sending it to us in 1¼-in. thickness, screen doors and windows, door jambs, all parts of window frames, and every other member used in trimming a house, inside or out, in which the expense of oak interior trim is not justified, may well be of the splendid, beautiful, adaptable, durable fir.

Someone is Looking for You.—If you only knew it, someone, somewhere, is looking for you to give you an order or to enlist your services. Tell NATIONAL BUILDER what you are doing, for we are receiving many requests from prospective builders asking to be put in communication with builders and architects having experience in various special kinds of construction.

Gable Roof Portable Hog House

By F. C. Lewis, County Agent



Fig. 1—Combination roof hog houses with the windows and doors open for summer time. The side walls serve as sun shades for summer



Fig. 2—Combination roof hog house with the doors and windows closed for winter time. The side walls are made as nearly wind proof as possible



Fig. 3—Method of framing a combination roof hog house. The frame work is all built on the top of the floor. The floor is two-inch tongued and grooved material

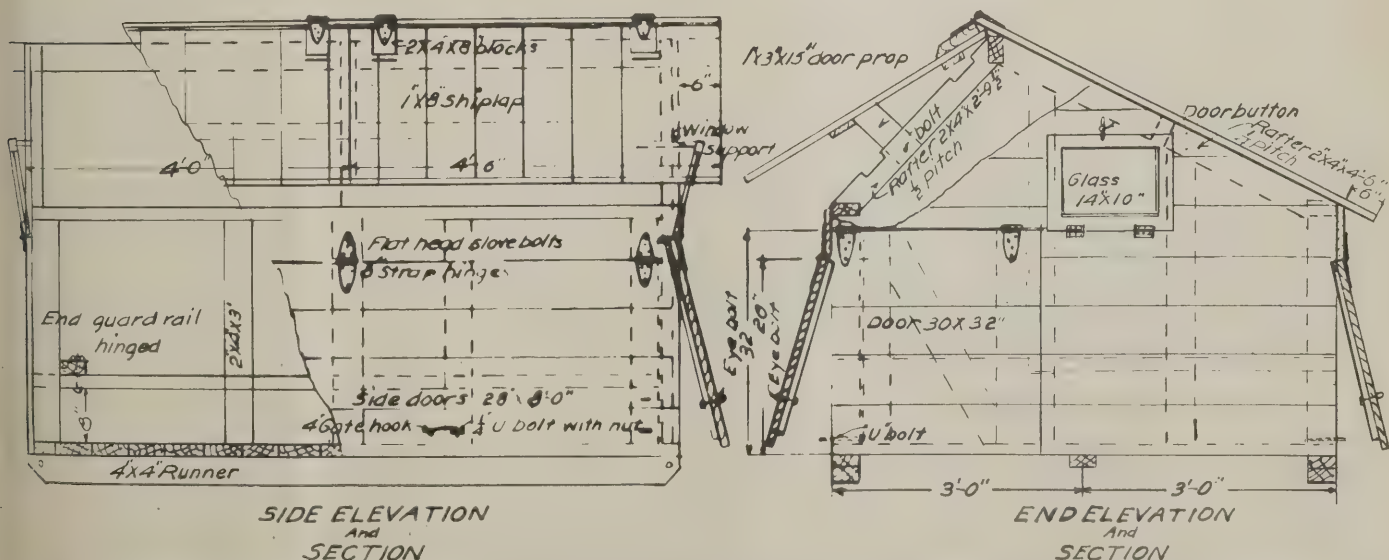


Fig. 4—Working plans for a combination roof hog house. The door for the entrance of the hogs may be hinged at the top, side, or it may be made to slide up

PORTABLE hog houses are of various types, but the one here described and illustrated has some unusual and very desirable features, in comfort and convenience, coolness in summer and warmth in winter, good ventilation, freedom from draughts, and means of admitting full sunlight to cause the sure death of all disease germs.

The construction is simple and no expensive foundation is needed. Renters, where permanent hog houses are not provided, will find this type of house very well suited to their needs. These houses may be easily moved to any part of the farm or from farm to farm.

This portable individual hog house is built by fastening 2 inch tongued and grooved flooring to 4x4 inch skids. On top of the floor 2x4 inch by 34-inch studdings are nailed. Plates are nailed to the tops of the studdings, forming supports for the rafters and roof. The sides and roof are covered with shiplap or tongued and

grooved material. The framing should be well braced to prevent damage by heavy winds, or in moving.

The entrance door is placed in the end wall and the side walls are hinged so that they may be fastened up to form a sun shade in summer.

The front side of the roof has a steeper

pitch than the back side and is hinged at the ridge so that it may be raised for ventilation and for attending the litter without entering the house.

Windows for admission of sunlight are placed in the gables. Additional windows, if desired, may be placed between the rafters of the front roof.

A Straw Loft Poultry House

POULTRY houses are very simple in design and construction. While the minor details of construction may vary widely they have little influence upon the desired purposes. There are several important points to be given consideration. The house should be simple and economical in construction; be convenient for caring for the flock; have sufficient floor space per bird and provision made for additional rooms. It should be free from moisture, provide for the admission of plenty of sunlight in winter, and fresh air without drafts and also be secure from vermin and burrowing animals.

Fig. 1 shows a straw loft poultry house which is an excellent house for a farm flock. It has a floor space thirty by thirty feet and will accommodate from two hundred and twenty-five to three hundred birds, depending upon the breed.

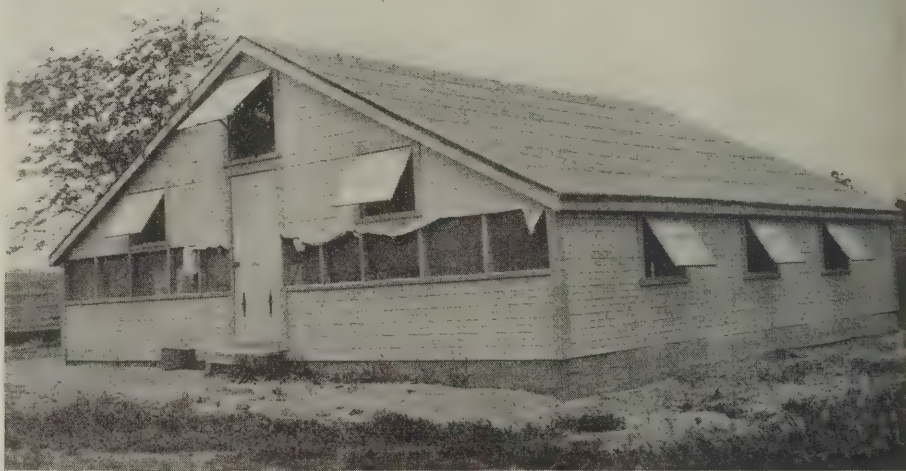


Fig. 1—A poultry house which will be well lighted, warm in winter and cool in summer. It is neat in appearance

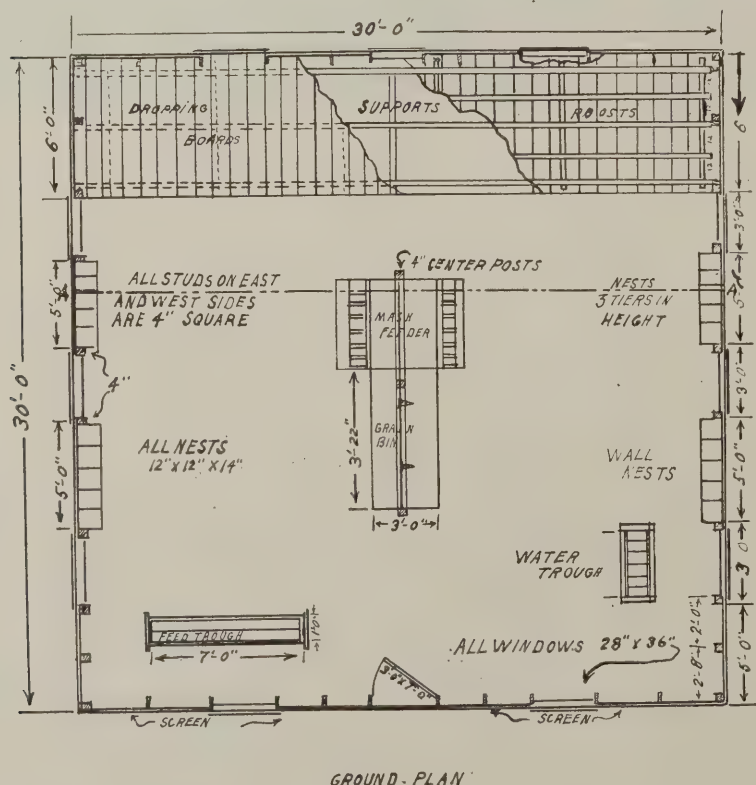


Fig. 2—Floor plan of a straw loft poultry house. A large, well lighted, durable and convenient floor space for a profitable flock

This house is designed to face with the ridge north and south. This places a gable end to the south so that the windows may be placed higher in the wall, thus throwing the sun's rays farther back into the building than is possible with many houses. This shape of house is easily, rapidly and economically constructed. Windows are located on all sides of the house, eliminating dark corners where the hens are liable to crawl into and lay. It is claimed that a hen in scratching faces the light thus working the litter to the darker parts of the house.

Figs. 2-3 shows the working plans as illustrated by Fig. 1. The foundation is of concrete and extends about sixteen inches below and thirteen inches above the surface of the ground. The floor is of concrete, two inches thick with a six inch under fill of cinders well tamped. This makes a sanitary, dustless, permanent, dry and warm floor which is easily kept clean. The covering of straw aids much in keeping the floor warm in winter.

Sills of 2x4 inch material are anchored to the foundation by bolts. The wall construction is of 2x4 inch studdings, four feet long, spaced two feet apart and covered on

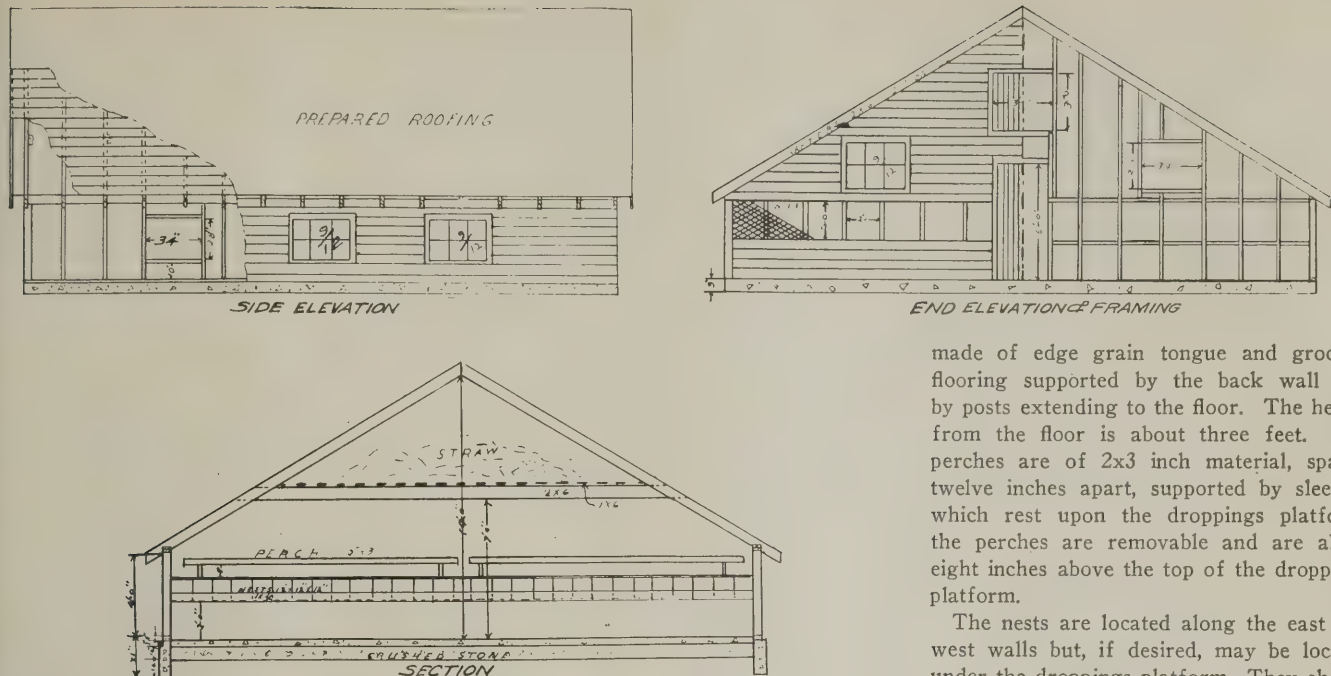


Fig. 3—Side elevation, section and end view of the straw loft poultry house. The walls and roof are tightly constructed. The large number of openings and windows insure abundance of light and ventilation

the outside with drop siding. The rafters are of 2x6 inch material spaced two feet apart and covered with shiplap sheathing and prepared roll roofing. This makes a tight roof which is non-conductive and will greatly aid in ventilation. Collar beams of 2x6 inch material are nailed to the rafters seven feet from the floor and covered with 1x4 inch boards laid with two inch openings forming a loft. This loft floor is covered with about a foot of straw which acts as an absorber of the dampness of the air and also acts as an insulator for the heat in summer by shutting off the heat from the roof. The loft has windows in the gable ends which when open gives a circulation of air through the loft, dries the straw and aids in cooling the house.

Windows containing six, 9x12 inch panes, single sash, are used in all sides of the house, thus supplying abundance of evenly distributed sunlight, preventing dark corners, this is especially important under the droppings platform at the back.

Hens must have plenty of fresh air to keep them free from diseases. Houses which are poorly ventilated are damp during winter and early spring, poor ventilation causes the moisture in the air to collect in the litter and on the walls and condenses into drops of water when coming in contact with cooler surfaces. Ventilation in the house, illustrated, is established by means of the open front, which is covered with poultry netting and muslin curtains. The curtains need be used only in cold weather or at nights. Added ventilation in summer may be established by opening the windows on all sides of the house to allow a free circulation of air.

The roosting quarters are placed along

the north wall where they are the most out of the way. The droppings platform is

AS sheep are covered with a thick coat of wool they do not need as warmly a constructed building as do most other farm animals, but if the fleece becomes wet and cold much heat from the sheep's body is necessary to evaporate this moisture. The housing quarters should be well lighted



Open front sheep shed

and ventilated and serve as a protection from cold rains and storms of winter.

Figs. 2, 3 and 4 show the plans for a combination roof open-front sheep shed, which will be found satisfactory for most sections of the United States.

The dimensions of the building are 22 ft.

made of edge grain tongue and grooved flooring supported by the back wall and by posts extending to the floor. The height from the floor is about three feet. The perches are of 2x3 inch material, spaced twelve inches apart, supported by sleepers which rest upon the droppings platform, the perches are removable and are about eight inches above the top of the droppings platform.

The nests are located along the east and west walls but, if desired, may be located under the droppings platform. They should be at least twelve inches square and twelve inches high and may be built in tiers.

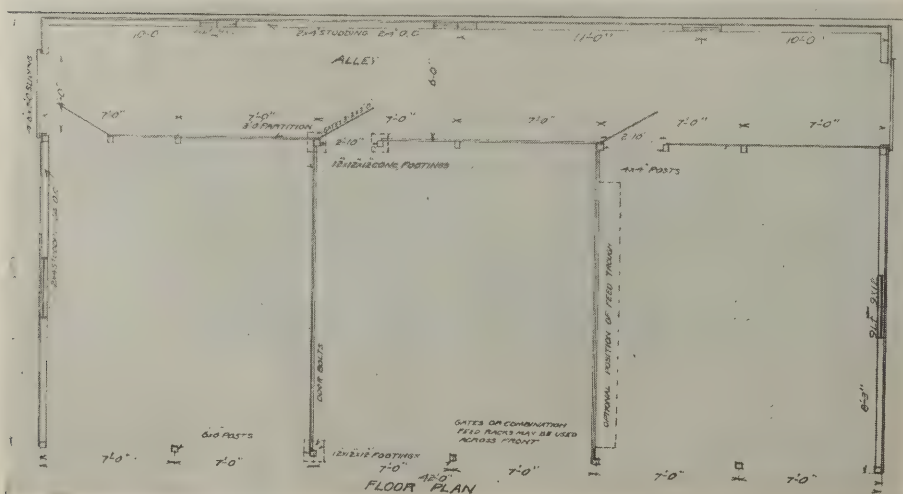
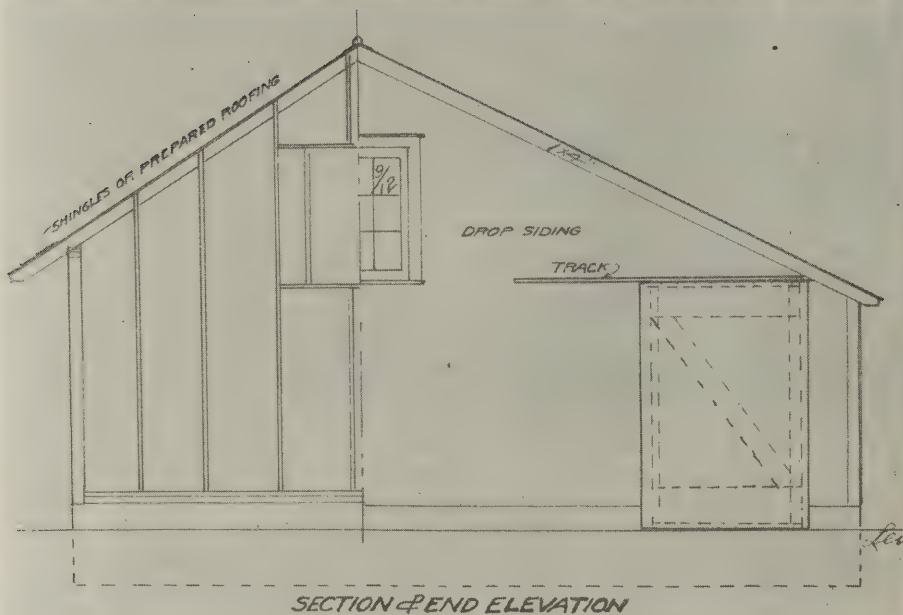
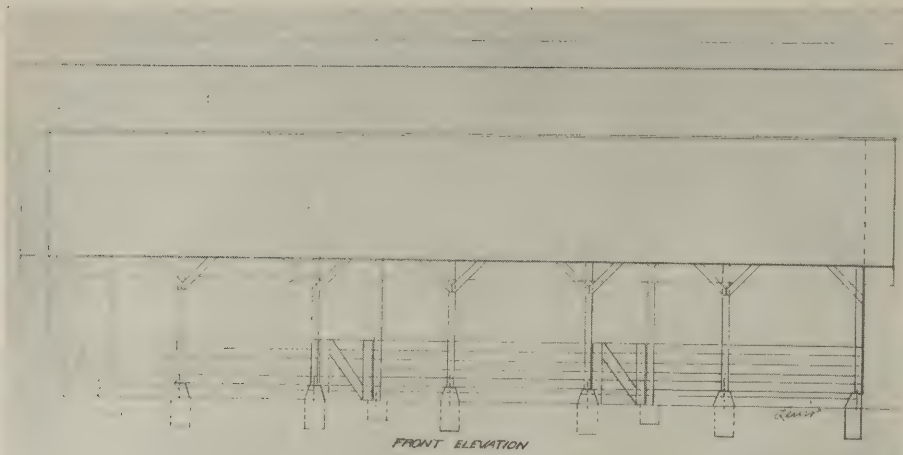
The interior equipment consists of water trough and mash and grain hoppers.

A building of this design and description, will, if kept well painted, last for years.

A Sheep Shed

wide and 42 ft. long. This shed has an open front and is designed to face south. Along the back is a 6-ft. alleyway for convenience in feeding. The feeding space is divided into three compartments by fences which run through the building. The back and the two end walls are supported on

concrete foundation walls 10 ins. thick extending 1 ins. above and 18 ins. below the surface of the ground. The end and back walls are constructed by anchoring sills to the concrete foundation and setting 2x4 in. studdings spaced 2 ft. apart. The back wall studdings are 5 ft. long. The end



and back wall studdings are sided with drop siding. Three windows containing four 9x12 in. glass are fitted in the back wall, and one sash of the same size in the

end walls high off the floor so that the glass will not be broken by the stock. The ends of the alleyway are inclosed by sliding doors 4 ft. 6 ins. by 7 ft. in size.

The front of the roof is supported by 4x4 in. posts, 6 ft. 6 ins. long, set on concrete piers. On top of the posts is a 4x10 in. girder braced to the posts and supports the ends of the front rafters.

The rafters are of 2x4 in. material spaced 2 ft. apart and reinforced by a truss every 7 ft. The posts along the alleyway carry a purline plate which supports the long rafters of the back. The roof consists of sheathing and shingles or prepared roll roofing.

An earth floor filled in with gravel or cinders may be used. The top of the floor should be higher than the surface of the surrounding ground to prevent water from draining into the building.

Trade Education

TWO THOUSAND MEN are preparing for the building trades in the largest school in the world. This is not a startlingly large number when it is considered that in the Trade and Industrial Training under the United States Veterans' Bureau there are enrolled 130,798 students.

The apportionment to the building trades is as follows: Carpentry, 512; heating, plumbing, and ventilating, 476; cabinet making, 304; house painting, 170; masonry work, 140; stone cutting and bricklaying, 45 each; paper hanging, 35; elevator installation, 25; plastering, 15.

After the school term is over the men usually go into industrial establishments for "training on the job" for varying lengths of time. The time varies—it may be a month or a year, all depending on the needs of the individual man. Sometimes, the man is put into an establishment for some trade, such as stone cutting, which is not taught in school. Sometimes the object of the "training on the job" is simply to "round out." Sometimes training on the job is the best possible for the type of man who cannot get along in schools and can only learn "to do by doing." In very many instances the man has given such definite satisfaction to the proprietor of the shop that he steps right into a job in the very establishment where he has been in training.

Taken almost at random from a list of men rehabilitated in the building trades is a list of men thus "trained into employment": A veteran lamed from a gunshot wound received at Verdun rehabilitated as a decorative plasterer at \$9.00 per day; another man rehabilitated as a plasterer at \$4.50 per day; another placed as an interior decorator at thirty-five cents an hour; another, a reinforced concrete worker at \$8.00 per day for an eight-hour day; a pre-war carpenter with an arrested case of tuberculosis rehabilitated as a cabinet maker at \$4.00 per day—all finding their jobs in the establishment where they were trained.—*American Contractor.*

Storage Tanks for Corn on the Ear

MANY of our readers will not appreciate perhaps that methods of storing ear corn have progressed from the unshapely, rat-infested corn crib of early recollection until today we have many handsome, fire-proof ear corn elevators of large capacity. Such is the trend through the great central corn belt and the result is as shown in the accompanying illustrations.

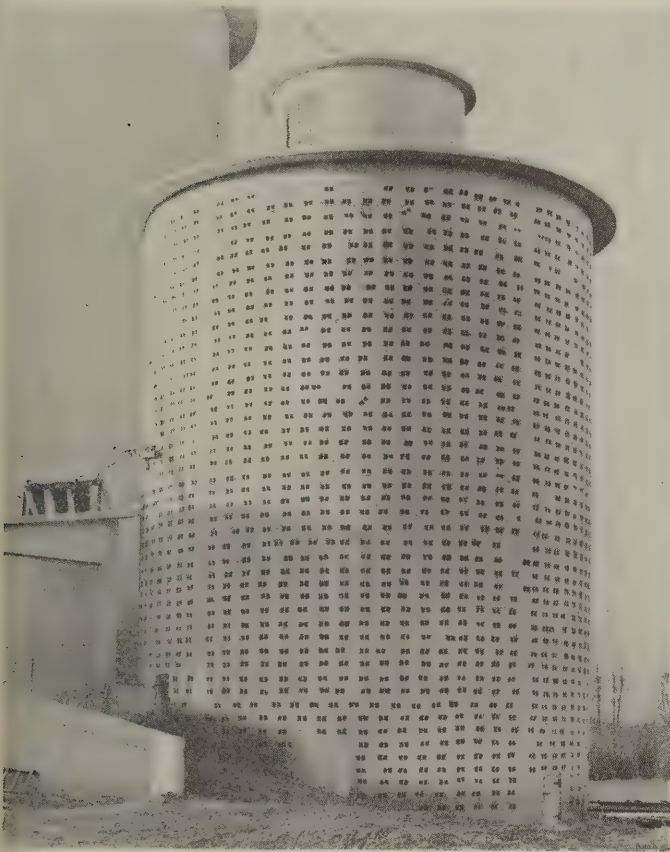


Fig. 1—Monolithic concrete storage tank for corn on the ear. The openings for ventilation were made by inserting hollow tile in the forms. The tiles are slightly inclined so water cannot enter. Lower rows of openings are protected against rats by means of screening

The corn storage elevator shown in Fig. 1 is constructed of monolithic concrete, with walls 6 inches in thickness. The air spaces are provided by means of hollow tiles inserted in the walls at sufficient intervals to give the necessary degree of ventilation. These elevators must not be built by rule of thumb methods, but preferably should be designed by engineers who specialize in this class of work. The inner end of the tile are raised slightly from the vertical to prevent water from getting in and the openings within a few feet of grade must be carefully protected with heavy screening (preferably embedded with the tile in the wall) to keep out rodents.

Circular tanks have proved most popular because they are usually the most economi-

cal in ground space, material and labor. The forms employed may be of either the sliding or the sectional type, but the work is of such a character that it should be undertaken only by thoroughly reliable and competent contractors.

Fig. 2 shows a similar tank built in connection with 45,000 bushel elevator installation at Petosum, Ill. The ear corn storage

in the illustrations, paying for it in a short time out of the saving in wastage which cannot otherwise be prevented. When the price of corn is high, this wastage appeals to us very strongly because of the greatness of the figures representing the loss; when corn is low, the farmer should be able to save every bushel in order to get out of his crop the maximum return.



Fig. 2—Concrete elevator and ear corn storage at Pesotum, Ill., designed by Holbrook, Warren and Andrew, engineers, Decatur, Ill. The capacity of the elevator is 45,000 bushels of small grain and 3,000 bushels of corn on the ear

has a capacity of 3,000 bushels. The tank is provided with a modern elevator system for loading and a full complement of machinery for handling the ear corn. The labor required and hence the cost of handling ear corn and, in fact, all grain in a plant of this kind is considerably reduced, producing argument enough for building them. The fireproof, maintenance-proof and rodent-proof features are then obtained at no additional outlay.

The alert contractor in corn growing regions will have no trouble in interesting growers of corn and country elevator concerns in the many practical advantages of this type of construction. The farmer who raises a substantial crop of corn can afford to erect ear corn storage of the type shown

Temperature and the Rate of Corrosion

THE effect of temperature on the rate of iron corrosion is practically an unknown quantity. But experiments have shown that at 80 degrees Centigrade iron ore corrodes nearly ten times as rapidly as at 0 degrees. The effect of light is very remarkable. It has been shown to accelerate corrosion very markedly, even after the temperature effects had been removed. Corrosion is clearly affected by barometric variation. The subject is very complex, and the results are not always the same, even when experiments are carried out under what appear to be exactly identical conditions.—*Scientific American*.

Sanitation, Heating and Lighting of Suburban and Country Houses

By Edward E. Ashley, Engineer; Starrett and Van Vleck, Architects, New York City

No. 9—Arrangement of Kitchen, Laundry and Pantry

THERE are three important factors in laying out a kitchen—

- (a)—Light
- (b)—Ventilation
- (c)—Accessibility

The kitchen should be so placed with the planning of the balance of the house

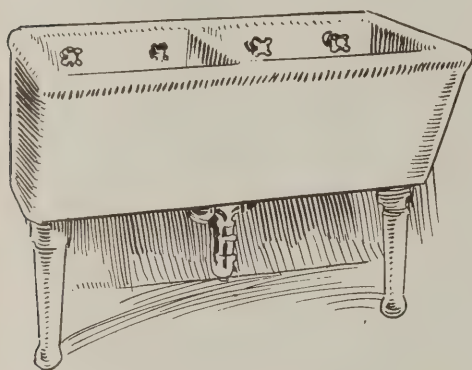


Fig. 53—Laundry tubs

as to afford good natural light and plenty of cross ventilation. It should have its windows extend as close to ceiling as practical, and of area to equal not less than 12% of the floor. A vent flue and hood over range is very desirable to carry away odors of cooking.

The windows and doors to outside should be entirely screened. The space occupied should be ample and at the same time not wasteful; it should be such that everything is reached with as few steps as possible, and at the same time provide plenty of work space.

The kitchen should be provided with a range, a sink, plenty of cupboard space, a central table and a general storage room adjoining. Where it is impractical on account of cost, the general store room may be combined with laundry by arranging cupboards or shelves with spaces for barrels underneath (as shown on plan of kitchen without pantry).

The fixtures should be arranged in sequence of work and so that as few steps as possible are necessary to and from stores, preparation table and range. Where no pantry is provided the range and central table should be accessible to dining room—as in plan of kitchen without pantry. In this place you will note that the sink is in the center of the outside wall with cup-

boards right and left so that dishes may be washed and put away without any additional steps and at the same time is very accessible to range. The centre table would be arranged with bins and two drawers for tools and possibly a rack over same; to the right of kitchen is the combination store room and laundry, very much preferable to placing the tubs in cellar and arranged with place for an electric washer and in front of window an ironing board.

The entry provides an excellent location for the refrigerator, allowing same to be iced without traffic in the kitchen, and at the same time accessible and away from the kitchen heat.

Note the cross ventilation from entry to

an offset in the flue and carry it to the range, placing the range in its proper location and saving many extra steps for the person running the kitchen.

In the kitchen plan with pantry and laundry the pantry is to the left and rear of range with sink under windows and with dish cupboards along wall. The kitchen in this arrangement is very similar to the previous one, except it should be a trifle larger and is provided with an additional cupboard, for it is assumed that the house with a pantry would be larger and contain more rooms than the one without.

The laundry is to the right of the kitchen and has a separate entry instead of opening off the kitchen, thus effectively

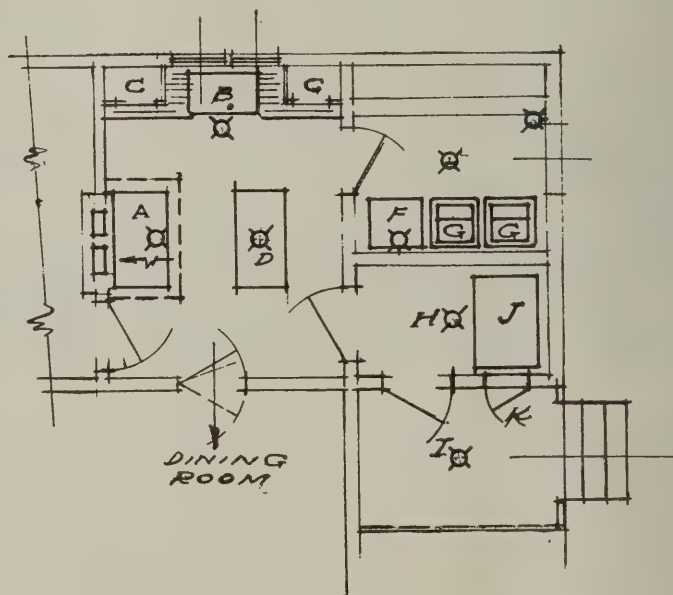


Fig. 54—Kitchen without a pantry

A—Range. B—Sink. C—Cupboard. D—Table with bins. E—Store shelves. F—Electric washer. G—Wash tubs. H—Entry. I—Screened porch. J—Refrigerator. K—Door for icing refrigerator. *Electric lights

windows and still not directly on range so as to affect cooking.

The range is provided with a hood and separate vent, which are very desirable, carrying away the cooking odors and confining the grease to the hood rather than the ceiling. In a great many plans the range is jammed in the corner because of the chimney, but while in some instances this is unavoidable it is far better to put

cutting off any odors of washing from the rest of the house.

The plan of kitchen with pantry, laundry and store closet is simply an alternate for the second plan and increases the area occupied by the kitchen to the extent of the screened-in porch.

Note that each layout is provided with a screened-in kitchen porch, which should be of ample size for a table and chairs for

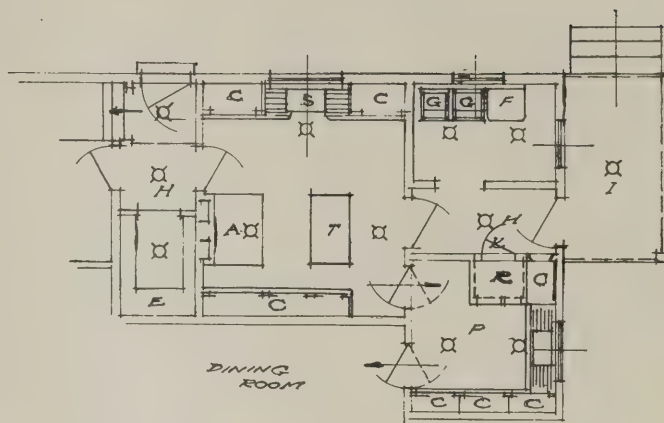
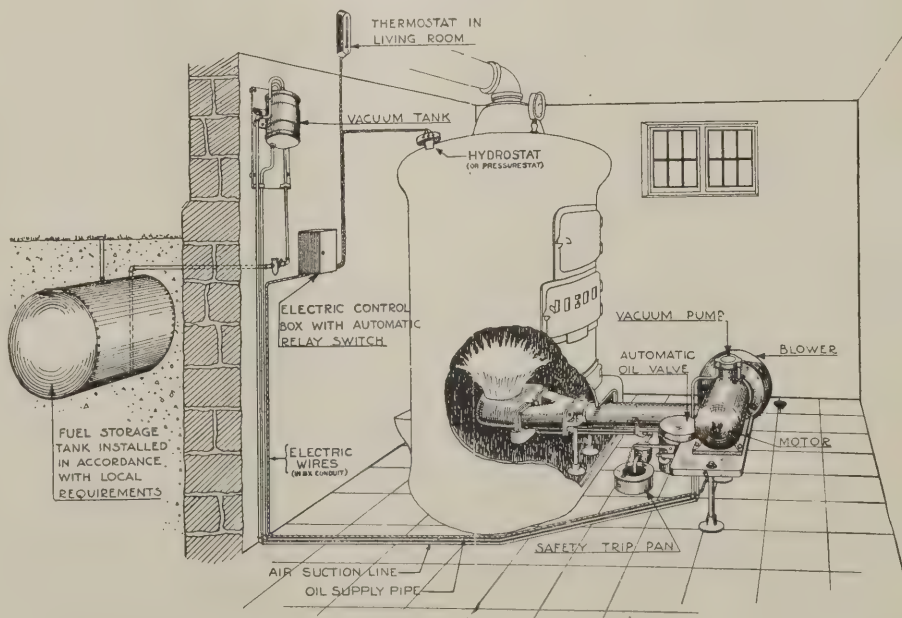


Fig. 56—Kitchen, pantry, laundry, and store closet

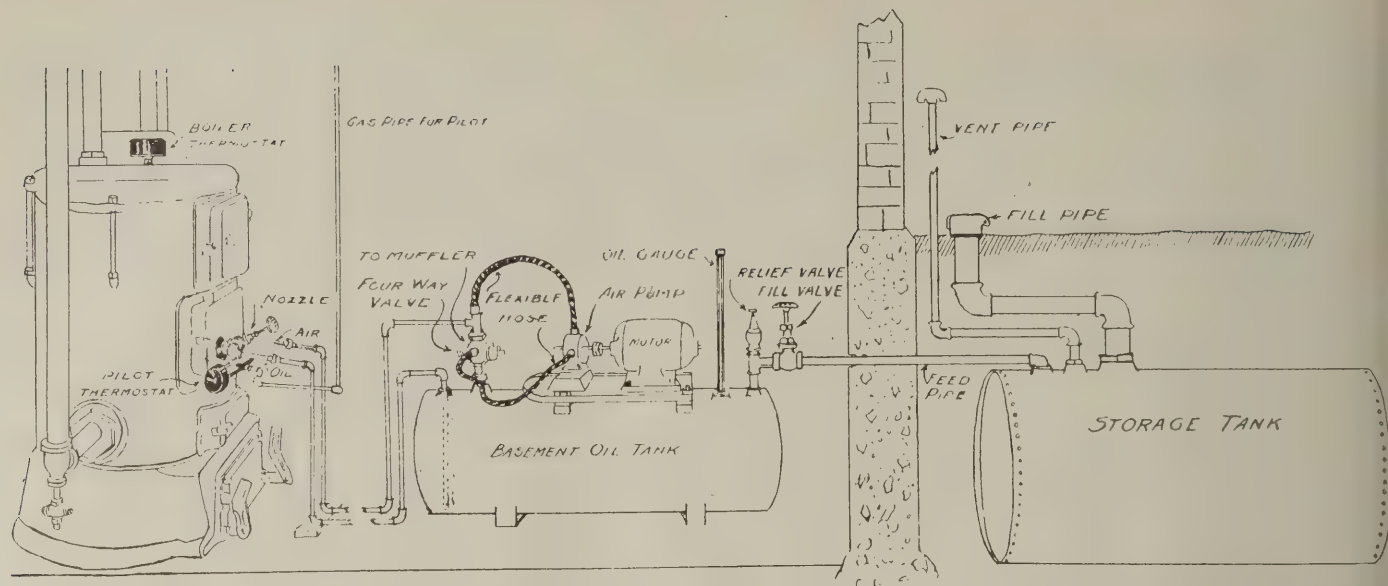
Hitherto most of the concerns selling oil-burner equipment for furnaces have operated through dealers or agents who

Oil Burners for Furnace Installations

These oil burners take the place of coal



make a specialty of installing the equipment. Recently, one manufacturer, at least, has adopted the policy of selling the equipment itself direct to contractors and build-



ers, and it is likely that other manufacturers will do likewise.

Installations complete cost the owner where installations are made by the manufacturer, all the way from \$350 for a small-house furnace to \$3500 for large apartment-house boilers. Ordinarily the installations can be made by any intelligent building mechanic. The company selling the equipment to contractors gives them a liberal discount and they can charge their own price for the installation complete, the same as they would for any construction work.

The two illustrations herewith show two typical oil-burner installations. In one an outside storage tank is the only tank required, in the other two tanks are recommended, although in small installations where fuel oil is readily obtainable, the outside storage tank can be dispensed with.

In all oil-burners the thing actually burned is a gas made by vaporizing the oil with a mixture of air. It is therefore essential to have a pilot light, for to fill the furnace and chimney flue with the gas before attempting to light it, would be dangerous. Likewise a motor and pump are essential to feed and vaporize the oil. The principles involved are the same as in oil burners used in industrial furnaces for many years, the same as those employed in a painter's torch or a plumber's furnace. They are very different from the burners used in any other kind of a domestic stove or oil heater.

Cleaning Greasy or Oily Floors

A SATISFACTORY method for cleaning greasy or oily floors is to use lime. Sprinkle air-slaked or hydrated lime over the floor in a layer about one-quarter inch thick. Leave it on for two or three hours, and then remove with a stiff brush. It will be found that the lime has absorbed the

grease and oil, and the floor will present a surprisingly clean appearance. This has been used successfully on oily cement floors

of machine shops which had resisted all other attempts to clean them.—*National Safety News*.

Finishing the Foundation Wall

IS it better to end the foundation wall of a frame building with the bottom of the first floor joists, or should the wall be carried up around the joists to the first floor level?

The first method is the one now commonly accepted. The second was once favored by many people, but is no longer

brick or stone masons fill in between the joists and bring the wall to the level of the underside of the floor. This method of construction was particularly favored in the more northerly states because it was considered a warmer form of construction. It also provided an effective fire stop since there is no chance of direct communication

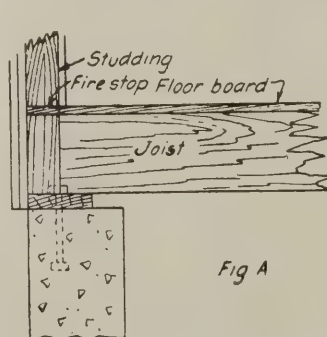


Fig. A

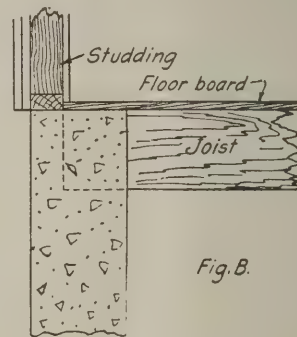


Fig. B

used to any appreciable extent. The present method conforms in general to that shown in Fig. A. The top of the wall is finished with a plate, preferably anchored into the wall, this plate serving as a nailing strip to which the joists may be secured. The studs lap the joists and can be nailed securely to them. This method is subject to considerable variation. Where brick walls are installed, it is usually considered necessary to use a sill of considerable thickness instead of a 2-in. plate.

The other method is shown in Fig. B. The studs are set on the wall and then the

of fire from the spaces between the joists to the air spaces between the studs. This construction, however, is objectional because of the expensive brick work involved in filling in between the joists. Present day knowledge concerning the reasons for decay in timbers also raises objections to the encasing of the joists in the masonry since this tends to keep the ends of the joists moist and thus encourages decay. The fire stop can be provided effectively in the form of construction shown in Fig. A by carrying the floor boards to the outside of the studs by boxing around them.—*Railway Maintenance Engineer*.

A Seven-Room House Built for \$7000

An Emporia, Kansas, Builder, by Omitting Needless Ornamentation and Building a Plain Design, Gives His Customer a Lot of House for the Money, and a House with a Practical Plan

C. A. KEINATH, contractor and builder, of Emporia, Kans., submits the accompanying photographs and floor plans of a seven-room house, 37x32, with two stories and a basement, which he has recently built at practically the pre-war price of \$7000.

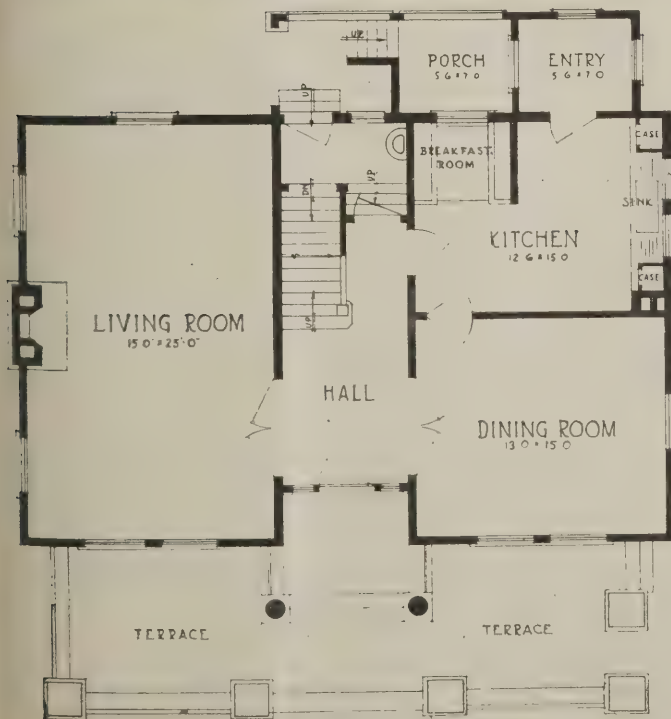
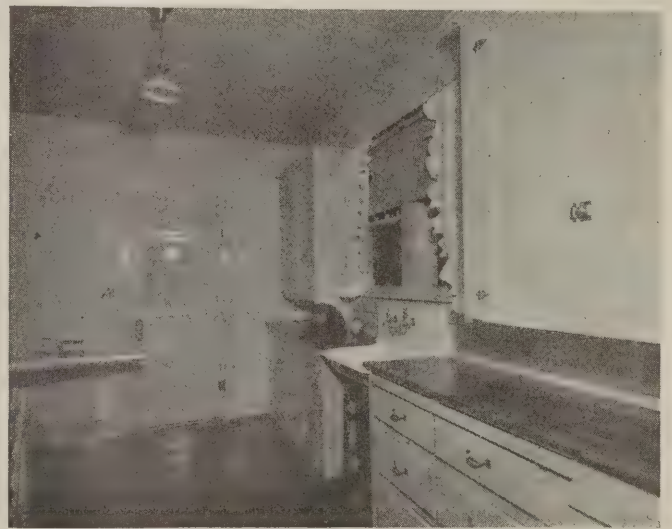
He has built economically by avoiding needless ornamentation, as for example, the heavy brackets so commonly and incorrectly used on small houses, heavy built-in porch columns, and similar forms. The plan is a simple layout without projections, wings, or complicated construction. The roof is a

plain gable with open cornice and broken only by a dormer, which permits ventilation and light for the attic.

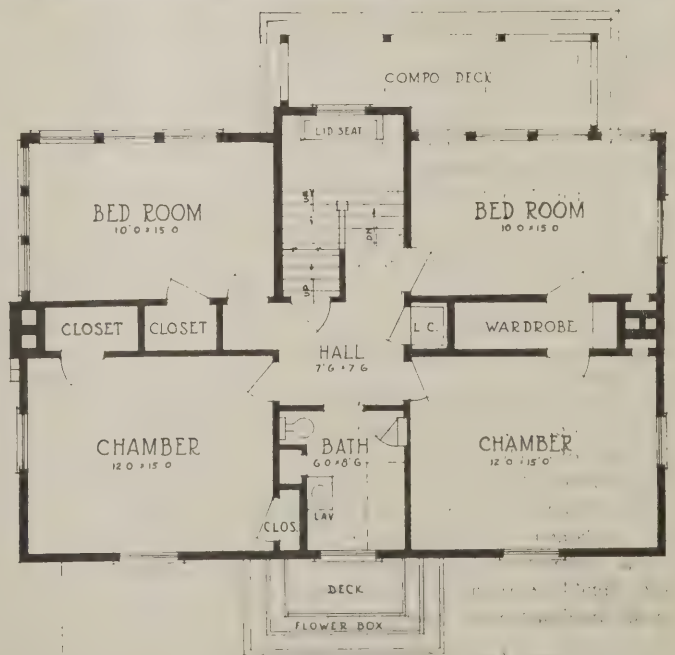
"I used oak both upstairs and downstairs," said Mr. Keinath, "in all my buildings, but economize on other things. For instance, I use very few mouldings, but instead rip out strips 1x1½ for all around the edge of the roof and the frieze. This costs only about 1 cent a foot, while bed moulding is selling for about 4 cents a foot. I make all my casing. I have a bench machine which is quite a labor saver.

"The cost of the lumber, cement and plaster for this house was \$3000; plumbing, \$650; furnace and wiring, \$400; making, with the labor, a total cost of about \$7000 without the lot.

The plan of the house has many good features. The wide central hall goes clear through the house and permits direct access from the kitchen to the front door without crossing the dining room. The living room is large and has light and ventilation from three sides (four, if the French doors from the hall are counted). A dining alcove in the kitchen adds to the livableness of the home and increases its selling value in the minds of many buyers. Upstairs four good sized bedrooms and a bath will accommodate a good sized family. Abundant windows in the two rear bedrooms make them the equivalent of sleeping porches. A usable balcony is another feature of the plan.



First floor plan



Second floor plan

The cost of all automobiles and trucks

[illegible]

should be charged to this account. It should be credited with the cost, as per books, of any automobile or truck disposed of. The difference between the value as per books and the amount realized on the sales should be charged to "Allowance for Depreciation of Autos and Motor Trucks" account.

The balance of this account is an asset and should represent the cost of automobiles and trucks on hand.

Horses, Wagons and Harness

This account should be charged with all horses, mules, wagons, harness and stable equipment purchased. It should be credited with the cost, as per books, of all teams, wagons and equipment disposed of; the difference between the book value and the amount realized being carried as a charge to "Allowance for Depreciation of Horses, Wagons and Harness" account.

The balance of this account is an asset, and should represent the cost of teams and wagons on hand.

Office Furniture and Fixtures

This account should be charged with all furniture and equipment purchased for the office.

It should be credited with the cost, as per books, of all furniture and equipment sold, scrapped or otherwise disposed of.

The difference between the book value and the amount realized should be charged to "Allowance for Depreciation of Office Furniture and Fixtures" account.

Care should be taken to see that no office supplies are charged to this account.

Allowance for Depreciation (an Account with Each Permanent Asset Except Land)

These accounts should be credited, at the close of each month, with one-twelfth of the annual depreciation of each permanent asset classification, the corresponding charge going to expense accounts through the Purchase Analysis (Figs. 7 and 7A).

When permanent assets are discarded, replaced or sold, the difference between original cost and sales price or scrap value should be charged to these accounts to the extent that depreciation has been provided.

In other words, the sale or disposal of any permanent asset will be credited to the

particular asset account at the same value at which it was originally charged thereto. The corresponding debit will be passed to cash for the amount of cash actually received, and to "Allowance for Depreciation" accounts for the amount of depreciation set up against that particular asset; and the difference, if any, between the total of the debits to cash and to "Allowance for Depreciation" accounts and the total credit to be passed to the asset ac-

count, will be debited to "Surplus" account. Or, if the amount received in cash plus the amount set up for depreciation exceeds the cost value of the asset, the difference will be credited to "Surplus Account."

In accurately accounting for permanent assets of all kinds, their cost, estimated life, rates of depreciation, annual depreciation applied and present sound value, the Equipment Record, illustrated by Figs. 26 and 26A, will be found extremely valuable.

Labor Cost Record for Contractor

A SIMPLE scheme for keeping labor costs, where a building contractor does not have a large crew, and has reliable help, is that used by Peter Larsen, a New Haven, Conn., builder. Each workman has a 3x4½ card, made of extra

record easily available for differentiating the cost of any particular building, in case a workman is employed on more than one building during the week. At the expense of a few more cards, and perhaps a little more complication, separate cards could be used for each job. Then the cards themselves would preserve the separate costs of each job.

Of course, a builder does not need to rely entirely on the record kept by the employee, as he can keep a time book or any other kind of a check he desires. However, it is the old story that a man put on his honor is at least twice as likely to be honest as one who knows he is watched. Moreover, the system above described helps the employees appreciate their own contribution to the cost of a job.

A comprehensive time-card compiled by the Master Carpenters Association of Milwaukee was reproduced and described on page 36 of National Builder for October, 1921.

From Some Railings We
Have Seen, We Be-
lieve It!

AFTER narrowly escaping death in a twenty-five foot fall from the front veranda of her home, an upper apartment at No. 1282 West avenue, Friday, Mrs. Rose James yesterday had recovered from the shock. She apparently was uninjured in the fall, but there is a possibility that she was internally hurt. She was sweeping on the porch Friday afternoon when the railing gave way, she says, as she bumped against it.—*From a New York Newspaper.*

PETER LARSEN BUILDING CONTRACTOR

Week ending Aug 5 1922

Name John Doe

Day	Hours	Name of Job	
Sat.	8	Jones House	
Mon.	8	"	"
Tues.	8	Smith Garage	
Wed.	8	"	"
Thurs.	8	Jones House	
Fri.	8	"	"
Total	48	"	"

Amount paid \$ 48

TO BE HANDED IN FRIDAY NIGHT

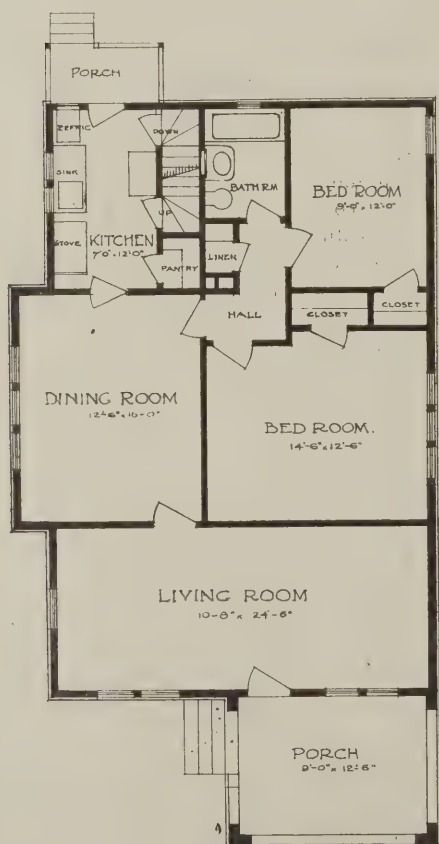
Short Cuts in Building Estimating

This is the Second of a Series of Articles on Rapid Estimating and Methods that May be Employed for Approximating the Cost of Buildings. (The First Article Appeared in the July Number of National Builder)

By Theodore F. Laist

IN the preceding paper we discussed the practicability of adopting short cut methods of estimating, correct, within narrow limits. Such methods to be particularly suitable to estimating small house construction with the figuring of which the lumber dealer and contractor are frequently burdened. The problem may be stated briefly thus:

Having many house designs of approximately the same type and construction, but of varying size and modified arrangement, can these plans be divided into groups, and is it possible that by figuring one or more of them can a cubic or square foot price be



Floor plan of bungalow

evolved which may be applied with reasonable accuracy, to other buildings of the group?

The conclusion reached was, that it is

Group A.—Walls

TABLE I.—TYPE (A)

One Story Exterior Walls of Frame Construction

Specification.—2x4 inch studding, 16 inch centers, single 2x4 inch floor plate or shoe; double 2x4 inch ceiling plate; no bridging; 1x6 inch matched sheathing placed diagonally; building paper; 1x6 inch lap siding.

Note.—Costs are computed for a square (100 square feet) and based on stud length of 10 feet.

	Waste, per cent	Ft. B. M.	Carpenter labor per sq., hrs., \$1 per hr.	Material per M and sq., dollars	Labor (includes helpers and foreman) dollars	Total material and labor, dollars
Studs, 2"x4", 16" ctrs.	10	80	2 3/4	35	2.80	3.15
Plates, 2"x4"	10	20	1 3/4	35	4.20	2.45
Sheathing, 1"x6", diag.	20	133	3 3/4	50	6.65	5.15
Siding, 6" lap, 4 1/2" to weather	33	133	3 3/4	3	.22	.22
Nails, 5 1/2 lbs.	20	120	1/4	2	.24	.35
Paper	20	120	1/4	2	.24	.35
Sub-totals				14.11	11.10	25.21
Total per square of wall of the above description in place						25.21

Add or deduct 12 feet B. M. for each variation in the stud length of 10 feet upon which is based the 80 feet for plates and studs in above table.

The greater the height of the studding the smaller will be the proportion of studding to be added to a square foot.

Waste is included but not overhead or profit.

Painting and Plastering.—To the above may be added the cost of painting and plastering, which will make the cost of the wall section complete, although this is not generally desirable.

Prices.—There are so many variations in prices, according to locality, due to freight and local conditions, that the prices, while approximately correct for this locality, should be regarded as fictitious and are only given to round out the tables.



Elevation of bungalow, perspective photo of what was shown on page 51, July issue

TABLE II.—TYPE (B)

Specification.—2x4 inch studding, 12 inch centers, single 2x4 inch floor plate or shoe; double 2x4 inch ceiling plate; no bridging; 1x6 inch matched sheathing placed diagonally; building paper; 1x6 inch lap siding.

Note.—Costs are computed for a square (100 square feet) and based on stud length of 10 feet.

	Waste, per cent	Ft. B. M.	Carpenter labor per sq., hrs., \$1 per hr.	Material per M and sq., dollars	Labor (includes helpers and foreman) dollars	Total material and labor, dollars
Studs, 2"x4", 12" ctrs.	10	104	2 3/4	35	3.64	3.85
Plates, 2"x4"	10	20	1 3/4	35	4.20	2.45
Sheathing, 1"x6", diag.	20	133	3 3/4	50	6.65	5.15
Siding, 6" lap, 4 1/2" to weather	33	133	3 3/4	3	.24	.24
Nails, 6 lbs.	20	120	1/4	2	.30	.35
Paper	20	120	1/4	2	.30	.35
Sub-totals				15.03	11.80	26.83
Total per square of wall of the above description in place						26.83

practicable to devise such methods, examples of which are variations of the so-called cubic and square foot methods of estimating.

Furthermore out of the previous discussion it was demonstrated that any method adopted must fulfill, to give satisfaction, the following requirements:

(1) No system unless built up from exact basic data is of any value.

(2) General cubic or square foot costs are not sufficiently accurate for the purpose and these must be figured for each locality and adjusted to meet current prices.

(3) The cubic foot price should be varied with the size of the building; that is to say a flat cubic foot price applied to buildings even of the same type but of wide variation in size is not accurate, that as the building increases in size the cubic foot price should be reduced. The same statement applies to the square foot price.

(4) Furthermore, such constants as plumbing, heating, etc., which do not vary directly as the size of the building should be deducted and the price of the remainder of the construction be determined.

(5) The cubic or square foot cost of any group of buildings may be plotted and the cost of all sizes of this particular type be determined from the curve.

Method No. 2—Using Complete Wall, Partition Floor and Roof Sections as Estimating or Pricing Units

With these general statements in mind we will proceed to consider the determination of combination units as a step in plotting the above mentioned curves. This has primarily to do with the estimating of the basic structures which must be obtained in order to construct the curves from which the costs of others are to be read.

In the method employed in the first article this was accomplished by figuring the cost of a one-foot section of the building, extending from floor to attic, which was then multiplied by the number of feet variation. The cost of this section may of course be obtained by preparing a complete bill of material or by the wall and floor area method, an analysis of which follows.

This method may obviously be used in figuring the entire building, but while it gives reasonably accurate costs it does not provide a detailed bill from which the material may be ordered. There will always be a difference between the itemized bill and the condensed bill in quantities, but not necessarily in dollars applied to the whole.

Short Cuts Must Be Based on Accurate Data

Lest the object of this paper be misunderstood, it cannot be emphasized too strongly that while there are many short cuts which may profitably be adopted in building estimating, such short roads must in every case be based on substantial and carefully worked

Add or deduct 17 feet B. M. for variation in the stud length of 10 feet upon which is based the 104 feet for plates and studs in above table.
The greater the height of the studding the smaller will be the proportion of studding to be added to a square foot.
Waste is included but not overhead or profit.
Painting, Plastering and Prices.—The note in connection with Table I, Type (a) applies.

TABLE III.—TYPE (B)

Interior Partitions of Frame Construction

Specification.—2x4 inch studding, 16 inch centers, single 2x4 inch floor plate or shoe; double 2x4 inch ceiling plate; no bridging.
Note.—Costs are computed for a square (100 square feet) and based on stud length of 10 feet.

	Waste, per cent	Ft. B. M.	Carpenter labor per sq., hrs., \$1 per hr.	Material per M and sq., dollars	Per Square—Labor (includes helpers and foreman) dollars	Total material and labor, dollars
Studs, 2"x4", 16" ctrs.	10 1/2	72	2 3/4	35	2.52	3.15
Plates, 2"x4"	10 1/2					5.67
Nails, 1 1/4 lbs.				.06		.06
Sub-totals				2.58	3.15	5.73
Total per square of wall of the above description in place						5.73

Add or deduct 12 feet for variation in the stud length of 10 feet upon which is based the 72 feet for plates and studs in above table.

Plastering.—To the above may be advantageously added the cost of plastering per square on one or both sides of the wall, making the cost of the wall complete.

TABLE IV.—TYPE (D)

Specification.—2x4 inch studding, 12 inch centers, single 2x4 inch floor plate or shoe; double 2x4 inch ceiling plate; no bridging.
Note.—Costs are computed for a square (100 square feet) and based on stud length of 10 feet.

	Waste, per cent	Ft. B. M.	Carpenter labor per sq., hrs., \$1 per hr.	Material per M and sq., dollars	Per Square—Labor (includes helpers and foreman) dollars	Total material and labor, dollars
Studs, 2"x4", 12" ctrs.	10 1/2	96	2 3/4	35	3.36	3.85
Plates, 2"x4"	10 1/2					7.21
Nails, 1 1/4 lbs.				.06		.06
Sub-totals				3.42	3.85	7.27
Total per square of wall of the above description in place						7.27

Add or deduct 17 feet for variation in the stud length of 10 feet upon which is based the 96 feet for plates and studs in the above table.

Plastering.—The note at the end of Table III, Type (b) applies.

Group B.—Floors

TABLE I.—TYPE (A)

Frame Construction, Joists, Single Floor

Specification.—2x8 inch joists, 16 inch centers; 1x3 inch cross bridging; finished floor 1x3 1/4 inch face.

	Waste, per cent	Ft. B. M.	Carpenter labor per sq., hrs., \$1 per hr.	Material per M and sq., dollars	Per Square—Labor (includes helpers and foreman) dollars	Total material and labor, dollars
Joists, 2"x8", 16" ctrs.	5	108	1 1/2	40	4.32	2.10
Cross bridging, 1"x3"		8	1/2	35	2.80	.70
Fin. floor pine, 1"x3 1/4" face	24	124	1 1/2	75	9.30	2.10
Sub-totals				16.42	4.90	21.32
Total per square of floor of above description in place						21.32

TABLE II.—TYPE (B)

Specification.—2x10 inch joists, 16 inch centers; 1x3 inch cross bridging; finished floor 1x2 1/4 inch face.

	Waste, per cent	Ft. B. M.	Carpenter labor per sq., hrs., \$1 per hr.	Material per M and sq., dollars	Per Square—Labor (includes helpers and foreman) dollars	Total material and labor, dollars
Joists, 2"x10", 16" ctrs.	5	136	1 1/2	40	5.44	1.75
Cross bridging, 1"x3"		8	1/2	35	2.80	.70
Fin. floor, 1"x3 1/4" face	24	124	1 1/2	75	9.30	2.10
Sub-totals				17.54	4.55	22.09
Total per square of floor of the above description in place						22.09

TABLE III.—TYPE (C)

Frame Construction, Joists, Double Floor

Specification.—2x8-10-12 inch joists, 16 inch centers; 1x3 inch cross bridging; sub-floor 1x6 inch, laid diagonally; paper; finished floor 1x2 1/4 inch face.

	Waste, per cent	Ft. B. M.	Carpenter labor per sq., hrs., \$1 per hr.	Material per M and sq., dollars	Per Square—Labor (includes helpers and foreman) dollars	Total material and labor, dollars
Joists, 2"x 8", 16" ctrs.		108	1 1/2	40	4.32	1.75
Joists, 2"x10", 16" ctrs.		136	1 1/2	40	5.44	1.75
Joists, 2"x12", 16" ctrs.		170	1 1/2	40	6.80	1.75
Cross bridging, 1"x3"		8	1/2	35	2.80	.70
Sub-floor, 1"x6"		120	1 1/2	40	4.80	1.75
Felt and nails.					1.50	.70
Fin. floor, hardwood, 2 1/4" face.	33 1/2	133 1/2	2 1/2	110	14.66	3.50
Machine sanding						1.05
Sub-totals						
2"x 8" joists, 16" ctrs.				28.08		9.45
2"x10" joists, 16" ctrs.				29.20		9.45
2"x12" joists, 16" ctrs.				30.56		9.45
Total per square of floor of the above description in place for:						
2"x 8" joists, 16" ctrs.						37.53
2"x10" joists, 16" ctrs.						38.65
2"x12" joists, 16" ctrs.						40.01

out basic data equal to that obtained through bills of material.

Standard Composite Units

The only difference, as I see it, between any so-called short cut and the laborious bills of material generally prepared by contractors and in lumber yards, lies in combining small units into larger or working units; in other words, instead of going back to the basic parts of the structure each time an estimate is made in which the standard, simple units are used these are employed in combination rather than individually.

The object of this plan is two-fold. In the first place, the saving of time; in the second place, the avoidance of error.

It is much more profitable to establish once for all very carefully the cost of a large section of a wall or of a section of a building and then continue to use the cost of this item rather than figure in detail each part for each operation or job.

For example, frame wall construction is very much standardized and will become more so after the work of the Hoover Committee on Standardizing Small House Construction has been made public.

The tendency in the American business world now is to standardize. It is realized what an enormous waste of time and effort is occasioned by small variations in sizes of basic materials, in similar products and in processes of manufacture which serve no useful purpose but hamper the producer as well as the consuming public.

With this object in mind the common, standard types of frame wall and floor construction have been assembled and the quantities contained in a square (100 square feet) computed and prepared ready for pricing.

These composite units have then been assembled into a typical bill of material on the new plan, followed by a standard and detailed bill of material. The difference in length between this and the standard bill of material is marked and typical, and the advantages of the new plan may be judged therefrom.

Lumber Bill

20	pcs	2x6	14	S&E
47	"	"	12	"
47	"	2x8	12	"
50	"	"	14	"
65	"	2x4	12	"
20	"	"	14	"
95	"	"	16	"
45	"	"	18	"
260	"	"	8	"
1400	ft.	1x6	No 2	Flooring
2200	"	1x6	"	Sheathing
5500	"	No 1	short leaf	YP Lath 2/8
1000	"	"	"	" 4/0
700	"	¾	No 1	Com Ceiling
1800	"	½x6	Clr	Redwood Siding
1500	"	13/16x3¼	B&B	Flooring
17	Square	4 in 1	Multiple	Shingles
1	Roll	Green	Slate	Shingles
3	Squares	4 in 1	Green	Shingles
12	Squares	Felt		

Mill Bill

3	Cel	Fr	10x12	1½	3 lt
1	P C	Trip	Fr	20x24	1½ 2 lt. 1½
1	"	"	"	18x20	"
1	"	Mull	"	20x24	"
1	"	"	"	24x24	"
1	"	"	"	16x16	"
2	"	Wind	"	24x24	"
1	"	"	"	18x18	"
1	"	Fr	"	36x20	1½ R 1 lt

Plastering.—To the above may be added the lathing and plastering of the ceiling below if desired.
Stripping.—Strips 1x2 inches are sometimes placed upon the felt to provide room for conduits and improve the deafening. These should be added to the items above if desired.

TABLE IV.—TYPE (D)

Specification.—2x8-10-12 inch joists, 12 inch centers; 1x3 inch cross bridging; sub-floor 1x6 inch laid diagonally; paper; finished floor 1x2¼ inch face.

	Waste, per cent	Ft. B. M.	Carpenter labor per sq., hrs., \$1 per hr.	Material per M and sq., dollars	—Per Square— Labor (includes helpers and foreman) dollars	Total material and labor, dollars
Joists, 2"x 8", 12" ctrs.	148	1¼	40	5.92	1.75	7.67
Joists, 2"x10", 12" ctrs.	185	1¼	40	7.40	1.75	9.07
Joists, 2"x12", 12" ctrs.	220	1¼	40	8.80	1.75	10.55
Cross bridging, 1"x3"	8	½	35	2.80	.70	3.50
Sub-floor, 1"x6", diag.	20	120	1¼	35	4.20	5.95
Paper and nails.				1.50	.70	2.20
Fin. floor, 2¼" face	33½	133½	2½	110	14.70	18.20
Machine sanding					1.05	1.05
Sub-totals:						
2"x 8" joists, 12" ctrs.				29.12	9.45	
2"x10" joists, 12" ctrs.				30.60	9.45	
2"x12" joists, 12" ctrs.				32.00	9.45	
Total per square of floor of the above description in place for:						
2"x 8" joists, 12" ctrs.						38.57
2"x10" joists, 12" ctrs.						40.05
2"x12" joists, 12" ctrs.						41.45

Plastering and Stripping.—See note at end of Table III, Type (c).

Group C.—Roofs

TABLE I.—TYPE (A)

Frame Construction

Specification.—2x4 inch rafters, 20 inch centers; 1x6 inch matched sheathing; 1x4 inch braces; asphalt shingles.

	Waste, per cent	Ft. B. M.	Carpenter labor per sq., hrs., \$1 per hr.	Material per M and sq., dollars	—Per Square— Labor (includes helpers and foreman) dollars	Total material and labor, dollars
Rafters, 2"x4", 20" ctrs.	10	48	2½	35	1.68	5.18
Bracing, 1"x4"	10	14	½	35	.49	1.19
Roof boards, 1"x6"	20	120	1½	40	4.80	6.90
Asphalt shingles, 4 in one, in place.						8.00
Sub-totals					6.97	6.30
Total						21.27

Condensed Bill of Materials of Walls, Partitions, Floors and Roofing

	Quantity	Unit price	Total
Wall, Group A, Type a, Table I.	18	\$25.21	\$453.78
Floor, Group B, Type c, Table III.	10	37.53	375.30
Roof, Group C, Type a, Table I.	21	21.27	467.67
Partition A, Type a, Table III.	13	5.73	74.49
Total			\$1371.24

Note.—The above prices are net costs, include no overhead or profit and are for the framing and exterior covering as specified under each table.

1	Out	Dr	Fr	3/0x6/8	1¼R	1½	P C
1	"	"	"	2/8x6/8	1½	"	"
1	"	"	"	2/6x6/6	"	"	Grade Entrance
3	In	"	"	2/0x6/8	"	13/16	Jbs & Stops
7	"	"	"	2/8x6/8	"	"	"
3	Doors	2/0x6/8	1½	2 Panel			
6	"	2/8x6/8	"	"			
1	"	2/6x6/6	"	4 lt	BW	218	
2	"	2/8x6/8	"	"			
1	"	3/0x6/8	1¼	BW	290	WP	
2	Wind	16x16	1½	2 lt	top cut	3 wide	
1	"	18x18	"	"	"	"	
3	"	18x20	"	"	"	"	
5	"	20x24	"	"	"	"	
4	"	24x24	"	"	"	"	
1	Sash	36x20	1 lt	cut	3 lts	wide & water drip	
3	Oak	Carpet Strips					
140	ft	lin	1x8	YP	S4S		
170	ft	lin	1½x2½	Cyp	Water Table	Bev	
300	"	"	¾x5½	YP	Base		
350	"	"	½x¾	"	Shoe	Mld	
140	"	"	¾x1¼	"	S4S		
40	"	"	Or	Rd	YP		
3	Cel	Sash	10x12	3 lt			
2	pcs	1x8	16	Clr	YP	S4S	to 7½
4	"	"	"	"	"	"	Porch
1	"	1x7	16	"	"	"	"
2	"	"	"	"	"	"	"
1	"	1x12	16	No 1	Com	YP	Shelving
1	Med	Cab	for	opg	16x20	& door	for mirror
1	set	Trip	Casg	20x24	YP	Band	Mld
1	"	"	"	18x20	"	"	"
1	"	"	"	20x24	"	"	"
1	"	"	"	24x24	"	"	"
1	"	"	"	16x24	"	"	"
2	"	Wind	"	24x24	"	"	"
1	"	"	"	18x18	"	"	"
1	"	Sash	"	36x20	1 lt	"	"
23	"	Door	"	"	"	"	"
1	pc	1½x21	10'	Clr	YP	SOS	Seat
3	"	¾x4	12	"	"	"	"
2	"	2	x10	16	No 1	YP	"
2	"	1	x10	16	"	"	S4S
15	"	1	x8	3/6	"	"	"
13	"	1	x9	3/6	"	"	"
1	YP	Kitchen	Cupboard	5'x22	below	12¼	above
2	plain	ends	no	wood	back		
1	In	Dr	Fr	2/8x6/8	1¼R	YP	

"The Hotel Butcher, Garde Manger and Carver," by Frank Rivers, supplemented by gleanings from the *Hotel Monthly*, 208 pages; 7x10 in.; freely illustrated. This work gives the experience of the author during thirty years in buying, handling, sale and service of meats, poultry and fish for hotels, restaurants, clubs and institutions. Interesting to builders and architects as indicating the modern requirements in planning hotel and restaurant kitchens. The supplementary matter from the *Hotel Monthly* shows plans of kitchens, cold rooms, refrigerators, etc., of a number of the best hotels with descriptions and illustrations of the materials and equipment. Published by the Hotel Monthly Press, 443 So. Dearborn St., Chicago, Ill. Price \$2.50.

Dangers of Shoddy Construction*

By Lyman Clark, General Electric Co., Schenectady, N. Y.

A Splendid Argument that Architects, Builders and Contractors Can Use with the Public to Justify the Employment of Good Materials—Materials Made by Reputable Manufacturers, Nationally Known Through Advertising in Reputable Trade Papers

AS there can be many interpretations given to the subject of "Dangers of Shoddy Construction," it may be best to paraphrase by stating that "Dangers" refers to economics; "Shoddy" refers to waste due to material or personnel and "Construction" refers to building structures either commercial, industrial or residential.

1. *Causes of Shoddy Construction:* (A) Ownership, (B) Construction.

(A) Ownership—There are many causes for shoddy construction that are traceable to the ownership of property. We look upon property in the sense of invested capital upon which we must seek a financial return. Our constant thought is to develop the property for one purpose or another, that it may make a return on the invested capital. From the standpoint of building construction the owner is always confronted with the problem of what best can be done with his property from two points of view; he must consider the property in the light of a holding with ever-increasing value or he must consider it in the light of something to be traded in as an article of commerce. Where the owner has adopted the latter consideration, there springs up within our urban and suburban centers an enormous amount of building construction.

The owner of property, desiring only that his property enhance in value as time goes on, generally cares little for the structure that may be placed upon it other than that the property may earn its taxes. Unquestionably this opens up the possibilities of a certain amount of shoddy construction.

We must then consider the owner of a piece of property who desires to improve it merely for purposes of trade. Well realizing that his interest in the property is purely speculative and manipulative, there exists another cause for shoddy construction.

There is a cause for shoddy construction where the owner tries to seek a greater earning increment by attempting to build beyond his means. Without sufficient capital requirements, he often places upon the

property a building of the dimensions and contents he desires by utilizing shoddy construction. In other words, he is forced to build beyond his borrowing ability.

There is, however, a consideration where the owner desires to improve the property in order that it may earn on the capital investment in perpetuity. He has in mind that the property will always remain in the possession of himself or his heirs and is, therefore, not desirous in any way of receiving shoddy construction.

"Modern Buildings Require Immense Amount of Study"

(B.) Construction. It is questionable whether more shoddy is introduced by those having to do with the actual construction of buildings than those who are concerned in the ownership of property and buildings. In the construction work, we have to consider the following responsible personnel: (1) architects and engineers; (2) general and sub-contractors, and (3) labor.

(1) There is probably no profession upon which is imposed a greater necessity of knowledge than that of architecture. In the architect's relations to shoddy construction we may truthfully state that ignorance is the only possible avenue for its introduction. Sometimes this ignorance is due to a "closed ear" on the architect's part from his inability to receive or lack of appreciation of advice, but it is seldom, if ever, the question of wilful introduction of shoddy construction by him, a condition which does not always pertain to the owner.

Modern building structures require an immense amount of engineering study and we find that a great number of structures built by architects without the employment of trained engineers suffer from the introduction of shoddy due to ignorance. In general, there is a considerable lack of appreciation on the part of owners and those making loans on property accounts, of the value of professional services in building structures. There has grown up a feeling that a professional service charge of the architect should be a fixed percentage of the cost of the building regardless of whether the architect requires additional professional services or not. We

find that ownership pays too little attention to economic benefits secured by professionally trained men. There can be no question as to the introduction of shoddy construction due to ignorance which is a resultant from a lack of appreciation of the best services in either the design of building structures or the specifications covering their construction.

None More Desirous of Avoiding Shoddy Construction than Building Contractors

(2) Volumes have been written as to how building structures should be erected and what should be the charge on the part of the builder over and above his charges for material and labor. Generally speaking the owners, the architects and the engineers are more or less in agreement that contracts for building structures should be let in competition. Competition on the other hand leads to practices permitting of the introduction of shoddy construction. Probably no class of people in our industrial life are more desirous of avoiding shoddy construction than are building contractors. Competition seems to be the only element forcing them to any consideration in the use of other than the best of products.

It is realized, however, on the other hand, that all competition eliminated, there can spring up a growth of avariciousness creating a condition of super-charges which would not be economical in our general conduct of the building industry. However, there is little question but that we are improving in this matter; that there is a growing tendency to recognize well organized construction companies which maintain such auditing accounts that they can show to any owner that regardless of any price obtained by competition, they could more economically construct without any price at all. It should be remembered that we receive little for nothing and there is something more in the construction industry than the mere throwing of materials together; there is that assurance to the owner that he has not only received the best for his money but that he has received the maximum return for the longest time on his investment.

(3) Labor can be, but is not as a rule

*From a paper presented at a recent Housing Section Meeting of the Chamber of Commerce of the United States.

responsible for shoddy construction. Undoubtedly there have been pernicious situations where labor has refused the installation of very good materials in building structures but on the whole their work does not tend necessarily to shoddy construction. Rather would labor be in favor of the very best of materials. There is no question but that the brick-layer desires to lay the best make of brick; the carpenter desires to work with the best grade of lumber and so on through the trades. Supplied with the best of material, labor will perform its best work. Therefore outside of isolated cases, we might consider labor as constituting one of the least causes of shoddy construction.

II. Reduction of Shoddy Construction: (1) Loans; (2) Regulations; (3) Education; (4) Co-operation;

(1.) *Loans.*—While it may be a delicate question to impose upon him who loans funds for building purposes, a further consideration than the return of interest and principal, there, however, seems to be a growing consideration that financiers must be more concerned with this question than they have in the past. The mortgagee of property should be concerned not only in the assurance that principal and interest are returned but that the loan has been wisely and judiciously invested. It should be the duty of one loaning money for buildings to know that the character, kind and quality are the best within economic means.

"Careful Loaning Will Put a Premium Upon Good Construction"

The life of building structures has been variously estimated as being for cheap frame tenements of from ten to fifteen years and for the best structural buildings of from seventy-five to one hundred years. A rate for sinking funds would then be 10 to 5 per cent for the cheap frame tenements for a term of nine to sixteen years. In the structural buildings the rate of the sinking fund would only need to be 1 per cent and the term only one-half its life. Therefore, we may reduce the introduction of shoddy construction by impressing upon the owner the economical considerations of building well, and further, by making it difficult to obtain loans for shoddy construction. We may be able in this way to reduce shoddy construction by placing a premium upon good construction.

(2.) *Regulations.* We have comparatively few cities with what are municipally known as building codes and none of these codes absolutely prohibit the use of shoddy construction. In the majority of cases they are made out for the purpose of creating fire walls but do not go very far into the character or necessities of good construction. We have various rules for the fire protection which more or less define the kinds of materials but again these materials are merely to prevent fire hazards rather than to create good construction. While there are inspections of one sort or

another for urban and some suburban properties there does not seem to be such regulations that prohibit or reduce to any marked extent a considerable amount of shoddy construction. Attempts have been made, however, to clarify and unify many regulations imposed upon the building structure. We may, therefore, hope by this means to greatly reduce shoddy construction in future buildings.

"Architects and Contractors Should Help Educate the Public as to the Economic Advantages of Good Construction"

(3.) *Education.* It is possible to reduce the use of shoddy through many educational facilities. Considerable good work has been done along these lines, not only in the technical press but in popular magazines, newspapers and circulars. That considerable more can be done in our schools and educational institutions, there can be no question. The building public should be advised as to the economic advantages of quality materials. Considerable benefit in the building industry might accrue also from visual instruction through the use of motion pictures distributed by manufacturers and others.

(4.) *Co-operation.*—Probably no better means for reduction of shoddy is provided than through co-operative effort stimulated by Trade Associations. There has been a tremendous amount of work done by Trade Associations in setting up useful and economic standards that have materially reduced the waste in building structures. There is still a great deal of work to be done and it would seem worthy to propose that wherever possible, various Trade Associations should be notified by the architectural profession, by the engineering societies, and by various contractors associations of anything that will tend to reduce the use of shoddy by its removal from the market.

III. Elimination of Shoddy Construction: (1.) Standards; (2.) Regulations; (3.) Trade Associations; (4.) Technical Societies;

(1.) *Standards.* Unquestionably, from time to time through the effort of many, there has been introduced a certain fixed standard either for work or material that has eliminated once and for all an element in shoddy construction. No greater benefit in building construction can be devised than the universal agreement in the adoption of a fixed standard known and proved to be necessary in any building operation. Where good standards have been set up they should be rigidly adhered to in the construction industry and architects, engineers and builders should collectively agree to their use.

(2.) *Regulations.* Whatever regulations in building may be provided, they are, as is well known, not a cure for shoddy construction. It is a difficult matter to set up regulations with any assurance that they will be obeyed. All regulations, however,

have their great beneficial effect but they should as far as possible be made common to all communities. The same regulations for fire prevention in one metropolitan city should be no different from that in another metropolitan city. It has been found very difficult in many lines of building construction to set up an universal specification for a given thing. A specification often has to be accompanied by such terms as "In accordance with local ordinances." Therefore, every consideration should be given by the building industry to create in all municipalities and state governments, a common set of building regulations.

National Trade Associations Make for Better Construction

(3.) *Trade Associations.*—From Trade associations we can probably secure the greatest benefits and eventually the elimination of shoddy construction. Various manufacturers associations give a great deal of time and consideration to the elimination of shoddy within their industry and there has been a well noted tendency for a great improvement in the products of all manufacturers that are members of such associations. It is also true in all Trade Associations that there is a great desire to do quite the proper thing; the only question involved is the way in which to do it. Only through association can fixed methods and fixed ways be found that will give us hope for the elimination of shoddy.

(4.) *Technical Societies.*—That Technical Societies are wide awake to the subject of shoddy construction, there can be no question. In all societies certain new standards are being issued from time to time. They are, however, not entirely appreciated by the construction industry. When we find that the Society for Testing Materials, the Society of Mechanical Engineers, the American Institute of Electrical Engineers and the Bureau of Standards, are in agreement on a certain standard, it would be prohibited on the part of any industry to neglect that standard or to cause an increased expenditure for something other than the standard when it can be clearly shown that no material benefit will accrue.

Conclusions—Present Labor Rates Require Good Materials and Construction

We are confronted today in the construction industry with the price of labor sufficient to necessitate the use of only good material and certainly entire elimination of shoddy material. It is impossible to conceive of paying the prevailing rates of labor for the introduction of shoddy. If one will undertake to examine the material in the market, it will be clearly and easily seen that the use of good material does not vitally affect the cost of building structures; that those concerned with building operations do not examine thor-

oughly the market price of commodities, in planning and building structures must be evident. We, for instance, do not find a marked increase in the use of copper at a price in the neighborhood of $13\frac{1}{2}$ cents over the use of copper at the price of 26 cents; we do not find a marked increased use of rubber at 13 cents over its normal price of 90 cents or during the war at \$3.30.

In residential building, we are confronted with a condition where about one-half the cost goes to labor and one-half to material. Eliminating certain items of material that are accepted standards and then increasing the cost of the balance by an average amount equal to 10 per cent, we can figure on obtaining a home in the definition of Webster: "the abiding place of affections." Generally, quality may be obtained at an expense of only $2\frac{1}{2}$ per cent of the total cost. Sometimes through the application of knowledge the same is true without any increase in the investment.

Shoddy as meaning "waste" must be eliminated if we are to approach any economical refinement. Therefore, may I suggest that all interest in building construction, the banks, insurance companies, merchants, industrials, professions and trades interest themselves in every means available for the reduction and elimination of shoddy construction.

Sheathing and Lath in One

THIS house, which is to be finished in stucco, is sheathed with the Byrckett type of wood lath. The advantages claimed for this lath are that it gives a mechanically stronger wall than common wood lath, that it is easier to apply, and that it saves plaster.

Single strips of this lath cover the same width of wall as two common wood lath.

Dovetail grooves formed at the junction of two strips and a dovetail groove in the middle of each strip, furnish a suitable bond for the plaster without an unnecessary waste. It is important, however, that a good grade of plaster be used with this lath and that the plaster be carefully applied. This, however, may be said to be true with any lath, to insure a first class and satisfactory job.

Some contractors say that there is a danger of shrinkage of this type of lath owing to the amount of wood in it, resulting in plaster failure. What is the experience of other readers?

Hydrated Lime for Waterproofing

ONE of the most widely known of all textbooks on building materials, which is used in many colleges and universities, devotes considerable space to the subject of waterproofing materials. In the fifth edition of *Materials of Construction*, by John B. Johnson, pages 490 and 491, may be found the following discussion of the subject:

Waterproofing Materials

"For a number of years attempts have been made to discover washes and compounds which will waterproof concrete and mortar. In general, tests seem to show that if proper attention is given to a proportioning, mixing, and curing, these compounds are not needed to secure impermeable concrete for heads under 100 ft. Furthermore, if good materials are procurable at average prices it is questionable if the extra expense involved in the use of such compounds will not be greater than the cost of additional cement required for water-tightness. It must also be understood that any beneficial results accruing from the use of these compounds cannot offset poor workmanship or

improper curing. Furthermore, if the concrete cracks neither a properly made mix nor the use of such washes or compounds is effective. When there is probability of cracking, expansion joints should be used or a waterproof elastic membrane forming an integral part of the wall should be employed.

Two Classes of Materials

"Waterproofing compounds may be divided into two classes: integral mixtures, those which are added before the concrete is mixed; and surface washes, those which are applied after the work is finished. The integral mixtures may be inert, simply void fillers, such as finely ground clay or hydrated lime; or they may be active by virtue of compounds which they form during the hardening of the cement or by their repelling action toward water, petroleum residuum oil and the soap and alum combination, for examples. The coatings comprise paints and varnishes with a linseed oil vehicle; bituminous compounds—the tars and asphalts; the hydrocarbons—the paraffin gasoline combination for example; and the soap solutions like alum and soap."

"In Technologic Paper No. 2, U. S. Bureau of Standards, p. 23, the following comment regarding these classes of compounds appears: 'As no organic substances can be considered as truly permanent, the durability of all these compounds, except the inert fillers, can be questioned.' However, since several of these compounds have been more or less advocated and used in construction, a very brief consideration of the results of tests on mixes containing some of them will be given."

Effect of Hydrated Lime on Permeability

"On account of the plasticity and easy working qualities which hydrated lime imparts to cement mortars, and since it also decreases segregation, it has been considerably used as a waterproofing compound. It may be mixed with the cement in proportions less than 15 per cent without producing loss in strength of concrete. Numerous tests on mortars and concretes have indicated that its use decreased permeability. With a 60-lb. per square inch water pressure, S. E. Thompson's tests indicated that additions of 8, 12, and 16 per cent of hydrated lime in terms of the weight of the cement gave water-tight concrete for 1:2:4, 1:2½:4, 1:3:5 proportions, respectively. The concrete was made of run-of-crusher, hard, conglomerate rock below 2-in. size with dust removed. All of the sand passed a ¼-in. mesh, 26 per cent passed a No. 40 sieve and 4 per cent passed No. 100 sieve. The thickness of wall subjected to flow was 8 in., and leakage through the specimens was caught and weighed. Thompson contended that hydrated lime paste is a more efficient void filler than portland cement paste, since the volume of the former is about 2¼ times that of the latter."



Byrckett type of wood lath

Using Eight-Inch Concrete Block Foundation Walls

By A. J. R. Curtis

IN the interests of lighter and more economical construction, many builders familiar with residence work have suggested the use of 8-inch hollow concrete block in preference to walls requiring the use of block 10 inches and 12 inches in width, which have been considered neces-

sary and have been made the legal minimum in most cities.

A careful analysis has shown the 8-inch block wall if of reasonably good block to be entirely adequate for the foundations of one and two-story dwellings. Such walls provide a factor of safety extraor-

dinarily high (usually from 10 to 25) so far as load-bearing ability is concerned; and for cellars of ordinary depth in dwellings of even quite large size, these walls are able to take care of the side thrust without difficulty.

Oak Park, a village of 42,000, lying directly to the west of Chicago, is probably the first large community, in the central west at least, to permit foundation walls 8 inches in width provided good quality concrete block are used. J. Kempston and Son of Chicago are now engaged in the erection of seven residences in Oak Park all of which have 8-inch well constructed concrete block foundation walls, plastered on the outside with three quarters of an inch of portland cement mortar, making a thoroughly watertight and satisfactory wall.

The concrete block foundations are built up on a footing of monolithic concrete which is 15 inches wide and 10 inches deep placed below the line of frost penetration. Instead of heavy plank forms for these footings Mr. Kempston uses 2 by 4's as shown in Fig. 1. With the forms placed as shown in this illustration the concrete is forced out below, under the tamping, as shown in Fig. 2, spreading the base of the footing several inches in addition to the 15 inches between forms. Fig. 3 shows the wall of 8-inch block ready for the cement plaster. The block wall is capped with a course of watertable block on which the wooden sill rests. The superstructure of these houses, which is to be of frame, will be erected in the usual manner.



Fig. 1—Forms for the footings for small house foundations may be made of 2x4's which permit the footings to spread under the forms



Fig. 2—Placing footing 15 in. in width for 8-in. foundation wall of concrete block

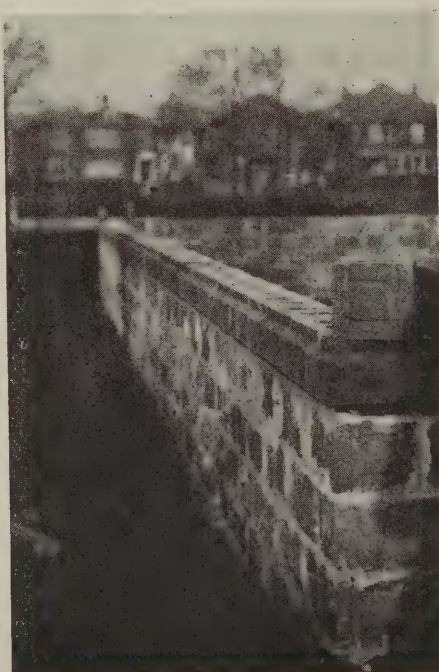


Fig. 3—An 8-in. concrete block foundation wall as permitted in Oak Park, Ill., ready for the exterior cement plaster coat

City Building Costs Compared

ACCORDING to a comparative table of building material prices compiled recently by the division of building and housing of the bureau of standards, United States department of commerce, the cost of building a home in Detroit is appreciably lower than in many of the other larger cities.

A home which can be built here for \$4,700, it is estimated, would cost \$5,782 in Cleveland, \$5,337 in Pittsburgh, and \$4,900 in Dayton.

Average prices paid by Detroit contractors as of June 1, for some of the most important materials which go into the construction of the home, are shown in the table as follows: Common brick, \$15.50 a 1,000; yellow pine, \$45 a 1,000 feet; common boards, \$45 a 1,000 feet; red cedar shingles, \$5.40 for 100 square feet; building sand, \$2.78 a cubic yard; gypsum plaster, \$13 a ton; tar paper, \$2.75 for 100 square feet; lime, \$16 a ton; cast iron soil pipe, \$50.82 a ton.

Damp Cellars Prevented

By John Y. Dunlop

Examples of Walls Used in England

THE greatest difficulty which an architect has to contend with in the ground work of a building is that of the ground water in low-lying land. Springs on hill sides are easily controlled but water which percolates through mud and gravel only a few feet below the surface of the ground and rises and falls with the rise and fall of a neighboring ditch furnishes a most difficult problem.

The level of ground water is always raised by capillarity. The amount of rise is estimated at about 1 foot in sand and 4 or 5 feet in clay and compact mart. Of course it is very difficult to lay down a fixed rule for building in damp soils because every site must be judged by itself as the nature of the ground varies greatly even in the shortest distance. A general investigation will give an idea of the conditions of neighboring houses and be a guide to what precautions might be taken in building the cellar on adjacent sites.

The drainage of soil renders it drier and by reducing the evaporation warmer but one of the difficulties in attempting to drain a site on which it is proposed to build is that the lie of the land might cause you to take the under water from a great number of sites round about and for that reason I am not much in favor of a wholesale scheme of land drainage before building. I always advocate if the site is damp to treat the dampness surrounding the house.

In many cases the house is built before the dampness of the site becomes a real factor in the situation. Dampness in the most of cellars is due either to water in the soil at a depth below the level of the cellar and affects the condition of the cellar floor and wall by capillarity or by water which is coming through the soil from a higher level and draining forward through the soil to a lower level.

In that case where this water comes near the house it finds a ready source of contact and shoddy work or opening jointing are liable to be flooded.

In other words the soil which has been disturbed in the building of the cellar becomes the least line of resistance, permitting the water to collect round the cellar wall.

The simple plan in treating dampness which arises from such a source is to drain the water off before it reaches the cellar wall.

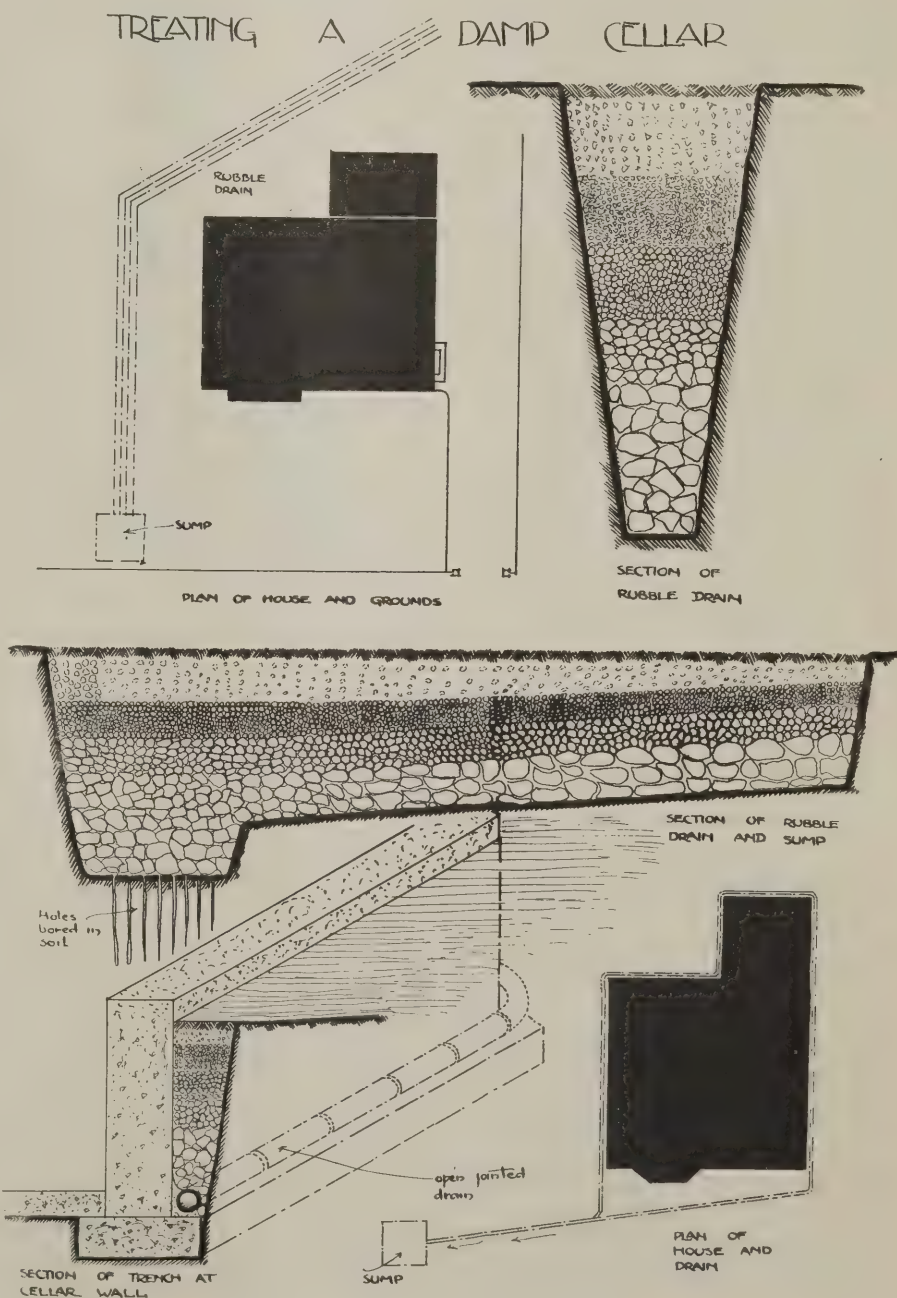
In the first place, we must take the trouble to find out in which way the water

or dampness is travelling forward by a careful examination of the cellar walls. Dampness in one place more than another is always a good guide and in extreme cases which I have seen the water has been known to trickle through some of the joints in the rainy season.

The best remedy for damp cellars arising from dampness collecting in this way is a

rubble drain formed along the side of the ground from which the water is traveling.

Any kind of rough material is suitable for the filling in of the trench. A sketch of the drain is shown with relation to the house and a cross section and a longitudinal section showing the sump is also given. The depth of the rubble drain is a matter which can only be decided after cut-



ting and examining the trench but in all cases the bottom of the sump should be below the level of the cellar floor.

In the section of the sump which is shown it is presumed that the trench is cut in clay soil and a few holes are shown pierced in the bottom of the sump to allow the water to pass off.

Where the dampness is due to capillarity the rubble drain has not the same effect and in that case it has been found better to dig out the soil surrounding the house and provide an open jointed pipe drain close to the foundation. In this way water which rises in the soil on each side of the house is collected in the open rubble soil which has been filled in when the drain is set. The water finding its way into the drain runs off on each side to where the drains meet and follows the line to the sump. This sump is just another large hole dug below the level of the drain and filled in with broken stone or screened gravel. Of course the best and easiest way to secure a dry cellar is by special construction.

An open area of sufficient width to admit of easy cleaning and extending to a depth of about 6 inches below the level of the cellar floor is an effectual preventive of ground air and ground damp in walls, the bottom of the area being concrete with asphalt on the ground layer and walls.

Space does not often permit of an open area with the result that air drains are formed with concrete and brick in the lower part of the cellar wall. The simplest form of air drain which we have in England is formed by making large concrete slabs and resting them on the extended foundation of the wall and front.

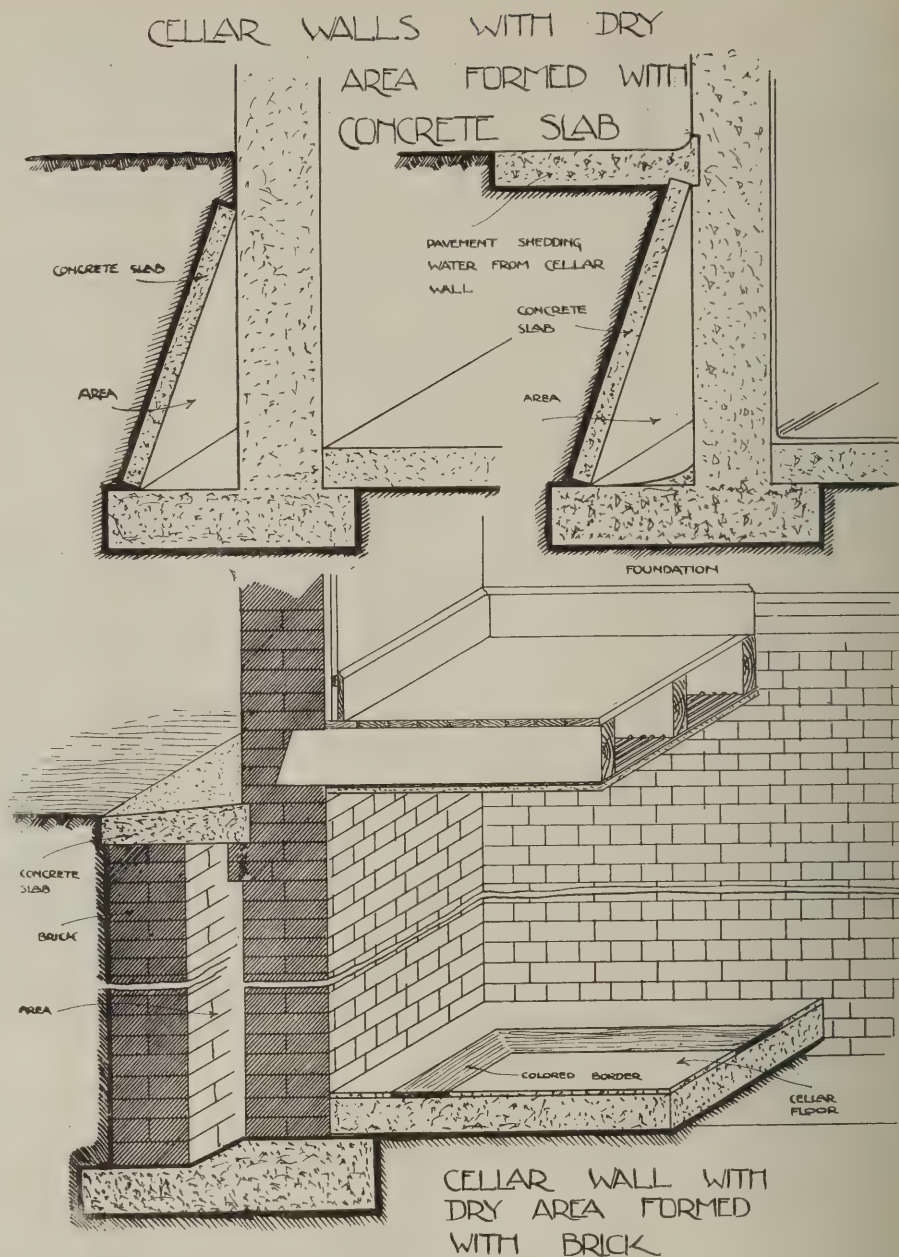
The slab in many cases is set in position and the soil filled in as shown in the first illustration but this method had the disadvantage that the ground water falling from the walls of the house often finds its way in at the joint between the slab and the wall.

The best examples of this type of air drain have a piece of concrete paving formed over the upper edge of the concrete and a cement fillet laid on top of the foundation. The advantage of these is that water dripping from the wall is run off clear of the building and should any moisture find its way into the air drain it is immediately run off from the cellar wall to the sloping slab.

The better plan is to form the air drain by means of an additional thin wall of brick or stone, the wall and area being covered at the surface of the ground with a cement slab.

An example of this type of air drain is shown in which the cellar wall and the outer wall is built 9 ins. thick. Just below the bottom of the cement slab two courses of the brick work of the cellar wall are made to project into the area.

The next two courses are cut to allow them to be set back 1 inch from the face of the wall so that the end of concrete slab



is recessed into the wall of the house. At the bottom the concrete foundation is made 9 inches thick under the cellar wall and is reduced to 6 inches at the outer edge so that the varying thicknesses allow the part of the concrete foundation crossing the area to be splayed, with the result that any water which may find its way in is diverted to the outer wall.

Another example of this class of work is shown where the area is formed over on the top with a semi arch. The advantage this design has is that there is no signs of the area construction from the top, but at the same time the forming of the arched portion made the top of the wall very likely to conduct water into the air drain or dry area.

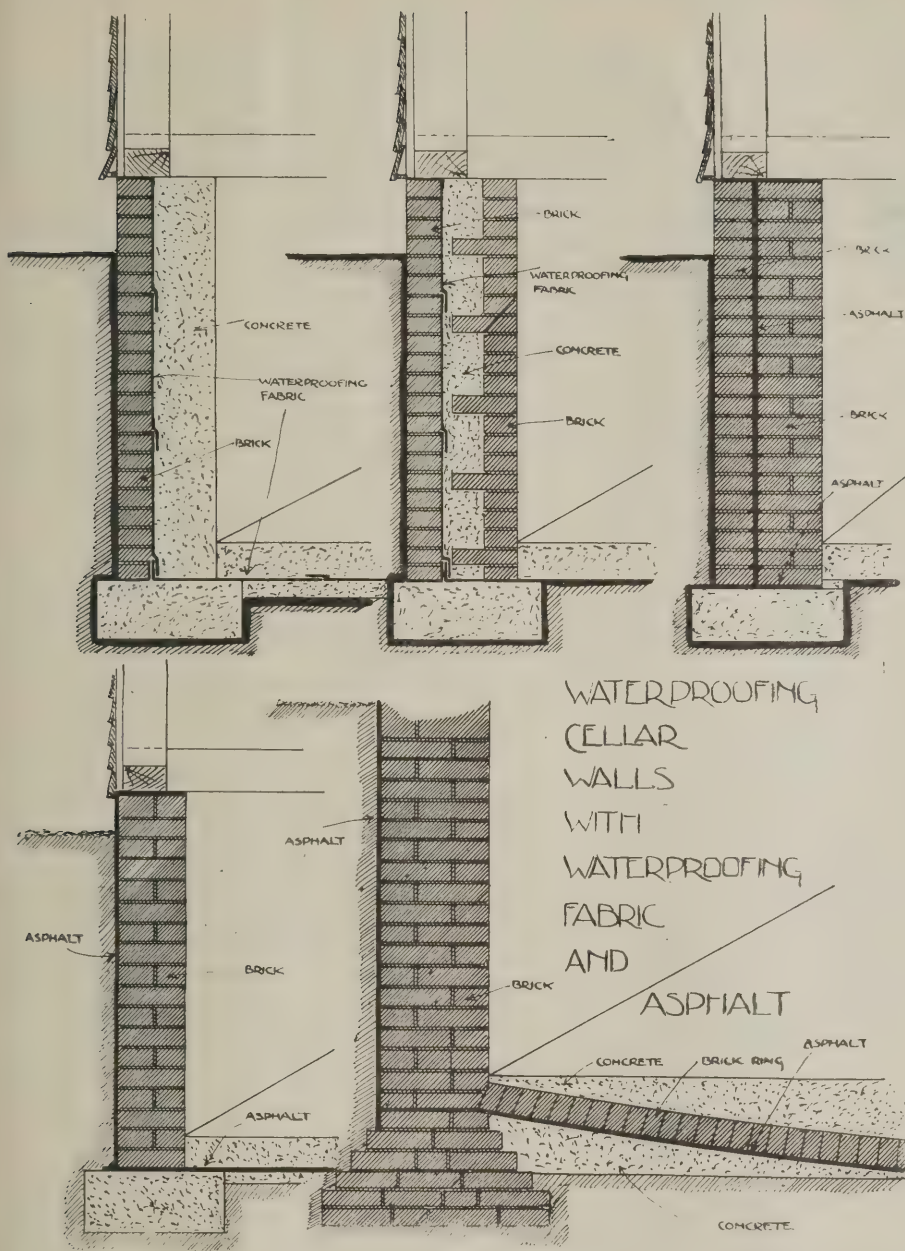
Usually the arched portion is built in cement or the top of the arch is covered with waterproofing sheeting or fabric which extends into the wall, forming a horizontal dampproof course.

Closely akin to the dry area is the hollow wall. In this the air space or cavity is very small. The drawing showing this construction has the outer wall built $4\frac{1}{2}$ inches thick; the hollow space 3 inches, and the inner part of the wall 9 inches.

Both the first floor and the basement floor are of wood which caused some method for ventilating the basement floor to be adopted. In this case a few air bricks are built into the outer skin of the wall just above the ground level and a corresponding number is also set in the inner wall just above the wall plate of the basement joists. With air bricks arranged in this way on two opposite walls ventilation is obtained for the space under the floor.

Many building experts in England question the construction of dry areas and hollow walls being the best method of construction to secure dry cellar.

The principal argument in their objection is that in each there is a narrow cavity well



high impossible of access to the householder but capable of harboring vermin and facilitating their movement and while they admit that both are of some use in retarding the ingress of ordinary damp into a cellar it is not an ideal arrangement.

However, these arguments are all open to question, for after all this special construction is a matter of opinion as we find in many districts nothing but dry areas and hollow wall for this class of work. Whereas in others we have open areas of sufficient width and where that cannot be obtained they form waterproof solid walls which are impervious alike to water and air.

As most of brick or concrete or stone is very far from being impervious it follows that a wall built of these materials alone, however well it may be constructed, cannot be absolutely waterproof. Certainly a wall built of good bricks and with portland

cement mortar; one part of cement to two parts of sand and well grouted with neat cement ought to be practically impervious, especially if a cavity in the form of a vertical opening be left in the body of the wall and run with grout; but such is the carelessness of the ordinary bricklayer that it is almost certain that it won't be impervious.

A method sometimes adopted is to build a vertical layer of roofing slates between two skins of brickwork and a better method is to form a narrow vertical cavity one-half inch or three-fourths of an inch wide in the body of the wall and to run it full every three or four courses with molten asphalt or waterproofing composition. Great care must be taken as the work is being raised to keep the cavity free from mortar droppings. This is usually done by means of a thin board built into the wall to form the cavity and lifted it up when the third or fourth course is com-

plete when the cavity is at once filled with the asphalt.

In building walls of this kind the brick should not be hedged completely across in order that the asphalt may key into the back of the level joints as shown in the sketch of this wall.

One of the disadvantages of this type of wall is that some builders and their laborers think that any class of artificial asphalt is good enough for this work. It cannot be seen after it is run in and nobody is the wiser. A mixture of pitch, oil, and sand made by rule of thumb is far from reliable unless very careful supervision be exercised. Most satisfaction is obtained from the use of natural asphalts or from well-known rock compositions.

Waterproof cellar walls are often made by using waterproof fabric in between the layer of the hard fabric as is shown in the two sketches.

The first wall consists of brick and has the fabric attached to the back of the outer skin when the cellar wall is boarded on the inside and the concrete inner part carefully filled in.

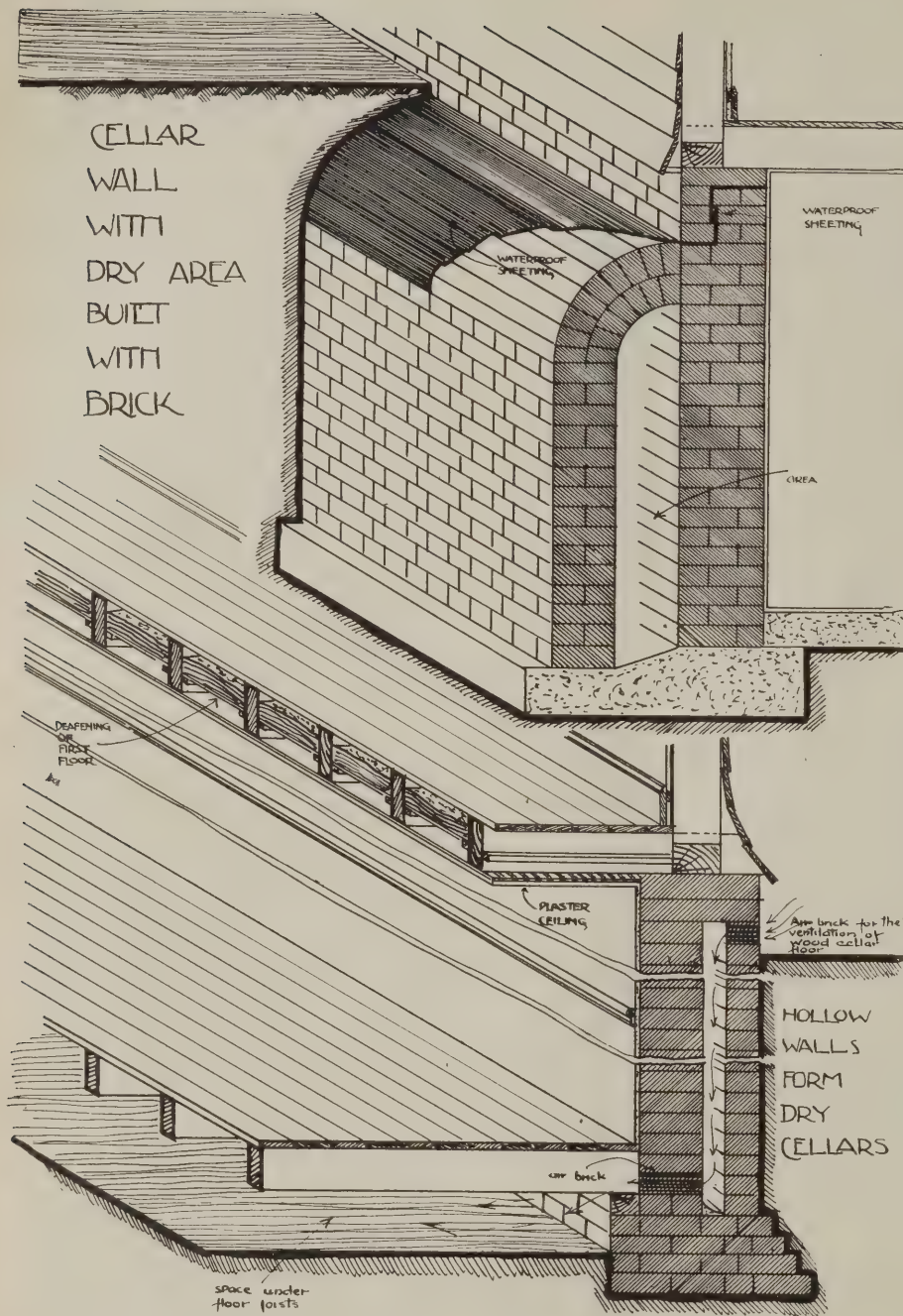
The second example where no boarding is required has the outer skin prepared in much the same way as in the last wall. The inner part of the wall is then built four courses high and the concrete hand filled between the two skins.

A great deal depends on the construction of such wall on the careful filling in of the concrete and on sufficient lap being given to the vertical and horizontal joints of the waterproofing fabric. One disadvantage of this method of construction of cellar walls is that the outer portion of the wall is not protected against the damp and a second disadvantage is that no inspection of the vertical damp proof course is possible. What may occur through carelessness or the presence of a small piece of mortar or brick or water may not be discovered until damp has struck through the wall.

The only way to make the whole of a wall in damp ground quite dry is to spread a waterproof coating on the outside of the wall. The best method is to spread one or two coats of natural asphalt carefully connected with the horizontal damp course. The top of the vertical course may be finished by tucking it into a joint above the ground for a depth of an inch or it may be connected to a second horizontal damp course at that level.

Cellars which are below the flood level of an adjacent river should have the ground layer and walls with a sheet of asphalt absolutely flawless and continuous and so arranged to resist the pressure of the water.

A simple method of doing this is shown in the sketch with the floor arch. In this the horizontal damp course is spread on the wall when it has been built to the level of the ground layer and on it the upper



part of the cellar wall is built and a sufficient weight of concrete is deposited over the ground layer to resist the upward pressure of the water.

In exceptional cases where the pressure is great the concrete ground layer may be formed with a concave surface on which the asphalt is spread. An inverted arch of one or more $4\frac{1}{2}$ brick rings of brickwork in cement may then be built on the top of the asphalt and finished above with concrete.

The material used in the formation of cellar walls are often of the commonest kind. Certainly where the wall is well waterproofed there is not so great a necessity for impervious and non-absorbent materials but as a general rule it may be said that materials exposed to damp as in

cellar walls should be hard, dense and durable to give satisfaction under all conditions.

Preparing Mortar and Plaster a Good Time in Advance

THERE are several advantages in the practice of preparing sufficient mortar and plaster at one time for a complete job. More mortar can be made when the lime is allowed to age, as it mellows and grows fatter as time passes. A mortar that is a trifle stiff at first will prove smooth and easy-working if allowed to age for a week or so. The high sand-carrying capacity of

lime is best utilized when this practice is followed.

On a good job it is important that the mortar or plaster be uniform in quality. This is insured by preparing the required amount in advance. The materials can be measured easily in large quantities, and the right proportions easily prepared. As storage improves lime mortar and plaster, it is frequently economical to mix up a large batch some time before it is needed and store it in a pile for future needs. As the mortar is needed it can be taken from the storage pile and easily tempered as desired. The mortar will be uniform in color, as well as in quality, and consequently will improve the appearance of the building.

Double Box System

Many plasterers prepare two boxes, one for mortar for the scratch and brown coats, and the other for the fine, smooth-finishing one. As not much of this pure white putty is required, more care can be taken in its preparation and a fine job assured.

Lime putty for mortar, or for use in scratch and brown coat work should be screened through a No. 5 screen, and for finishing work it should be run through a No. 12 screen. The use of these screens will eliminate the possibility of any unslaked particles of lime getting into the finished product. It is essential, however, that the screens be kept in repair, as trouble has been caused by using a screen that was in poor condition, having some large breaks, thus permitting unslaked lime to get into the mortar. A careful builder, however, should never be bothered by such an experience.—*Construction Lime News*.

"Mechanical Testing," by R. G. Batson and J. H. Hyde, Vol. I, "Testing of Materials of Construction," Vol. II to follow, 413 pp., 258, illus., index. An English book which covers in a very comprehensive manner the theory of testing and methods used to test the strengths and resistance to failure of all kinds of construction materials. The second volume will deal with testing apparatus, machines and structures. Published by E. P. Dutton & Co., New York City, and sells for \$9 (both volumes).

"Materials of Construction," by H. E. Pulver, $6\frac{1}{4} \times 9\frac{3}{4}$, 318 pp., illus., index. Gives definitions, methods of manufacture, properties and uses of various building materials. Subjects covered are plasters and natural cements, limes and lime mortars, portland cement, portland cement mortars, plain concrete, building stone, brick and other clay products, timber, pig iron, cast iron, wrought iron, steel, special steels and the non-ferrous metals and alloys. Published by the McGraw-Hill Book Co., New York City, and sells for \$3 per copy.

Questions, Answers, Kinks and Discussions

Edited by V. L. Sherman

Herein is a Department of Mutual Help for the Exchange of Experiences and Ideas. It is Not Only Well Worth Your While to Give Your Experiences for What You Get Back from Others, but National Builder Pays You for Doing So in Good Hard Cash

A Bench Stop

S. E. T., Alamagordo, N. M., sends the idea for a bench stop shown in Figure 1. He writes: "This is a bench stop which is real handy and easily made. Take a board about six inches wide by about ten inches

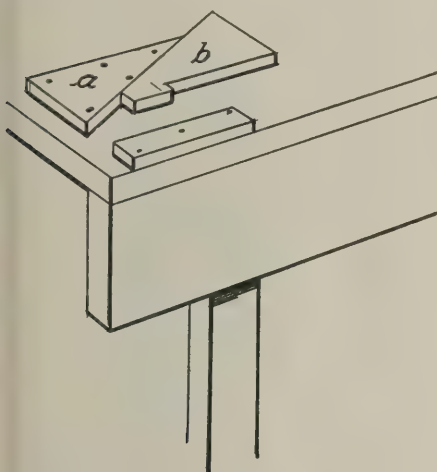


Fig. 1

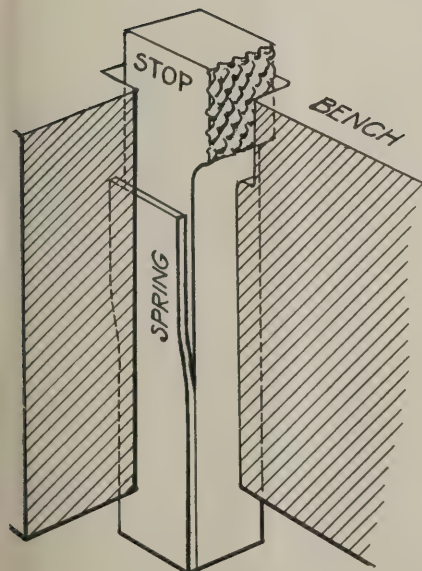


Fig. 2

long, rip on a diagonal bevel, and nail down (a). Cut lug (b) and your stop is done. This stop has the advantage of taking quite large stock without any adjusting."

Another Bench Stop

There has been quite an interest in bench stops recently. Their design runs from the simple to the complicated, and the designers are eager to prove their advantages over some other type which they have seen.

R. K. S. sends a sketch of a stop which he has used, and which was suggested by a blacksmith who had made them before. "Along the bench there are a number of square holes for receiving the stop and each hole is provided with the shoulder shown in the sketch, Figure 2. The stop is a square forged steel piece with the face filed. The spring strip is welded to the shank."

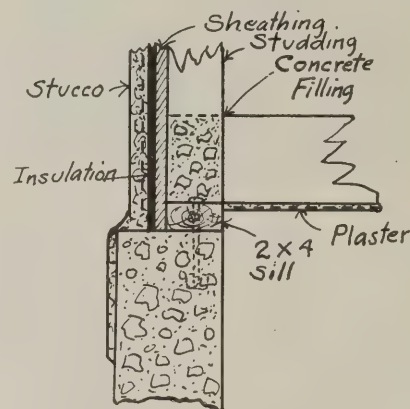
Sills

The photograph below shows preparation for bolting a 2"x4" sill to a concrete foundation. It was presented in discussion over



Fig. 3

the bolting of sills, and was taken in a town a little north of Chicago, where homes range around twenty thousand dollars, but



are sometimes four or five times that figure, where property runs from fifty dollars a foot up, and where most of the building is supervised by architects.

Why bolt the sills? In this case the houses were low set, the first floors close to the grade, and areas used. The sills carried the studs, and the basement was plastered. Concrete fill was also used and no trouble had been experienced from rot. The work was more substantial and lent itself well to brick veneer. With stucco exterior the insulation, sheathing, furring and stucco brought the wall far enough to allow a slight curve onto the foundation which carried the stucco to the grade. No one suggested that bolting down added any stability when the house was finished.

However, there was a difference between these well laid sills and some I have seen of 2"x8" brought up in spots with pieces of shingle.

One of the number advanced this argument against bolting sills for strength. A tornado provides wind velocity enough to demolish any frame structure; and it also provides a drop in air pressure sufficient to explode a house before the wind strikes it. Suppose, he said, you figure a drop of one inch in the barometer. If it were instantaneous the pressure on the outside of a house which was closed might be less by one-half pound per square inch than the pressure within. That would mean that the air inside the house would exert about

seventy pounds per square foot on the outside walls, and that is more than twice the figure allowed for wind pressure on city buildings.

Valley Leaks

A builder sends in the following query which is passed on for an answer to any who have found successful remedies for such a fault. He writes:

"On one or two houses recently finished I have had difficulty in keeping the valleys tight. The roofs are of the steep English

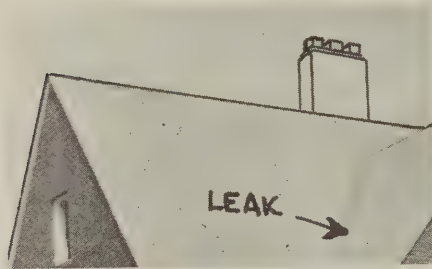


Fig. 4

pitch, as shown in the photograph, and are covered with prepared roofing. I know that the work was done by careful workmen in each case, but the leak appeared after the house was occupied and I don't seem able to check it. It seems as though the rain rushes down so fast from one side that it forces through on the other side of the valley. What is the way to stop it?"



Fig. 5

There is one way to prevent it, but that would not be helping him out. In some steep pitched roofs, especially in England, you will find valleys with continuous shingles, just the reverse of the new thatched shingle roof edges. They add to the appearance of the roof and do away with flashing.

Will It Pass?

At times sketches and plans are sent in for various structures where the design involves strength, and a limited scope in

form. In the majority of cases there is a bona fide effort towards the very best results, but occasionally the sketch and proposition is simply, "will it pass?"

In the August issue of Crane Company's *Valve World* there is an article which shows clearly what a difference there is in "getting by" and "making good." It concerns the new Imperial Hotel in Tokio, Japan. It must be seven years since a young chap named Mueller told me he was going to Japan to help build a hotel. Now in turning over the pages of the *Valve World* there is the drawing of the new hotel ready for occupancy this month. You may not be partial to the style of the architect, Frank Lloyd Wright, but in that building there is no thought of whether it will pass or not. It is a hotel for the Japanese in Japan, planned by an American, and superintended in the building by Americans. It shows the spirit of some, and may it compensate Kipling for the American missionaries in Japan who "construct clap-board churches and chapels for whose ugliness no creed could compensate."

Hammer Handle Grips

A builder finds that callouses on the hands get rather slippery and the hand polished handle of a hammer is often hard to grip. Some tape the handles but R. E. J. of Philadelphia knurls his. He writes: "Many carpenters wrap the handles of their hammers with tape in order to get a better grip. A good way to accomplish the same result is to take a saw and, starting at the end of the handle, draw the saw backwards, teeth against the handle, working up the handle and rolling the hammer as the saw is drawn across it. This gives a very satisfactory grip and is far preferable to a smooth handle."

Plaster Parting on Brick

The following solution for plaster cracks is submitted by H. N., of Denver, Colo. It relates to the joining of plastered surfaces where brick walls and frame partition meet.

"In brick houses where the plaster is applied directly to the brick, and there is a partition resting on the floor, the partition is liable to settle more than the main wall, due to the fact that the timber in the floor shrinks, causing the plaster to crack at the junction of the main wall and the partition. I find it feasible to put a temporary strip (2"x4"), in the corner and plaster the main wall first. Next remove the strip and put a strip of paper against the plaster. Plaster the partition and remove the paper, leaving the plaster in two sections. The crack, which is straight, can then be covered up with a thin coat of plaster and will not be noticeable. The paper used between the two sections should be strong oiled paper, so that it can easily be removed.

Should the crack appear again it can easily be covered up with a coat of white wash."

Leveling Sills and Joists

W. L. C., Boone, Iowa, writes: "Here is an easy and quick way to level sills, joists, etc. After the sills and joists are placed in position, drive a nail in each corner, then stretch a chalk line tight from corner to corner around building. Now place level under line on one side and raise low corner up until it shows level. Proceed the same around building. After corners are all level, then the low places can be wedged up to the line and all is done more quickly and as accurately as if a straightedge was used. If necessary, a small block of equal thickness can be placed under line at each corner to clear line of high places in sills."

Winders

Hardly had our opinion on winders been expressed a month ago when our attention was called to the staircase shown herewith. With its comfortable breadth and carpeted

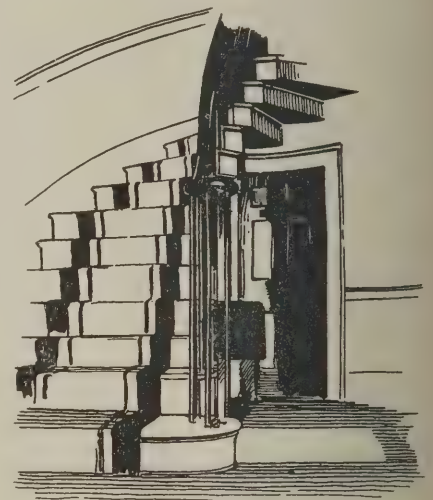


Fig. 6

treads the stair presents a fairly safe descent, but we defy any youngster to ride the rail. This stair is peculiar, though not unique, in that each stair is made from a solid block of wood. The blocks are laid one upon another and the curve is entirely unsupported from below. The saving in space is marked. What the writer likes about the stair is that it is built for the eye as well as the feet, and that it is not waxed.

The house which contains this staircase was one of two built for two brothers, ship-builders of Maine, during the first years of the last century. The houses were planned and built under the direction of an English builder, brought over for the purpose. They are still standing and occupied, we believe, and are two of the many monuments to men who are really builders as well as architects.

Announcements and Publications

Hardwood Manufacturers' Office Moved to Chicago—The Hardwood Manufacturers' Institute has moved its office from Memphis, Tenn., to 1020 South Wabash Avenue, Chicago, Ill. J. M. Pritchard is secretary-manager. This is a new organization of hardwood manufacturers for the purpose of promoting the right use of hardwoods and of furnishing a clearing house for all information relating to the uses of hardwoods.

"Warm Air Heating." Proceedings of the ninth annual convention of the National Warm Air Heating and Ventilating Association, 106 pp., 6¼x9¼. A large part of these proceedings deal with furnace manufacturing problems, but advertising and merchandising are also discussed, which may be of some interest to dealers and builders. An important part of the proceedings, so far as builders are concerned, is the proposed standard code regulating the installation of warm-air furnaces in residences. This contains specifications or directions representing the consensus of the expert opinions of men whose business success depends on satisfactory installations. Rules are given for the determination of the size of pipes, stacks and furnace. Published by the secretary of the National Warm Air Heating and Ventilating Association, Columbus, Ohio.

"Good Houses," by Russell F. Whitehead, architect, 8x11, 63 pp., 45 illus. Typical historic architectural styles for modern wood-built houses is the subject dealt with. Beautifully illustrated types of houses, from the 17th century New England colonial to the modern Pacific Coast bungalow are shown with sketch floor plans. While primarily intended to educate the public to a taste for good design, this book will prove of much value to architects and builders. The text not only briefly describes each type but points out those features which give it the distinction, character and individuality. To architects the book also has a definite value as a concise historical resume of American house architecture. While addressed to the intending home buyer, the following statements from the "Foreword" apply with even greater force to the professional builder who builds to sell: "Choosing an architectural style is one of the most puzzling problems that confronts the intending builder. Every site, every difference in personal need, every vagary of individual fancy, sets up new conditions. Here then is a book that interprets those architectural styles which are the foundation of American building traditions, and which are adaptable to wood construction. It tells where

these styles belong historically, what their chief characteristics are, and how they can be adapted to the modern home. Furthermore, it points out the fundamentals which should control judgment in the planning and in the building of a house." Published by the Weyerhaeuser Forest Products, St. Paul, Minn.

"The High Cost of Cheap Construction," 8x11, 68 pp., 60 illus. This is a companion volume to "Good Houses," noticed elsewhere. It is intended for home purchasers and deals with the importance of right construction in house building. However, it is a book that any builder would do well to have, for it calls attention to many details of poor construction which he is the one to guard against. The four principal types of house framing are described and illustrated by very clear and intelligible drawings. The various structural parts of the house, starting with the foundation, are discussed in detail, with special emphasis on common defects. Under "the outside covering of the house" stucco and brick as well as wood siding are discussed. The last three chapters deal with the selection of lumber for different parts of the house. There is much in this book of vital interest to every builder who aims to build a reputation from his work. The writer assures the readers that they "will find the better class of contractors and builders thoroughly familiar with approved building practices and eager for any opportunity that may be given them to build houses right." Published by the Weyerhaeuser Forest Products, St. Paul, Minn.

"Hollow Tile Construction," by J. J. Cosgrove, 4¾x7, 202 pp., 187 illus. A practical explanation of modern methods of designing and building fireproof residences of hollow tile, so written that the builder may use it; with chapters on walls, floors, roofs, partitions, framework, roofing, cornices, fireplaces and interior work; analysis of specifications, estimating, with reproductions of photographs and floor plans of completed buildings—in pocket-book form. Covers several types of blocks, various methods of construction, numerous building details, rules and data to help the estimator in calculating costs and pictures of good examples of tile construction. Technical terms are avoided so far as possible. Published by the U. P. C. Book Co., New York City, and sells at \$2.50 per copy.

"Small Boat Building," by H. W. Paterson, 4¾x7¼, 144 pp. 8 folding plates. Covers tools, woods, fastenings, laying

down, the backbone, setting up, framing, planking, deck framing and decks. This book is designed for the amateur and will interest particularly carpenters and builders who live by the water and know how to use tools. The plates give working details of ordinary motor and sail boat hulls. Published by the MacMillan Co., New York City, and sells for \$1.25 per copy.

"The House Owner's Book," by Allen L. Churchill and Leonard Wickenden, 388 pp., 5½x8, 47 illus. Good index. Designed primarily for the prospective home purchaser this book contains much real technical information in readable language. The subjects by chapters are: Materials, carpentry, heating and ventilation, paints and painting, treatment of floors and wood-work, lighting the house, electricity, water supply, drainage, plumbing, special appliances, garage, recipes, safety in the household, tables of weight, measurement and temperature. The completeness of the treatment is illustrated by the analysis of a single chapter, "Materials," as follows: Wood—common defects in lumber, identification of lumber, the kind of wood to use, sawing and quartering. Brick—the kind of brick, how to test the quality of brick, brick bonds, cost of brick. Hollow tile—advantages of hollow tile for building, cost of hollow tile. Stucco—methods of building frame and stucco houses, stucco on wood lath, proportions of stucco, methods of applying, repair of stucco. Cement and concrete—portland cement, proper proportions in mixing portland cement; concrete, what concrete is, quantity of sand and stone to use, how to estimate quantities; some simple jobs in concrete, concrete foundation piers, laying a concrete path. Mortar—how to repair joints in old masonry. Plaster—composition of plaster, the scratch coat, cracks in plaster. Roofing—wood shingles, asphalt shingles, asbestos shingles, rubber-type roofings, asbestos roll roofings, metal roofing, tiles, comparative costs of different roofings. Metals—how used in house construction, iron, steel, brass, bronze, copper, zinc. On many of these subjects the treatment is of course very cursory and of little value to the architect or contractor, but nevertheless the book does contain much general information of value even to the professional builder. Published by Funk & Wagnalls Co., New York and London, and retails at \$2 net per copy.

"Inspected Electrical Appliances," 274 pp., 3½x5½. A pocket list of appliances tested and approved by the National Board of Fire Underwriters, classified and alphabetically arranged. Published by the Un-

derwriters' Laboratories, 207 East Ohio street, Chicago, Ill.

"The Identification of True Mahogany, Certain So-Called Mahoganies, and Some Common Substitutes," by Arthur Koehler, 6x9, 28 pp., 13 illus. This is Bulletin No. 1050 of the United States Bureau of Agriculture and is sufficiently described by its title. It is obviously valuable to anyone who buys mahogany, either as lumber or in the form of furniture or fixtures.

"Field Practice," 4¾x7, 206 pp. This is the second edition of an inspection manual for property owners, fire departments and others covering common fire hazards and their safeguarding, and fire protection and upkeep. The text forms the basis of specifications for many kinds of construction work. Published by the National Fire Protection Association, Boston, Mass., and sells for \$1.50 per copy.

"House Wiring," by Thomas W. Poppe, 4¼x6¼, 208 pp., 160 illus., index. A practical treatise describing and illustrating methods of installing electric light and power wiring, bell wiring and burglar alarm wiring; intended for the electrician, helper and apprentice, to aid in solving all wiring problems in conformity with the rules of the National Board of Fire Underwriters; fourth edition revised and enlarged. Published by the Norman W. Henley Publishing Co., New York City. Sells for \$1 per copy.

"Wiring a House," by Herbert Pratt, 5½x8, 36 pp., 29 illus. Paper-bound booklet on electric light wiring for a residence. Sixth edition revised and enlarged. Published by the Norman W. Henley Publishing Co., New York City; sells for 35 cents.

Concrete Houses, 34 pp., 8¾x11½, 34 illus. Perspective sketches of concrete houses and sketch floor plans make up the bulk of this work, which is in loose-leaf form the intention being to add new designs from time to time. The houses shown are intended to be built of concrete block and covered on the outside with portland cement stucco. The designs contemplate the use of standard 8x8x16-in. block in the upper walls with basement walls of block 10 or 12 in. thick. With slight changes concrete building tile or block of other sizes and shapes can be used. Monolithic concrete construction can be substituted with only detail changes necessarily varying slightly to conform to the particular systems of forms used. Four pages cover descriptions of such details as insulation, rigidity, steps, porches, floors, roofing, etc., together with a page of construction details. The book is intended to serve chiefly as a plan reference book. Complete detail plans of every house illustrated are available at a nominal price (\$10). The designs were

made by prominent architects in various parts of the country from Boston to California and are the property of the publishers. Each design is given a name as well as an identifying number. A brief description accompanies each design of which there are 25. One page is devoted to concrete-block garages. Published by the Portland Cement Association, Chicago, Ill., and sells for 50 cents per copy.

"Farm Buildings," by W. A. Foster and Deane G. Carter, 5½x8½, 377 pp., 331 illus., index. Treats of location, planning, construction and repair of farm buildings. Subjects covered by chapters are: The dairy barn, the horse barn, beef cattle and sheep barns, general purpose barns, barn equipment, essentials of barns, classification of barns, barn construction, barn framing, barn ventilation, hog houses, hog house sanitation, poultry houses, grain storage buildings, silos, implement and machine shelters, ice houses, minor buildings, home-built farm equipment, development of the farm house, planning the farm house, farm house construction, the tenant house, farm home equipment, farmstead planning, wood as a building material, cement and concrete, brick and hollow building tile, mechanics of farm buildings, building codes and fire prevention, contract and specifications, cost estimating, plan drawing, rafter framing and cutting, weights, measures and formulas, reference table for farm building design. The above synopsis shows many things elementary to the experienced builder, but on the other hand the information and illustrations on up-to-date design of farm buildings are valuable alike to builder and farmer. The authors are experienced farmers, experiment station workers and teachers of agriculture and engineering. Published by John Wiley & Sons, Inc., New York City, and sells for \$3 per copy.

"Practical Steam and Hot Water Heating and Ventilation," by Alfred G. King, 6½x9¾, 402 pp., 304 illus., index. Gives a brief history of the science of steam and hot-water heating and ventilation, the early methods, and describes and illustrates the advancement and improvements over the earlier methods. By illustrations, rules and explanations the steamfitter or apprentice is shown the best methods of estimating and installing heating work under any one of the modern systems. Third edition, revised. Published by the Norman W. Henley Publishing Co., New York City, and sells for \$3.50 per copy.

"Trade Associations," by Emmett Hay Naylor, 6¼x9, 389 pp., index. A detailed analysis of typical trade association activities designed chiefly for use of association officers and employees, but of interest and value to all trade association members; attempts to draw the line between the legitimate and illegal activities of trade associa-

tions. Published by the Ronald Press Co., New York City, and sells for \$5 per copy.

"Standard Practical Plumbing," by R. M. Starbuck, 406 pp., 347 illus., index. An exhaustive treatise on all branches of plumbing construction, including drainage and venting, ventilation, hot and cold water supplies and circulation; intended for the skilled plumber or plumbing contractor but of much value to the professional builder, general contractor and architect. Clear working drawings of plumbing details are a valuable part of the work. Published by the Norman W. Henley Publishing Co., New York City, and sells for \$5 per copy.

"New Building Estimators Handbook," by William Arthur, 1922 edition, entirely revised, reset and enlarged, 5x7¼, 1002 pp., illus. Subjects covered include: Measurements of building work, the quantity system of measuring, speed and how affected by (1) climate (2) hand vs. machine labor, excavation and filling, piling and underpinning, concrete work, reinforced concrete, stone, gravel, marble and terra cotta, brickwork, cement, stone, structural iron and steel, tile and gypsum fireproofing, steel sash and steel buildings, plaster, carpenter and joiner work, millwork, glass, roofing, sheet metal work, hardware, painting, plumbing and gas fitting, heating, electric conduit work, tiling, asbestos materials, dairy barns, silos and tanks, municipal work, tables of weights and measures. A handbook as complete as this contains a great deal of information about materials and their use, as well as information on how to estimate costs; the details of construction given are an added value. Published by the U. P. C. Book Co., Inc., New York City, and sells for \$6 per copy.

"Modern Theater Construction," by Edward Bernard Kinsila, 5½x7¾, 266 pp., 42 illus. A compilation of best obtainable data, interspersed with original ideas of author, who is an architect and theater specialist, intended to serve as a handbook of practical suggestions for the general reader and as a guide and reference for prospective theater owners, managers, architects, and builders in search of reliable information on this type of structure. Subjects covered include: A brief history of the theater, controlling elements, site selection, designing and planning, the stage section, lighting, motion picture theaters, safety, comfort, heating and ventilation, accoustics, construction, examples of theater architecture, original model suggested for very large theater, original model for a neighborhood theater, appendix with ordinances of the National Board of Fire Underwriters, and of New York City, governing details of theater construction. Contains photographic reproductions of exteriors and interiors of theaters and small scale floor plans of many. Published by the Chalmers Publishing Co., New York City, and sells for \$2 per copy.

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The submerged track slopes in the form of a bowl from 4½ in. in depth at the outer edge to 16 in. in the center. On the front rim of the bowl are two ramps for the car to enter and leave by. The bottom of the bowl is cleated in a corrugated form with solid concrete. At the center is a deep pocket covered with a grating; also intake and overflow pipes. The bowl is kept filled with water from the city mains.

The car owner wishing to have his car washed pays 25 cents admission fee to the attendant who straps a rubber cover over the radiator and the car owner drives his car in and around the basin until he is satisfied that the mud has been cleaned from the chassis and wheels of his car. The corrugations on the bottom of the bowl produce a vibration of the car sufficient to shake off the mud as the water loosens it.

When the car leaves the bowl it is stopped on the exit ramp and a number of nozzles are set to throw a spray which cleans off the balance of the dirt from the chassis and wheels.

Then if the owner of the vehicle wishes



Automobile wash bowl, St. Paul, Minn. A new type of structure for concrete contractors to build



Bumping over the corrugations on the bottom of the pool cleans the car at 25 cents a "swim"

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to have his car completely washed there are adjacent to the bowl a number of racks with showers, and for a small sum additional the car owner can have his car thoroughly cleaned and polished. It has been found that in this manner 300 cars in two hours' time on a busy Saturday afternoon can pass through the bowl.

Adjacent to the bowl one can have parking places, also oil and gas stations, tire and tube accessories, and the location of the bowl, it is suggested, would gradually become known as a place where tourists could come and shake off the dust of travel; get their cars washed, oiled, and greased; and make their toilet and generally refresh themselves with the facilities that can be established in connection with the bowl. Therefore structures designed to serve the following ends are possible adjuncts of a bowl: Automobile repair shop; service station; tire shop; barber shop; beauty parlor; cigar stand; drug store; restaurant; sporting goods; shoe shining; soft drinks, etc.

Under the concrete are placed 12 in. of gravel, cinders or crushed stone, thoroughly tamped or rolled in place. The concrete is mixed in the proportion 1:2:4. No gravel or stone larger than $\frac{3}{4}$ in. is used in the mix. The bowl is poured in radial sections, but to ensure water-tightness the curb wall and slab of each section must be poured continuously. In addition the concrete is waterproofed with a patent waterproofing material or with 8 per cent of hydrated lime. The slab is reinforced with round corrugated steel bars. The construction joints are sealed with asphalt.

The automobile wash bowl above described is patented and the company owning the patents proposes to sell the right to build one to any one having a suitable location. The contract requires the purchaser to construct the bowl according to the plans and specifications furnished by the Service Station Construction Co., St. Paul, Minn. The charge for a set of plans and specifications is \$1,000.

A New Type of Cement Block

THE photograph herewith shows a new type of block developed by the Studebaker Corporation for use in its housing project at South Bend, Indiana. It is a self ventilated adaptation of the McIntyre block in which there is a central dividing wall that provides a double air space when mortar is applied to the central wall when laying. Ordinarily these two air spaces are dead air spaces, with no provision made for ventilation or circulation.

There have been many arguments as to the relative value of circulating and dead air for building insulation, though no definite decision can be said to have been made.

By the use of the block illustrated both a dead air space and a ventilating air space

may be provided. In using these blocks, one course is laid a foot or two below the first floor joists, with the ventilating opening on the inside. The wall is then carried



The use of these ventilating blocks proved successful in preventing moisture on the inside walls

up to a point above the ceiling joists with regular McIntyre type blocks, another course of ventilating blocks being laid with the vent opening into the attic space. It is readily seen that this provides a number of air ducts from the basement to the attic, through which air may circulate. For convenience, the opening to the face of the ventilating block is covered with a metal grating which is cast into it.

To solve the housing problem for its employees the Studebaker Corporation planned to build about 1,500 houses of various types and designs. Some 208 of these houses were built, many different designs being used. In 80 of them these ventilating blocks were used.

The slack season in the automotive industry left many of these new houses vacant during an entire winter. Though no furring and lathing was used and though the plaster was applied directly to the inside block wall, it was found that it remained dry and was injured in no way by the weather. This would seem to prove the value of the ventilated air space for this class of work.

Another interesting feature of this same project was the use of cinder cement blocks. The use of ventilating blocks in these houses showed the same results. All but one of the cinder cement block houses were stuccoed. The one in which the block was left in its natural state, however, was in perfect condition when it was inspected the following season.

Motor-Truck Crane for Cellar Excavation

A CLEVELAND, Ohio, contractor, Peter Herkimer, has developed quite an industry as a cellar-digger through the use of a revolving crane mounted on a motor truck. With a clam-shell bucket on this crane it is possible to handle an ordinary cellar job very expeditiously. Dropping the bucket rapidly with the jaws open, as illustrated in one of the views, makes it possible to work in comparatively hard mate-



Motor-truck crane for cellar excavation, Cleveland, Ohio



Motor-truck crane dropping the clam-shell bucket to get a grip in hard material

rial. Of course pick-and-shovel men are needed to square up the corners and loosen up the most difficult places. While obviously not so efficient an excavating tool for this work as a small revolving steam



Know the lumber you buy

FEW PERSONS take time to give *personal* attention to selecting the lumber to be used in their homes. Yet they insist on their favorite brand of shirts or shoes because they know that brand means dependability and maximum quality for the amount spent.

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Each process of manufacture and each step in the grading is under the supervision of experts who work to a standard. Each log is cut for purposes for which it is best adapted. LONG-BELL Lumber is of uniform quality.

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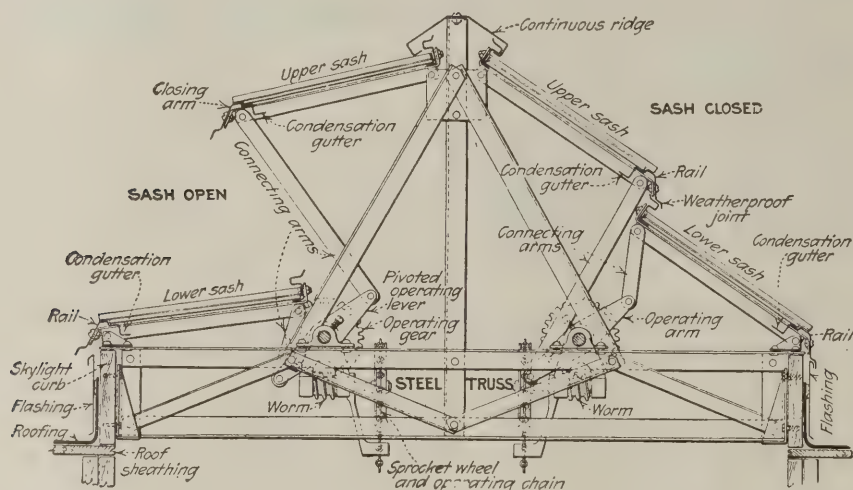
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shovel, its ability to be driven at high speed from one job to another, and the fact that it works outside the excavation appear to make it popular for this class of work in Cleveland.

Balanced Ventilating Skylight

STEEL-FRAME skylights having pivoted sash counterbalanced for easy operation and giving an exceptionally large unobstructed area when fully open form a recent development for industrial buildings in which fumes, steam or gases make ample ventilation essential. They are the invention of B. P. Blaski and are being introduced by McKeown Bros., Inc., of Chicago and New York.



From the drawing of the double-pitch skylight it will be seen that each face consists of two panels. The distinctive feature is that these two panels are hinged at top and bottom respectively and are so connected as to balance each other. When closed a weatherproof joint is formed. Interior condensation is collected by gutters on the sash. A rocking lever mounted on the skylight frame carries two connecting arms whose outer ends are pivoted to the two sash panels so that as one panel moves up the other moves down and the panels are thus counterbalanced. On the lever shaft is a worm wheel engaging a worm which is operated by a sprocket wheel and endless chain. In this way the panels can be moved readily to give any desired extent of opening and they will remain in position since they cannot overhaul the worm gear.

These skylights are made in four standard widths of 6 to 12 ft. and of any desired length, with all the sash movable or with alternate sections of fixed and inovable sash. They are shipped knocked down ready for erection and simple instructions enable any handy man to install them on existing buildings. For sawtooth roofs a somewhat different construction is used.—*Engineering News Record*.

Windproof Plate Glass Windows

NEW YORK and other large cities have had abundant experience going to show that the force of the wind is extraordinarily increased as it swirls about sharp corners and through narrow streets, and that no ordinary plate-glass window is safe against breakage in heavy storm. The trouble with the modern shop window lies in its size. A bridge of glass 12 feet or more in height and 20 or 30 feet between moorings has to support as a bridge the actual pressure of the wind; and, in addition, it has to withstand the shattering tendency of the vibration which the erratic gusts set up in the sheet itself. To meet the latter condition, which is regarded as the more serious of the two causes of

tar. This, of course, is far less than the wall will stand, and also quite a bit higher than it is ever required to sustain under ordinary use; the extra strength, however, is a good thing. If the excess is carried too far, a waste factor enters. It is no more logical to let a man do a boy's work than it is for a boy to attempt to do a man's work. The same reasoning holds true for mortar, so why use an excessively strong mortar for work in which lime mortar will most satisfactorily meet the requirements. Where is the waste? In the first place, a stiff, hard-working mortar is harder to handle and consequently slows down the mason. He is not to blame, for he has to use the material supplied. Then too, the cost of the material must be considered.

Lime Mortar Satisfactory

Lime mortar has been proved satisfactory, both in the laboratory and in the field. Lime has a high sand-carrying capacity, and is economical in first cost. The ease with which it is handled also makes possible appreciable saving in time. It works free under the trowel and clings to the brick when they are handled. If the brick are dry, a cement mortar is "killed," while with a lime mortar the effect is of minor importance. Where a particularly strong wall is needed, excellent results are obtained by using equal parts by volume of lime and cement.

Cold weather is approaching, and that always means a slowing down of work unless suitable materials are provided. When a man's hands get cold, it is especially hard to handle a "short" mortar. If, however, the mortar is "fat," work proceeds without interruption, because the mortar works easily enough to overcome the stiffness caused by the low temperature. Very little brickwork is done during freezing weather, but, when it is done, it is highly advisable to use a high percentage of lime in the mortar.—*Construction Lime News*.

Figures on Truck Longevity

HOW far will a good truck run before it is ready for the scrap heap? Figures recently issued by one of the leading truck makers show that 400 of his trucks have already run 300,000 miles or more; 5,200 have run from 200,000 to 300,000; 10,700 have gone between 150,000 and 200,000 miles; and 17,000 have covered from 10,000 to 150,000 miles, and all these trucks are still in service. A truck, like any detail of machinery equipment, must be properly taken care of—not petted or pampered, necessarily, but given the care and attention which an intelligent owner would expect to give any important mechanical detail of his business, but which for some vague, unexplained reason, he often seems to think is not required by the motor truck.—*Improvement Bulletin*.

Brick Mortar

IN order to lay a large number of brick per day, the bricklayer must be supplied with a "fat" mortar. It is not fair to criticize the workman for being slow when he is not given materials that will help him in an honest endeavor to show quantity as well as quality production. The critic who merely calls attention to the total number of brick laid per day, without taking into consideration the various effects of type of mortar, class of work, or weather and other working conditions, is not being fair to the public nor to the workman.

Building Code Allowances

Practically all city building codes allow a load of one hundred pounds per square inch on walls laid up in straight lime mor-

The Strongest Board-form Insulation on Earth



Studio Building, Cass and Superior Sts., Chicago
CELOTEX used for Roof insulation

CELOTEX
INSULATING LUMBER

CELOTEX For Roof Insulation

TEMPERATURE insulation is now recognized as an essential factor in all modern construction. CELOTEX Insulating Lumber is *board-form* insulation which is applied directly to roofs, walls and ceilings. Thus used, CELOTEX reduces the amount of fuel consumed for heating purposes approximately one-third.

CELOTEX Insulating Lumber is made from cane fibre. It is firmly matted, interlaced and felted into a tough, rigid insulating board. It is *not* built up of layers, but is of uniform structure throughout. CELOTEX shuts out winter cold and summer heat.

The DuPont Engineering Company recently subjected CELOTEX to the most rigid tests to determine its value as a roof insulation against heat and cold and in positively eliminating atmospheric condensation. As a result they are using eight carloads of CELOTEX to insulate the roof of their silk mill at Buffalo, New York.

Complete tests, conducted by other leaders of industry, have converted them to the use of CELOTEX in various forms of building construction.

Write for complete information including engineers' tests, specifications, samples, testimonial letters and other literature.

Use CELOTEX for sheathing, plaster base, sound deadener, exterior and interior finish.

THE CELOTEX COMPANY

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Hollow Tile for Cellar Walls

HOLLOW, clay tile blocks, laid as illustrated, appear to be the standard method of cellar wall construction for small houses in Cleveland, Ohio, and suburbs. The blocks are 4x8x12 and the outside blocks are laid on the 8x12 sides, while the

A Built-in-the-Wall Mail Box

B. F. PENNIG, a well known and experienced builder of St. Paul, Minn., has invented and placed on the market a built-in-the-wall mail box, which seems to fill a long-felt want.

The box is made of galvanized iron and

composite box, or series of boxes for apartment houses. Since the original box was developed a great improvement has been made in so manufacturing them that they are adjustable for various wall thicknesses.

The box is large enough to receive magazines and newspapers, as well as letters. The space required to install a box for a single house is 12x26x3½ in. (the last dimension being varied according to the character of the wall construction). The prices of the boxes range from \$6 to \$15.

Mr. Pennig has adopted the trade name "Mailo-Box" and the company organized to make them, of which he is the general manager, is known as the Penn-Greg Manufacturing Co., which has just completed a new factory at 809 University Ave., St. Paul, Minn.

Cutting Siding to Irregular Surfaces

IT is quite annoying to have to cut a lot of siding to a tight fit against such irregular surfaces as concrete block columns, stone work and fancy pilasters. A handy method which has been used for some time by a veteran carpenter is shown in the drawing. It consists of nothing more than a length of wire solder fastened to the end of a guide board by two or four staples. The staples are not driven in tight, but are loose enough to permit the sliding of the



Cleveland house foundation made of hollow clay tile



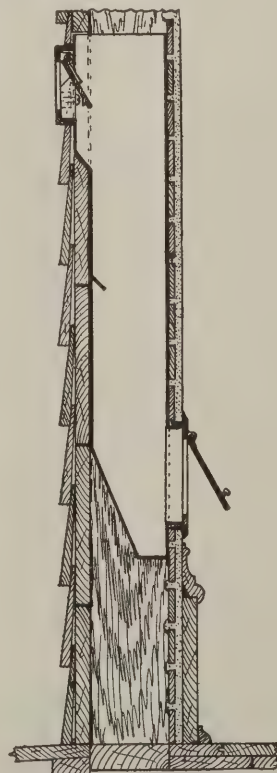
Method of laying hollow-tile cellar walls in Cleveland, Ohio

inside ones are laid on the 4x12 sides. This makes it possible to break joints between the inner and outer parts of the wall.

The exterior face of the wall is waterproofed by giving it a plaster coat of cement mortar, over which is a paint coat of asphalt, or similar mastic waterproofing.

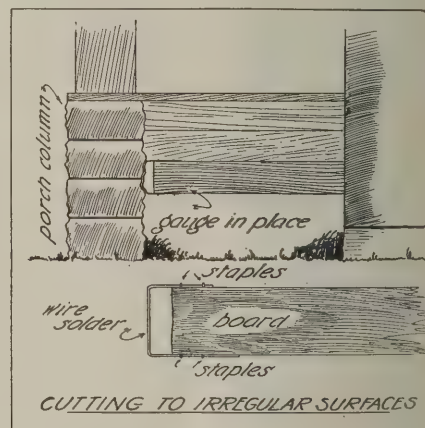
Another Built-in-the-Wall Mail Box.—O. O. Kolstad, Duluth, Minn., announces that he has placed on the market a built-in-the-wall mail box that obviates all the disadvantages of the old-time system.

is built into the wall of the house or apartment. Mail is dropped through an outside slot and is taken out through a door on the inside of the wall, as the cut herewith shows.



Built-in-the-wall mail box

The box is made in four different sizes and trims for ordinary dwelling houses, four sizes for duplex or double houses, and a



work back and forth. The guide board is of the same length, less an inch or two, of the work being cut. Then all that is necessary is to fit the board, slide the wire out until it touches the irregular surface, force the wire to the surface either with the fingers or a light hammer and then use this as the pattern.

The drawing shows a sample case wherein the method is extremely valuable. The wire solder is so soft that it can be readily moulded to the most irregular surface often encountered. If the other end of the guide board is cut to match the work to be fitted, all that is then necessary is to lay the guide over the other and take the measure.

The idea may lend itself to other problems.

Better Business for Builders

"The biggest thing in construction in years"—that's what many say of the Ideal All-Rolok Wall idea!

Most people want and admire brick homes. In the past the extra cost has forced them to be satisfied with frame.

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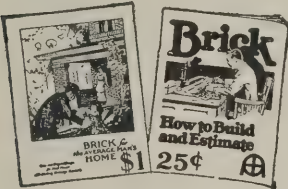
That builds reputation for you—reputation that will keep you busy when others think business is dead.

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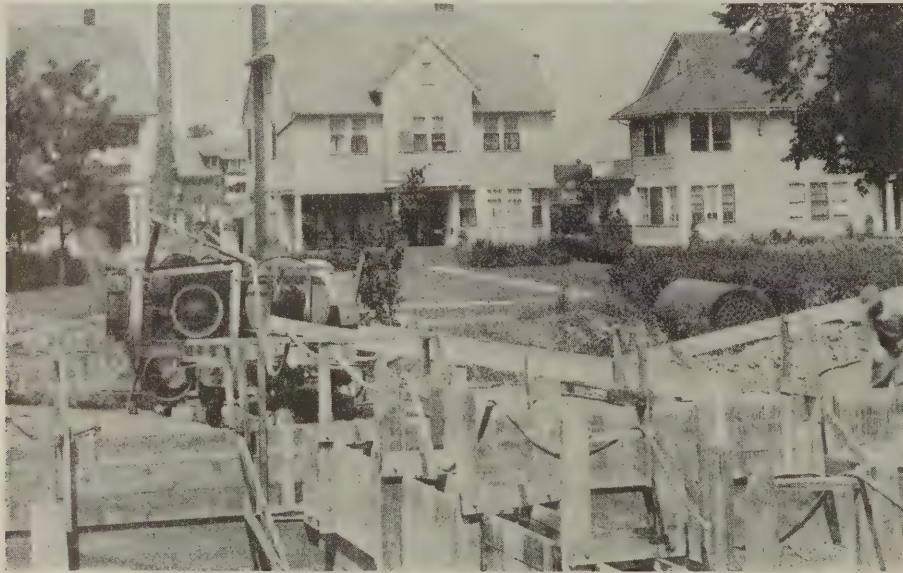
Ideal Brick Hollow Wall

"Brick Homes at the Cost of Frame"

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Placing Concrete by Gravity in Cellar Walls

IN large reinforced-concrete building work placing the concrete by gravity chutes is, of course, the customary way, but in the case of small-house cellar walls it is evidently taken for granted that the old-fashioned wheel barrow method is the only thing. The view shows how one contractor in Cleveland, Ohio, met the problem.



Placing concrete by gravity in cellar walls

Instead of wheeling the wet concrete around he raised the mixer so that it would discharge by gravity to a central chute and thence to distributing chutes. Unfortunately he did not incline the chutes enough for the wet concrete to run without the help of a man with a hoe. The aggregates were rolled up an inclined plank in wheel barrows to the mixer hopper. The view offers the suggestion, however, that it might pay a contractor to try out the gravity system of placing concrete even on a small job. With a small crane or elevator to feed the mixer, it could undoubtedly be placed high enough for all the concrete to flow to the forms by gravity.

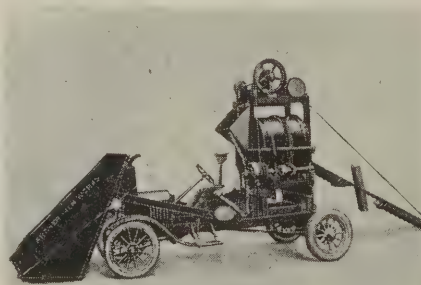
Oxy-Acetylene Torch Clips Off Bars

GETTING rid of the projecting ends of reinforcing bars when finishing concrete work often proves a tedious sort of job, but a New York contractor has solved the problem most effectively. One of the men arms himself with an oxy-acetylene torch, says *Successful Methods*, and attacks the projecting bars. The torch clips them off in a flash and he moves along with only a moment's delay for each operation. This method, in addition to its speed, has the advantage of clipping off the bars flush with the concrete without injuring the concrete itself in the slightest degree.

Combination Ford Truck and Concrete Mixer

A NEW development in concrete mixers is announced by the Archer Iron Works, Western Avenue and 34th Place, Chicago, in which the type of mixer illustrated is mounted on a Ford truck chassis and provides greater power than mixers of equal capacity, the power being taken from the Ford motor and the full power of the Ford

engine made available for operating the mixer. The mixing drum is the company's standard one-bag mixer, and the machine can be operated from the driver's seat or



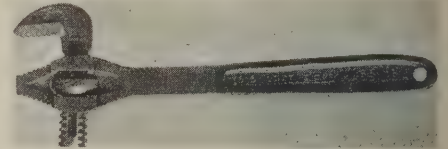
Combination Ford truck and mixer

from the ground. It is equipped with side-loader, automatic water tank and 9-ft. chute

with gate openings as standard equipment. The machine is also furnished as a low-charging mixer. The portable character of this mixer makes it economical for both the large or small contractor. The former will find it advantageous in finishing up-work and the latter will find it cuts down costs owing to its portability to and around the job in addition to its low price, convenience and capacity—100 to 150 yards of wet mix per day.

An Improved Pipe Wrench

A N improved pipe wrench has been introduced by the Greenfield Tap and Die Corporation, Greenfield, Mass., under the trade name of the "Little Giant," in sizes 8, 10, and 14, 18 and 24 sizes to be



A positive pipe wrench

added later. The illustration is almost fully explanatory of the claims for the positive character of the new wrench which, it is said, makes it capable of handling pipes in corners, close to walls and other confined places. The manufacturers point out among other improvements that there are only three parts and no springs, rivets, frame or pins. There is a double set of teeth on the main jaw and the movable jaw can be engaged with either of these at will, thus adding to the life of the teeth. On the larger sizes, 14 in. and greater, two additional sets of teeth are provided, and the movable jaw can be reversed to engage these. Owing to the elimination of extra parts the new wrench, while meeting the most severe prescribed tests for strength, is of less weight than the conventional standard wrenches of the same capacity.

Home Made Cements

HOW often have you wished for a good cement for wood, marble, metal, or glass? It is not necessary to buy a high-priced article, for such a cement may be very easily prepared from material that may usually be found in the house.

Take four parts of fresh curd from sour milk and mix it thoroughly with one part (by volume) of hydrated lime. If hydrated lime, which is a dry powder, is not available, it may be prepared by slaking a little fresh quicklime with just enough water to make it crumble and form the dry powder. As this cement sets very rapidly, only a limited amount should be prepared at any time.

Before applying this cement to wood or marble, it is advisable to coat the surface with a solution made by dissolving some

in the Saturday Evening Post on BEAVER BOARD!

Beaver Board



MRS. WILL BROWN made her husband's life miserable till he promised to have the bathroom done over. They used that special tiled Beaver Board. It didn't cost much, but Mrs. Brown is delighted.



GEORGE HARTER, of Harter & Son, furniture manufacturers, not only has Beaver Board on the walls and ceilings of his plant, but uses it for backs of bureaus and mirrors, for folding screens and in other ways too numerous to mention.



AN UNTIDY KITCHEN was the bane of Mrs. Watt's existence until she conceived the idea of having the walls and ceiling covered with Beaver Board. Now, the kitchen is the pride of her heart. And she says you'd be surprised to know how little it cost.

IN EVERY TOWN there are innumerable uses for Beaver Board. Doubtless you, yourself, have some construction or repair work in mind for which this versatile material can be used much more economically and satisfactorily than ordinary lumber.

A partial list of the ways in which Beaver Board can be used is given below. Read it and see if it doesn't suggest something to you—some new addition or improvement you have been putting off, some repairs you have been postponing—because you feared the cost.

Genuine Beaver Board is a wonderfully economical material. It is flawless, knotless, manufactured lumber—made from the long, tough fibres of white spruce. And it comes ready for use in panels that are sized by our *patented Sealrite process*, which makes a perfect surface for painting and decorating.

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BOARD



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THE OTHER PART of the answer is the campaign to follow. There are more big pages in the Saturday Evening Post—and a striking series for newspapers. Then, there is a well-planned campaign for your tie-up. All are based on the one big idea—more sales of Genuine Beaver Board right away! If you aren't a Beaver Board dealer now—wire or write for full details of our dealer proposition. It will interest you. Prompt delivery.

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curd in ammonia or borax solution. This will fill the pores and make the cement stick better.

Powdered quicklime, mixed to a paste with white of egg also makes a quick- and hard-setting cement which is suitable for use on such materials as ivory, marble, glass, porcelain.—*National Lime Association Construction News.*

A Shingle Baler

LOOSE and waste shingles may be retrieved and bundled with a simple and comparatively inexpensive shingle baler is the announcement of the Johnson Mfg. Co., Kelley, Iowa. The illustrations of the baler shown herewith indicate its practical economy.



Typical pile of broken shingle bundles



Assembling the shingles in baler



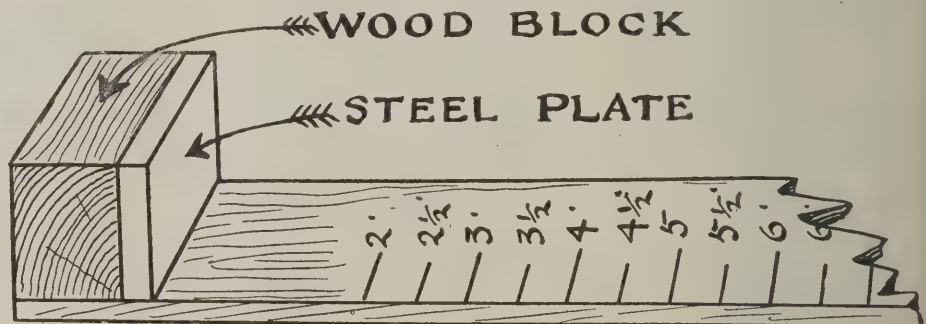
The bundle completed and the screws pressing the shingles together so that bands may be nailed to cross pieces



The bundle tied, neat, tight and as salable as originally put out by the mill

Device for Rapid Sorting of Mixed Lengths of Flooring

AMONG the various devices for saving labor used by the Herman H. Hettler Lumber Co., Chicago, Ill., according to the *American Lumberman*, is a long board, having marked off on it lengths in half-foot



A time and material saver

units, as indicated in the illustration. Lengths of flooring are shoved against the block at the bottom and consequently the one who is bundling the material can tell by glancing at the mark at the other end of the bundle just how long the board is, and can easily mark down the number of lineal feet in it. Such a device is susceptible to uses for various kinds of short length lumber, and should be a great help in keeping both yards and shops tidy and the material records accurate.

Texture on Artificial Stone

WALTER O. LLOYD is a contractor and builder of Poughkeepsie, New York. On his work he has occasion to use a considerable amount of concrete sills and artificial stone and the method he uses to obtain a high class finish is described in *Successful Methods*. When mixing the concrete he places granite or marble chips made up with white Portland cement in the facing to a depth of about two inches. After curing, a stone cutter pitches the rock face, which brings out the texture and gives a pleasing appearance.

Waterproofing and Damp-proofing

THE builder should, as a means of insuring a dry cellar, always place upon the surface of the wall—be it of brick, concrete or stone—the kind of waterproofing or damp-proofing necessary. It is a matter of comparatively slight expense to do this at the time of construction but if neglected until the damage is done he will have not only an expensive and difficult operation, but a dissatisfied customer.

Brickwork bonds excellently with any kind of waterproofing. The best joint to use for the purpose is a rough cut joint—the cheapest joint that can be formed—for to make it the bricklayer simply cuts off with one motion the excess mortar squeezed out beyond the face of the wall. The struck joint does not provide the flat surface, flush with the brick, that the rough cut joint affords, upon which to place the

waterproofing. Brickwork has the advantage of drying out quickly; waterproofing can in fact be placed upon it with safety as soon as the wall is built. In using any kind of waterproofing the greatest care should be taken to see that the surface to which the waterproofing is applied is absolutely dry. Stone walls must be plastered on the outside to provide a smooth surface upon which the waterproofing can be placed. Sometimes a rubble wall is built without this precaution, the rough exterior surface allowing the penetration of moisture bearing earth into its joints, and this may lead to a damp wall. The same criticism holds good regarding concrete that is poured directly against a bank of earth with forms on one side only. For a satisfactory wall it is quite as important that the exterior face be laid up to an even surface as the inside.

If a head of water is encountered waterproofing must be made heavier and more elaborate. It must, in fact, extend under the whole area of the cellar floor, through the walls and up the sides to form practically a tank. The waterproofing under the floor must have over it a sufficient thickness of material so that the pressure from below will not force it up.—*Improvement Bulletin.*

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Kicks and Compliments

A WELL-CONSIDERED constructive kick is worth a bushel of compliments. Compliments make you feel satisfied with yourself and your doings and like many other pleasant things is not good for you in the main. The best compliment is the good word that is passed to somebody else about you, but the kicks are what you need mostly to keep you up-and-coming.

* * *

That is why we dearly like compliments coming from the right angle—a triangle—but we do appreciate kicks. There are kicks and snarls. A snarl is an expression of an in-growing grouch and is not constructive, while a kick has a real reason—why behind it—usually.

* * *

We are out on the job nearly all the time looking for the best things to interest our readers. Suppose you were sending a man to look up some facts on building for you, what would you tell him to look for? Well, we are the man. We are guessing as nearly as possible what you want. If you don't get what you want, KICK. You would kick if the imaginary fellow didn't bring in the bacon that you sent him after, and you would have a good right because you are supposed to have told him what you wanted. Suppose while you are getting ready to kick that you tell us what you are wanting us to obtain for you.

* * *

Here is a compliment fresh from the West: Will R. McDaniel, building contractor, Bristow, Okla., sends it. He says: "The only kick I have regarding 'National Builder' is that someone borrowed my May, 1922, issue and failed to return it, and knocked a h—l of a hole in my file that I have kept for the past four years. When I hit a stump I spend a few minutes running through my file of 'National Builders' and can always find what I want."

* * *

We want to more fully deserve what Will R. says. There are new ideas, new ways, new things coming up all the time. New wants, breaking new ground and raking over old ground. Get busy with us.

* * *

And by the way, have you started your file of "National Builder" yet? Don't wait with the expectation that we can send back numbers to you. Get in now and keep it up. Remember, it is \$2 for one year and \$3 for two years. Think of twenty-four books like this recording the results of investigations in the building field and travel of many thousands of miles in your interest—all for \$3.00. Do it now.

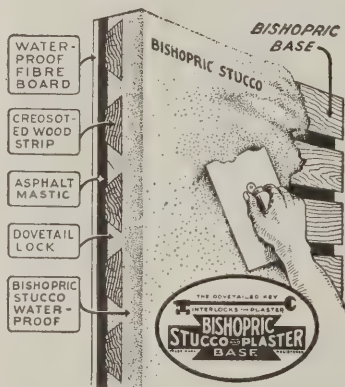
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Residence A. B. Headley, Esq., 1450 East Ave., Rochester, N. Y.
Architects, Foote, Headley & Carpenter, 401-403 Carter Building, Rochester, N. Y.
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Number 10

The Situation

PRICES are high but money is cheap and plentiful. September statistics of the building industry, when they are assembled, will undoubtedly show a very considerable falling off from the August figures, which were only 8 per cent below those of July.

Contracts awarded in 27 northwestern states during August amounted to \$322,007,000, according to the F. W. Dodge Co. This figure was 46 per cent over that of August, 1921. That a seasonal decline has set in after four months of unprecedented activity and that the decline is so slight would seem to be a most wholesome indication for the remainder of the year.

The August figures brought the total for the year to date up to \$2,362,872,000, which is not only the largest figure for the first eight months of any year but is greater by \$7,000,000 than the total for the entire year 1921. Comparing this year with 1921 on the eight months basis, this year is 58 per cent ahead.

The outstanding feature of the August statistical statement is the increase in industrial plant construction, which amounted to \$67,373,000, or 21 per cent of the month's total. This is the largest monthly figure for this class since March, 1920. One project accounted for \$35,000,000 of this large total, the by-product coke plant of the Carnegie Steel Co., near Pittsburgh. Even omitting this large single project, the remaining amount is greater than any monthly total since November, 1920.

Residential building still maintains the lead in August, with \$100,882,000 worth of contracts, or 31 per cent of the total. Public works and utilities amounted to \$49,825,000, or 15 per cent; business buildings, \$38,122,000, or 12 per cent; and educational buildings, \$32,055,000, or 10 per cent. Contemplated new work reported during the month amounted to \$371,249,000.

Present conditions favor an increase in industrial and commercial building rather than residential construction. Industrial and business buildings can make use of low-priced money to good advantage even though building commodity prices are high, and in many instances the prices of building ma-

terials used in such structures have increased less than house-building materials. In Chicago, prospective home purchasers have been advised to delay their construction work because of the rapid increase in construction costs, estimated at from 15 to 25 per cent. The advice was given by the citizens' committee to enforce the Landis award.

The increase, according to General Manager Fred W. Armstrong, is due to a number of factors, not the least of which are the recent price increases in lumber, glass and other important materials entering into the building of homes and apartment buildings.

"The estimated increase of 15 to 25 per cent," said Mr. Armstrong, "is based on statements made by Landis award contractors experienced in this type of construction. As a matter of fact, it is highly conservative.

"In one instance reported to the committee, bids made recently on a proposed apartment building were nearly 100 per cent higher than those obtained in March. Common dimension lumber, according to a recently obtained estimate, is now at \$50 a thousand. The war-time peak ranged from \$54 to \$55. Glass is soaring and practically every item with the exception of common brick is on the upward trend.

"More homes are still needed, but they are of the type of apartment which will rent for \$50 a month or less, or for bungalows which will sell for a monthly expenditure of about that amount when taxes and fuel are added.

"Home and apartment building on a rising market will not remedy this situation. Indeed, it will be aggravated, for the day will be postponed when the man on a small salary will be able to rent at a figure somewhere in proportion to the amount contained in his weekly pay envelope. A great surplus of apartments which must rent at high figures if a just investment return is secured will be of no benefit to him."

In California and in Texas and other sections of the country where weather conditions will not affect winter building a great

deal of activity in house building is reported. In Oklahoma and other oil-producing sections the construction industry is in a very prosperous condition. High prices of materials and low prices of agricultural products, however, are delaying much farm building that would otherwise be undertaken at this period of the year. Although most crops this year are large, prices apparently are going to be all out of line with the prices of manufactured products; and the farmer fully realizes his disadvantage in this respect. Lumber manufacturers estimate that 50 per cent of the lumber consumption of the country is used by farmers or in rural communities, so that the decreased buying power of the farmer is a serious matter to the majority of country building contractors.

As might be anticipated in a declining market for construction work, labor controversies are few and far between. The majority of building trades mechanics no doubt realize this is a poor time to press their alleged grievances. However, there is less prospect of any radical reductions in building trades wages than there is of a rise in the wages in other industries to somewhere nearly equalize the price of labor generally. One of the most interesting items recently published is a compilation of wage changes reported from every field of industry in all parts of the country in the last month. The compilation was made by the National Industrial Conference Board and shows a striking nation-wide upward movement in wages.

"This movement is in strong contrast to the situation in the preceding month, from July 15 to August 15, when wages reached an equilibrium with few changes reported and increases about matching decreases," the board says. "The following table fairly reflects, in the increases and decreases reported, the wage movement in the last few months:

	Re- ductions	In- creases	Total changes
April-May	54	9	63
May-June	23	26	49
June-July	25	21	46
July-August	7	8	15
August-September	4	119	123

"Real American" Architecture Adapted to a Subtropical Climate

J. W. Northrop, Jr., Architect, of Houston, Texas, Has Helped by Good Designs and Proper Provision for Ventilation to Popularize the Middle Atlantic Colonial Style of House in the South—Developing a Whole City Block as a Co-operative Proposition

OF course most of us differ as to what is "real American architecture," but whatever it is, it deserves to be cultivated. And from every indication of the tremendously growing popularity of the "colonial" type house this is one real American style of architecture, the advantages of which are being widely appreciated.

"I think these pictures and floor plans will substantiate my contention that real American architecture (for there is such a thing, despite the claims of some supposedly well-informed people to the contrary) is as well adapted, or at least can be as well adapted to the climate of this part of the country (southern Texas) as the architectural forms borrowed from Italy, Spain, England, or the ancient Greeks and Romans." So speaks J. W. Northrop, Jr., architect, of Houston, Texas, and his work there certainly has done much to bring about an appreciation of the American colonial styles in the face of much competition with the present extreme California bungalow styles.

Proper Setting Most Important

Mr. Northrop says: "The *real problem* in this climate is one of orientation, and of securing to every possible room a maximum of exposure to the prevailing southeasterly winds, and of placing openings of

ample size and so arranged as to provide for all possible cross drafts. A large



J. W. Northrop, Jr.

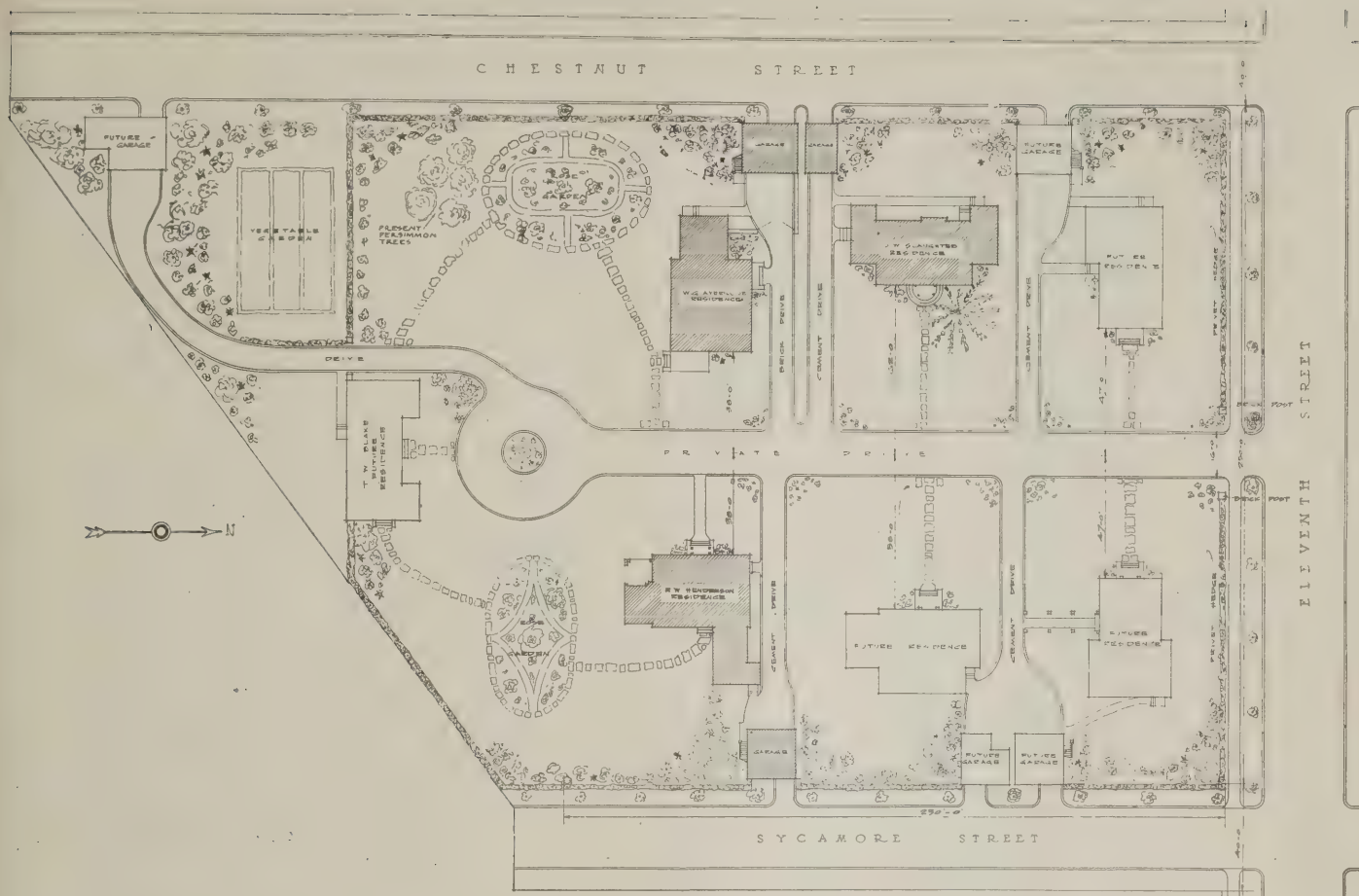
number of my houses have west fronts, which is considered the least desirable exposure in this climate, or locality. Yet, by making the houses narrow, or by putting out a wing on one or both ends, as is done in the Henderson, Pratt, Miller, Caldwell, Kendall and Daniell houses, every important room in the house is provided with some southern or eastern exposure.

"This west exposure is what makes some of my work look a bit severe; but porches, to be of any value or comfort in this locality, must be on the south or east sides. And when these can be so arranged, what type of house architecture could be more fitting and desirable than that developed by the "middle South" colonists of Maryland and Virginia?

"Colonial (or better *American*) details are the most refined that can be found in the residence work of any nation of the world, with the exception of early Greece and Rome, whose architecture was developed almost entirely on stone buildings of a monumental nature, so why not develop and preserve our native traditions of architectural form instead of borrowing from other countries which have not developed the grace of line, the delicacy of detail nor the adaptability of plan that our own native architecture has?



A community development in Houston, Texas



Plan of the community development



R. W. Henderson residence—one of the community development houses

"I make this plea for preserving our native traditions in architecture after seeing, beyond a doubt, that they can be adapted to any part of the United States, and can be worked out in plans that are as livable, and probably more livable, than the French chateaux, Italian villas, Spanish bungalows, etc., with which our American cities are now being cluttered up."

Mr. Northrop, who makes this eloquent plea for a revival of "American" house

architecture in a section of the country where for a time there was danger of its extinction, is a New England man, born in Bridgeport, Conn. He was graduated in architecture from the Massachusetts Institute of Technology in 1910. After graduating from Tech. he entered the Boston office of Cram and Ferguson, architects of the Rice Institute buildings at Houston. By them he was subsequently sent to Houston, where he remained in their employ for

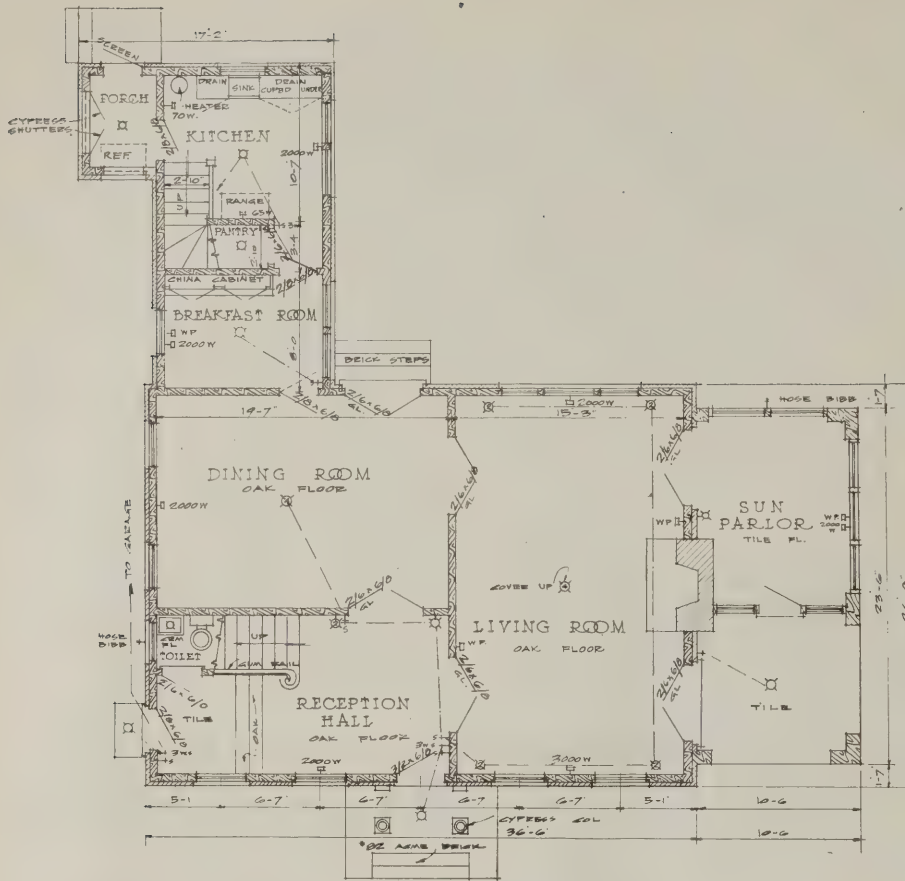
eight years. Recognizing the possibilities of this rapidly growing Texas city he decided to settle there and practice what he has preached in the foregoing quotation. He has also designed a number of apartments and commercial buildings.

Community Development

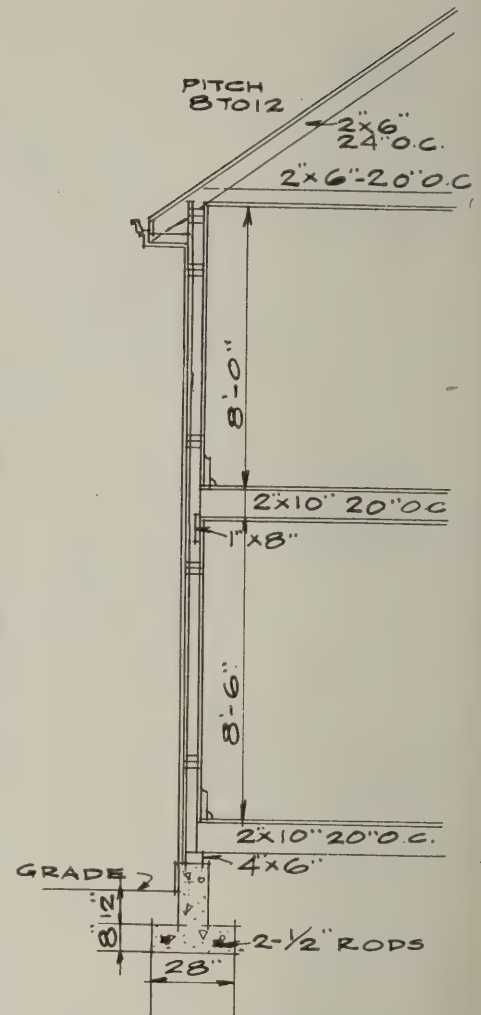
In 1920 Mr. Northrop was able to do something that doubtless will be done more



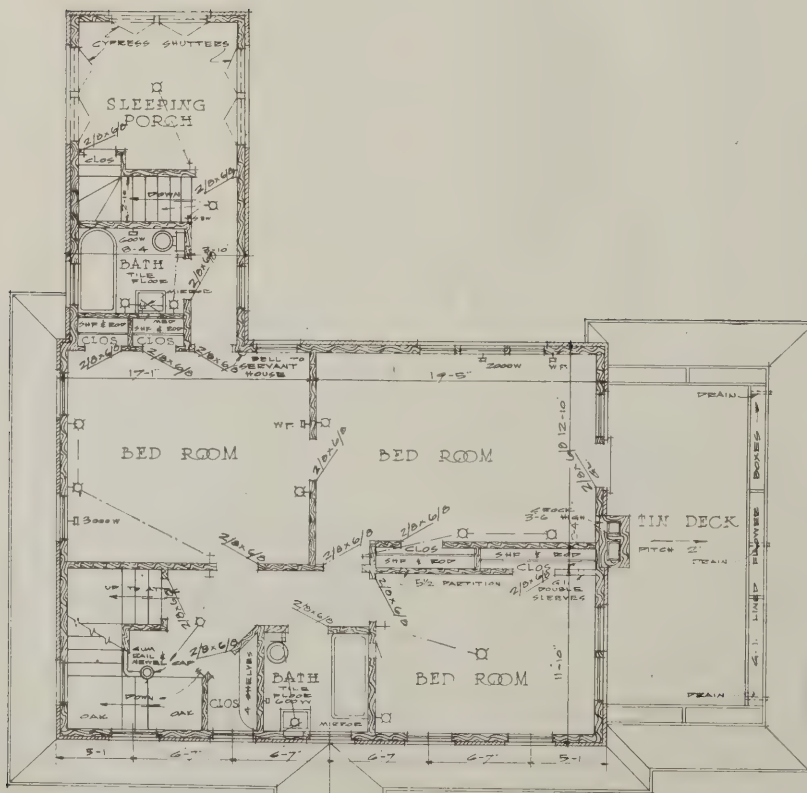
Fireplace detail of the R. W. Henderson residence. Plaster walls are tinted with mineral pigment in the finish coat



FIRST FLOOR PLAN



WALL SECTION



SECOND FLOOR PLAN

Plans of the Henderson residence

and more by the architects and builders of the future. This was the development of an entire city block, 250x240 ft., as a co-operative proposition of a group of clients. The advantages of this for high class residential districts is so obvious that commercial considerations alone will eventually bring home owners and professional builders, or real estate developers, to adopt the same idea.

The city block in question was laid out by the architect according to the accompanying plan. This plot of land was divided to accommodate seven residences, grouped around a private driveway and developed in such a manner as to form an attractive community unit. To avoid the noise and dust of a constantly increasing automobile traffic along the adjacent streets, the houses were arranged to back upon the city thoroughfares and the garages and servants' quarters were made to face these streets, which are used by the owners only for service and deliveries. But owing to the design of the buildings and the careful placing of the garages this scheme has not resulted in detriment to the surrounding property.

The method of laying out this city block is interesting and contains many practical

suggestions for the subdivider of high class residential property.

How the Community Scheme Was Organized

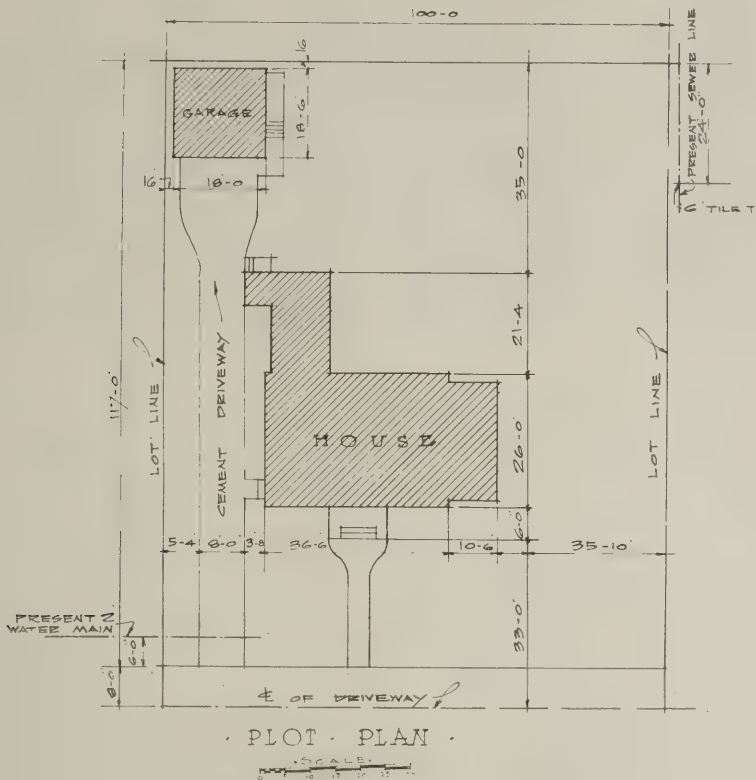
The details of the arrangement and

the equity in order that the group could acquire the entire block. The plot was then laid out into seven building sites, as shown on the accompanying plan. Four of these buildings sites were selected by the four co-operating owners, leaving three to be ultimately sold to others who might wish to join the colony and were acceptable to the original four.

Three of these who wished to build their homes immediately, then paid off their proportions of the blanket mortgage necessary to purchase the land, in order to clear their own lots, leaving only a first mortgage on the sites not to be built upon at once. Under the Texas homestead laws it is difficult to obtain home-building loans, as they are known in the North, and in this case the three prospective home owners arranged to invest sufficient cash to pay for the houses as they developed.

The project of building these three houses was placed entirely in the hands of the architect, and under his supervision separate contracts were let for the development of the land, including grading, curbs and gutters, and the necessary extension of sewer and water service lines to the several building sites. A central concrete drive and driveway returns were laid out and brick and stone piers were erected at the entrance to the block. The cost of these improvements was prorated among the seven building sites, into which the original block was divided.

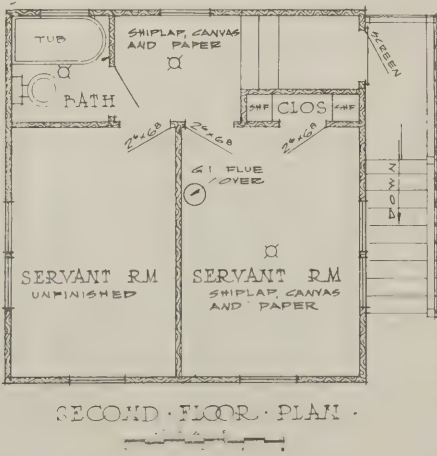
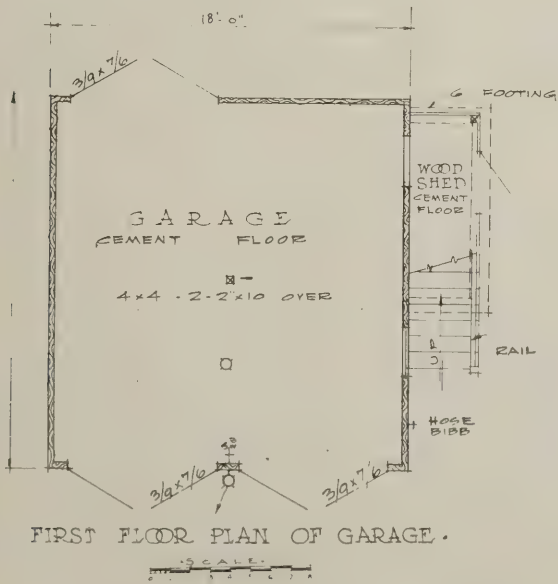
Separate plans and specifications were, of course, made for each of the three houses to be erected, and competitive bids were taken on each so that a separate contract



Plot plan for Henderson residence

part of the future home owners was found in the possibility of thus providing a large tract of land to be handled as a unit, and

financing in this case were as follows: There were four owners who were interested in building on this property. No

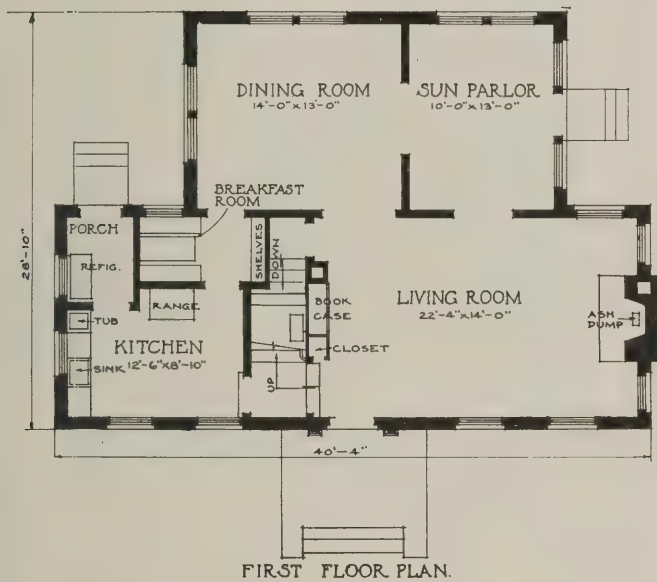
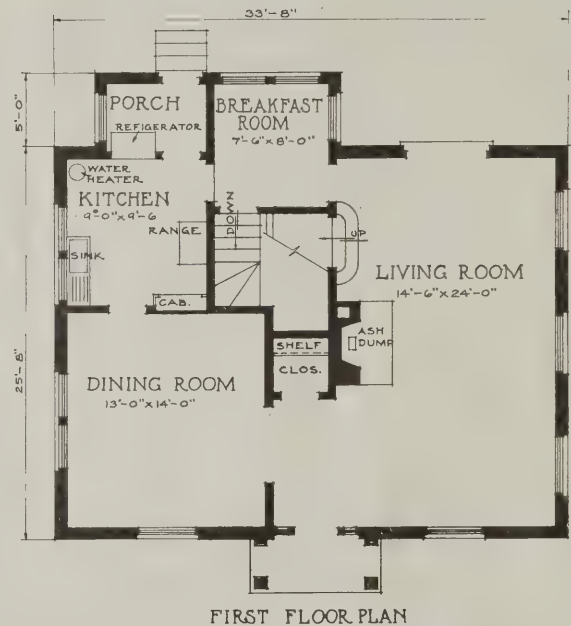
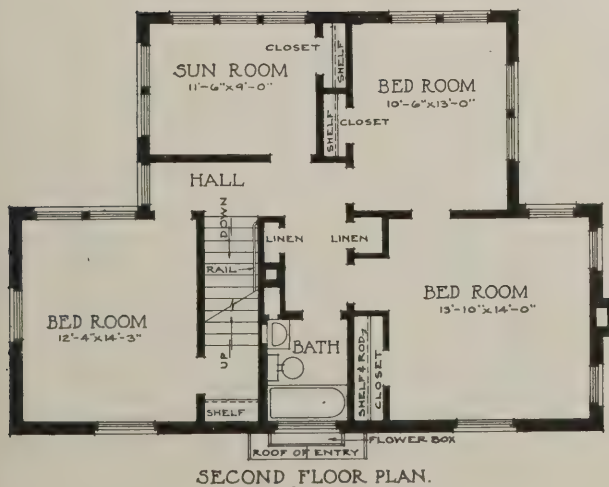
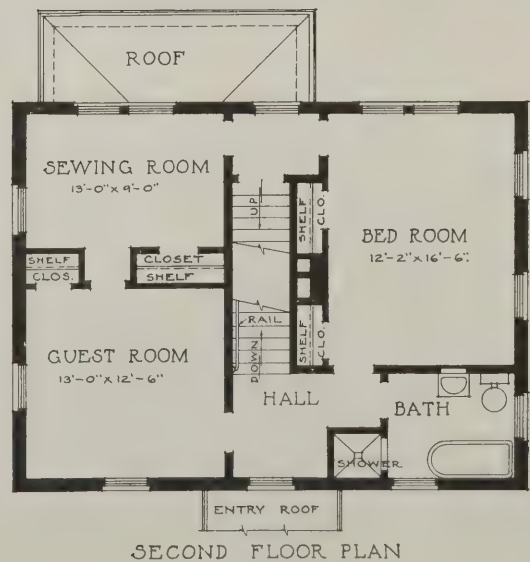


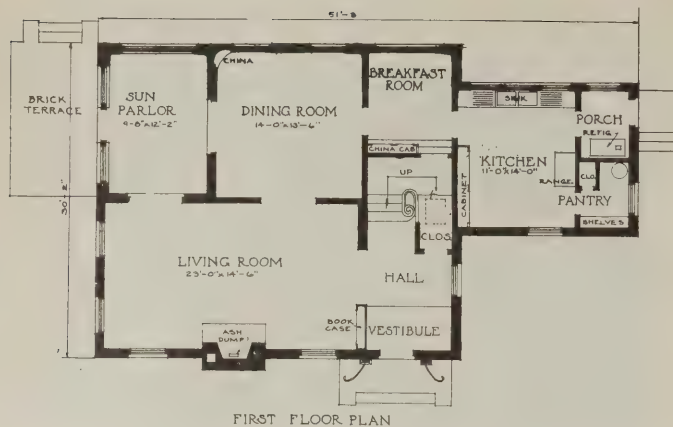
Plans of Henderson garage and servants' quarters

of arranging it so much the more attractively and conveniently for those who planned to build houses on it.

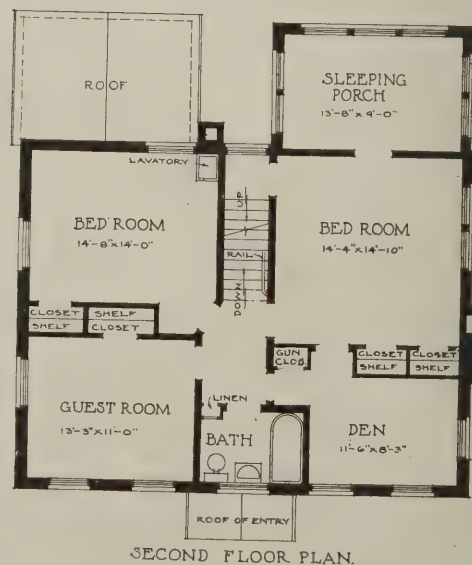
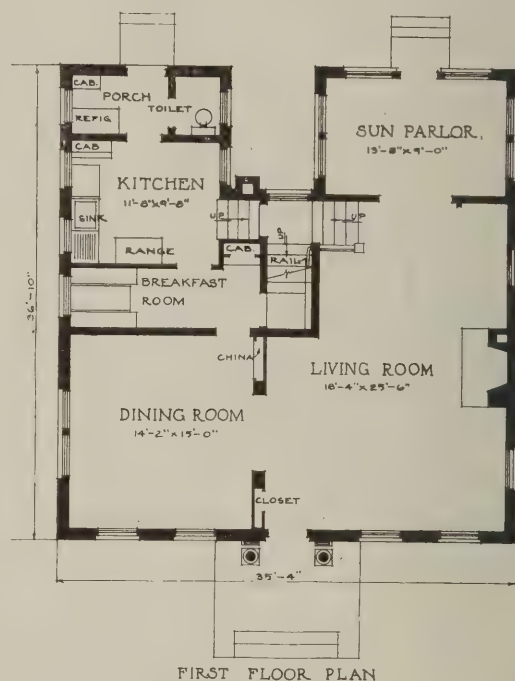
company was formed for the purchase of the land, but each of the four owners agreed to furnish one-fourth the cost of

could be let to the lowest reliable bidder for each house. It was found that the method thus out-

*Paul B. Miller residence**R. A. Conselyea residence**Paul B. Miller house**R. A. Conselyea house**Paul B. Miller house**R. A. Conselyea house*



Plans of residence of W. C. Averill, Jr. See elevation No. 7, page 36, of Style Sheet



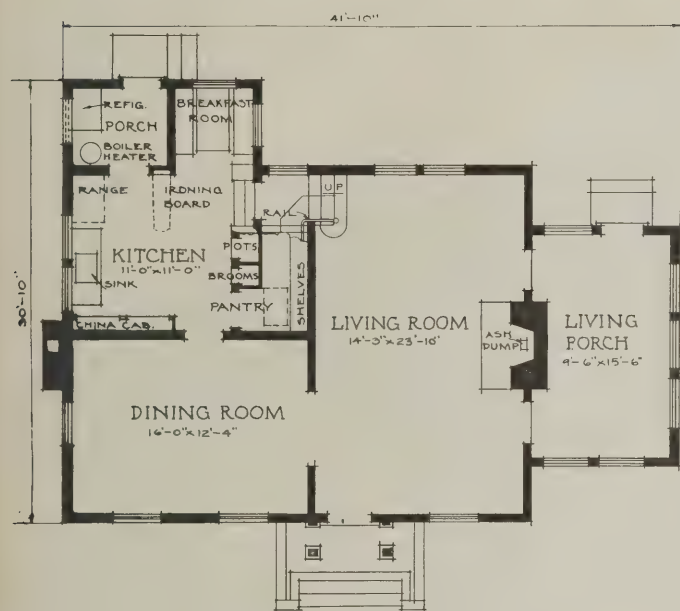
Plans of house for W. H. Hogue. See elevation No. 10, page 37, of Style Sheet



Residence of A. L. Dingle

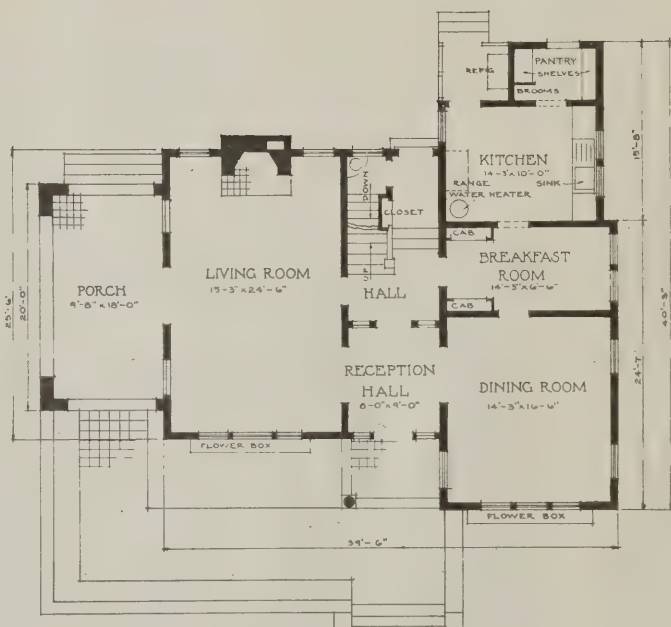


Residence of E. T. Rinehart



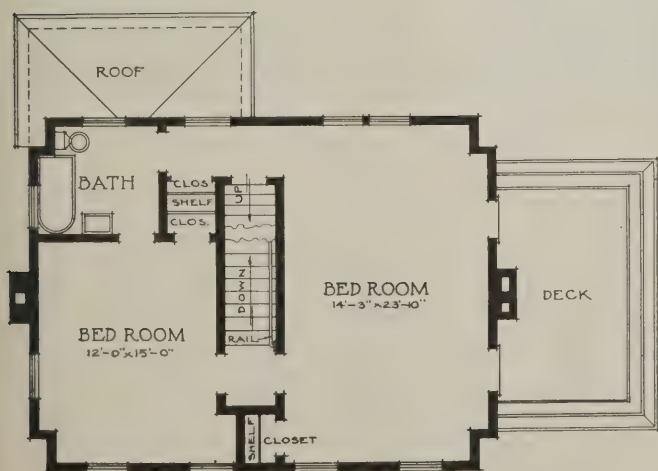
FIRST FLOOR PLAN.

A. L. Dingle house



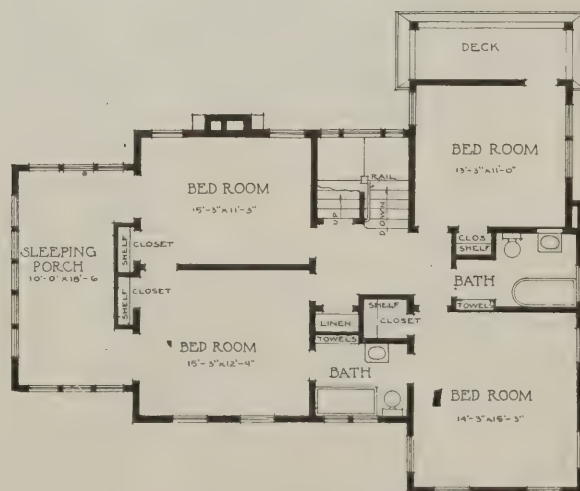
FIRST FLOOR PLAN.

E. T. Rinehart house



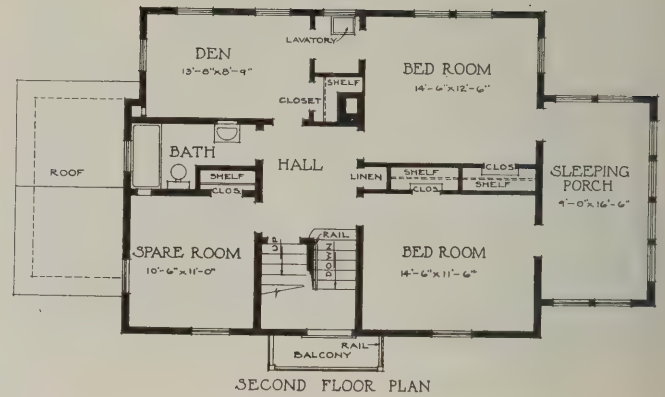
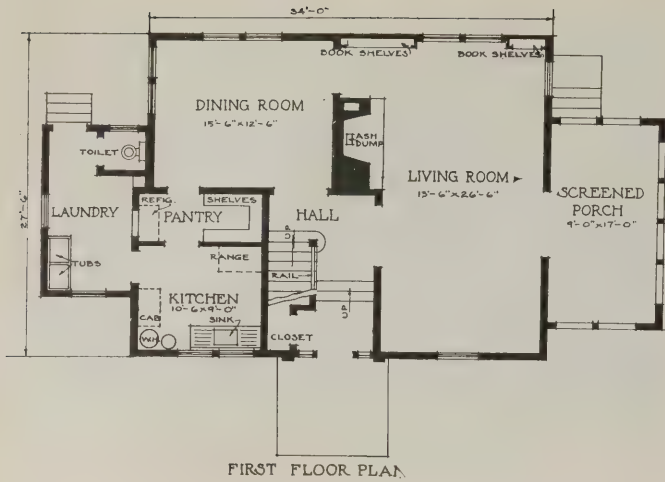
SECOND FLOOR PLAN.

A. L. Dingle house



SECOND FLOOR PLAN.

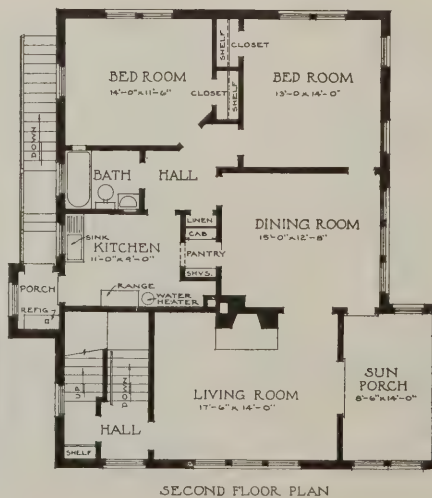
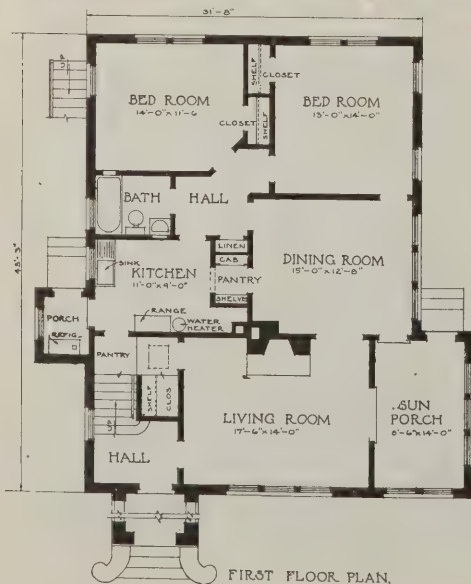
E. T. Rinehart house



Plans of house for H. K. Humphrey. See elevation No. 11, page 38, of Style Sheet



Duplex house for Tom Randolph

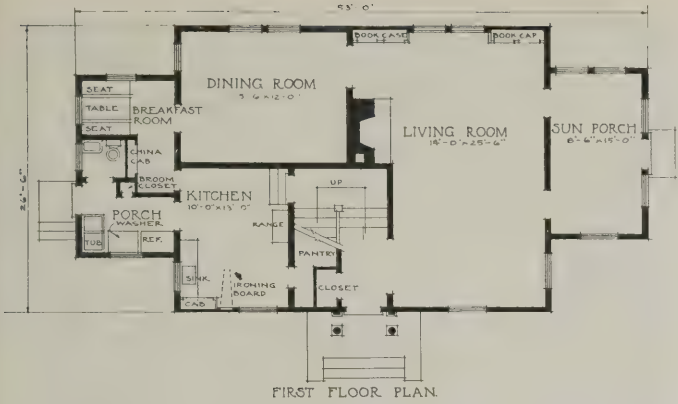


Plans of Randolph duplex house

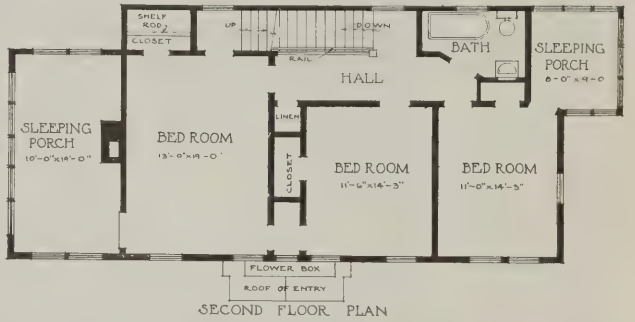
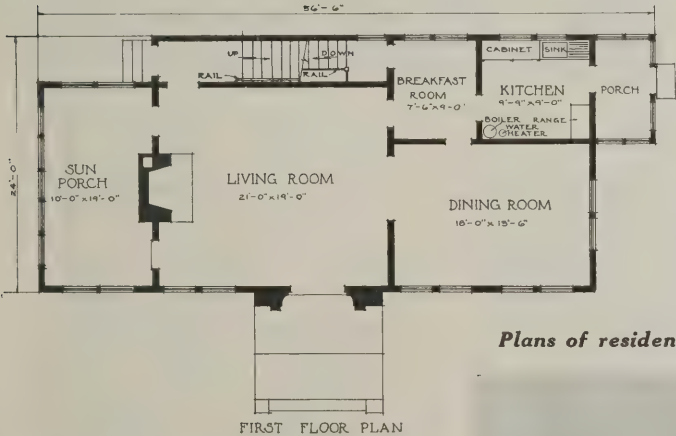
rop, range from \$10,000 to \$20,000 in cost, or 46 to 52 cents per cu. ft.

Telescopic Hoists

THE labor-saving, safety and speed with which ash-removals are effected by the telescopic hoists are described and illustrated in a new pamphlet issued by Gillis & Geoghegan, Inc., 537 West Broadway, New York. One of the tests made under actual working conditions is stated to have shown that 85 round trips were made between floors 16 ft. 8 in. with a 150-lb. load, using only 1 cent's worth of current. Each step in the operation of the equipment is clearly illustrated.



Plans of Wallace Pratt residence, No. 8, page 36, of Style Sheet



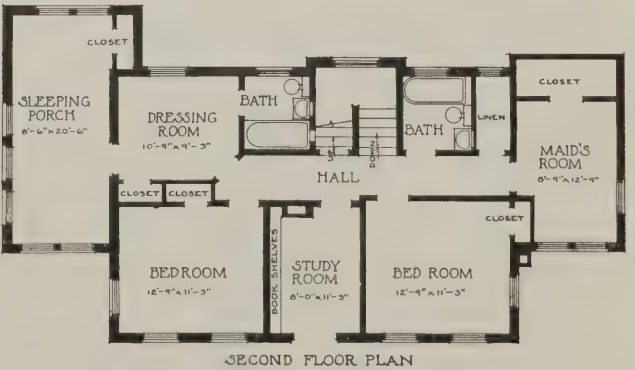
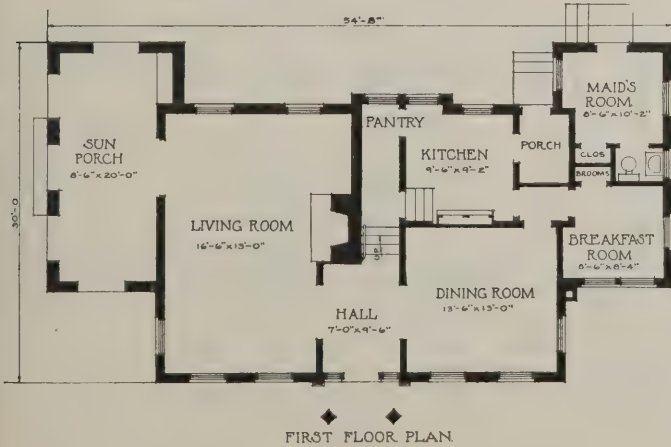
Plans of residence of J. W. Northrop, Jr. See No. 6, page 35, of Style Sheet



Entrance detail, J. W. Northrop, Jr., residence



J. W. Slaughter residence



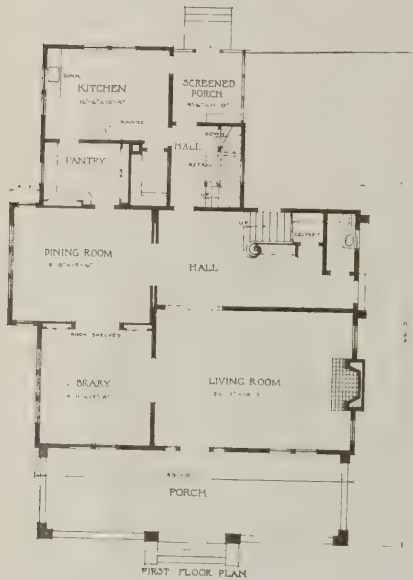
Plans of J. W. Slaughter residence



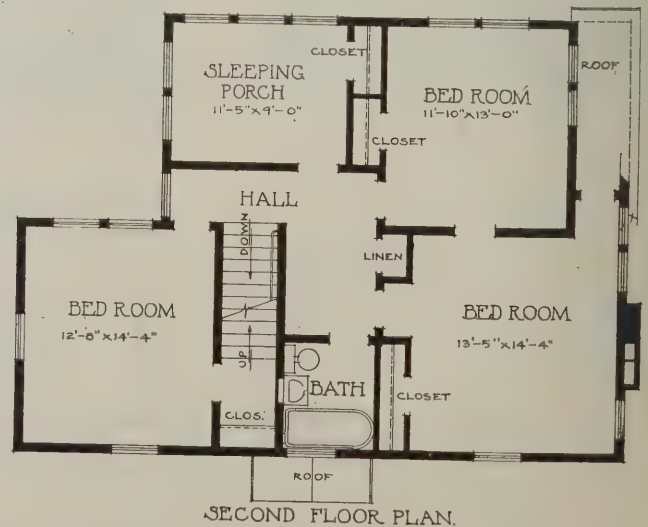
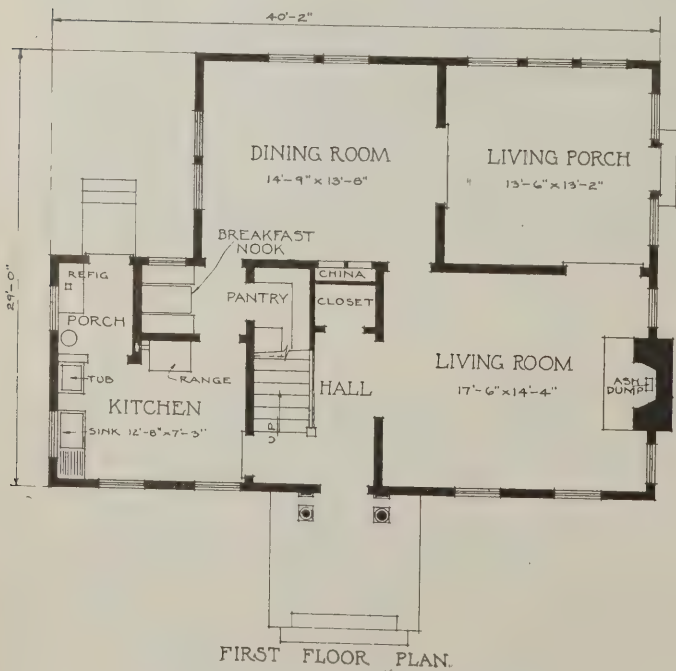
Residence of G. L. Noble



Fireplace detail, G. L. Noble residence



Floor plans of G. L. Noble residence and detail of entrance hall and stairway



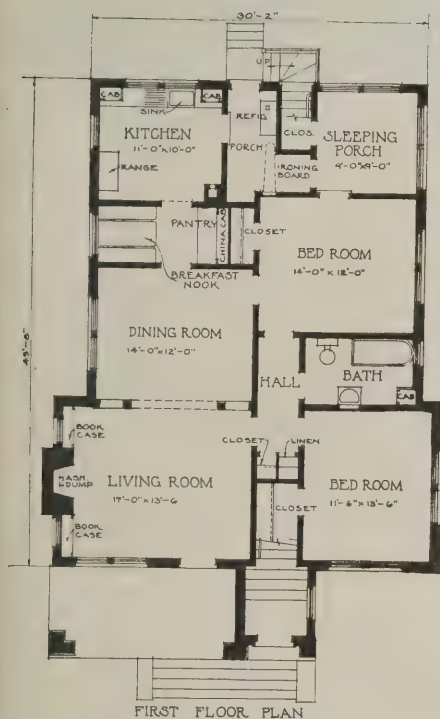
Floor plans of residence of Clarence Kendall. See house No. 9, page 37, of Style Sheet



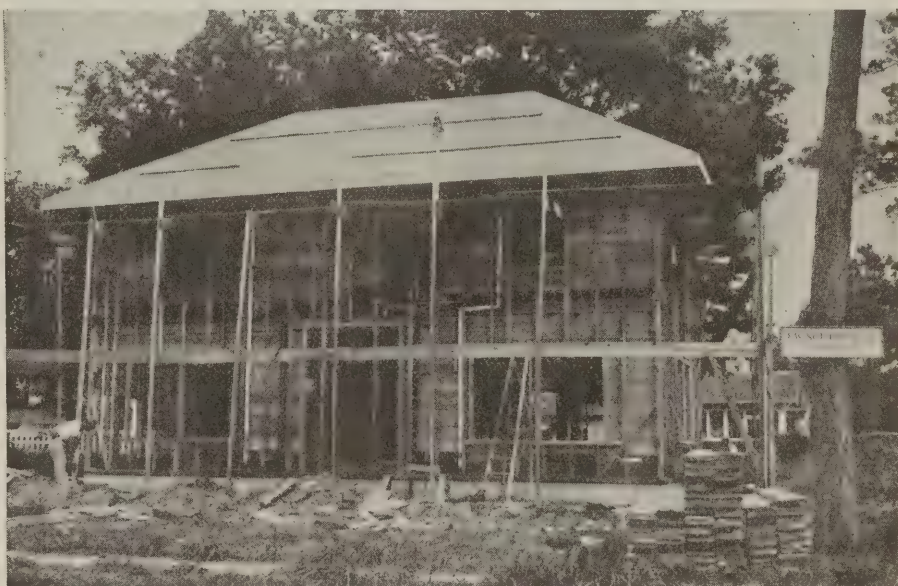
Residence of J. T. Finucane



Residence of L. M. Wirtz. See plans, page 26



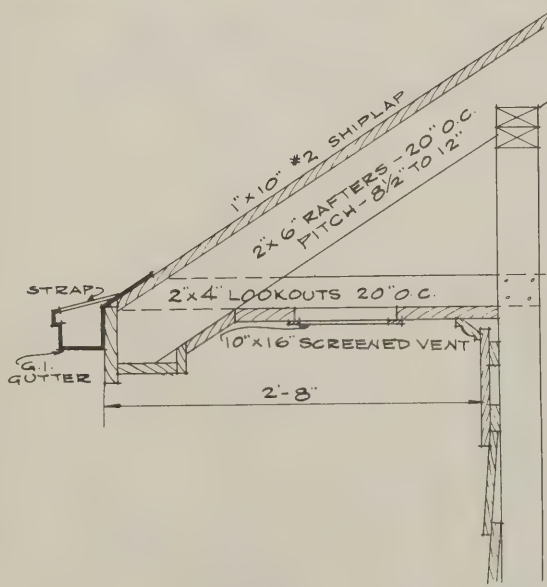
J. T. Finucane house



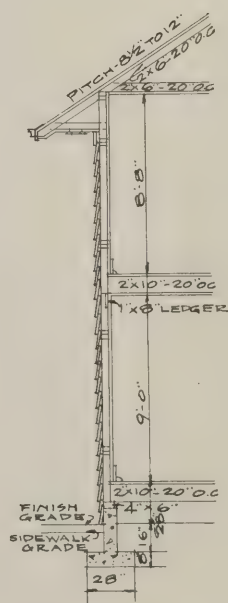
P. J. Daniell residence



J. T. Finucane house



CORNICE SECTION



WALL SECTION

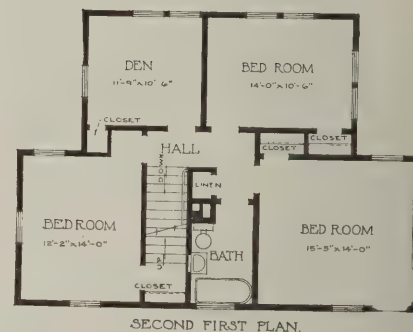
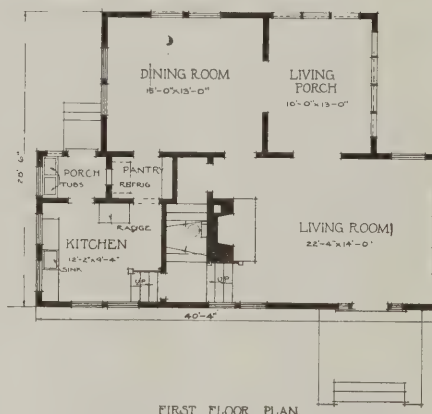
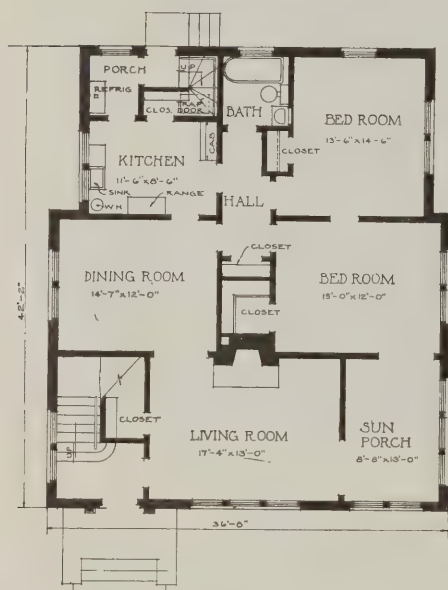
Construction details, P. J. Daniell house



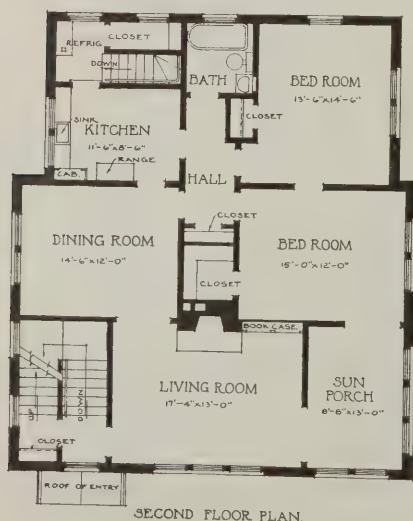
Residence of J. W. Caldwell



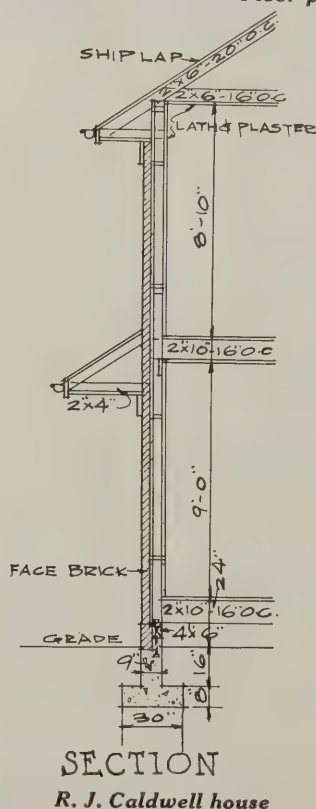
Entrance detail, Caldwell house



Floor plans of Caldwell house



Plans of L. M. Wirtz house. See elevation on page 25



Removal of Overloads on Timber Construction

THE load which a wooden member such as a floor joist or a rafter will sustain is dependent to a considerable extent upon the length of time the load remains on the timber. If the load remains on ten times as long, then the amount of load required to break the timber will be reduced about 10 per cent. If a given load will break a timber in 40 days, a load about one third greater will break the same timber in one hour. From the above it will be seen that it is important to remove the load from any overloaded wooden floor or roof as soon as possible since it is not certain that the roof or floor will not fail merely because it has held the load for a few hours or days.

For the above reason temporary stresses caused by wind or snow loads may be greater without danger of failure, than those due to the dead loads or long continued live loads.—Preliminary Report of the Building Code Committee of the United States Department of Commerce.

Good House Architecture Is Economy

Practical Ideas in Home Building Demonstrated Through the Help of a Big City Newspaper — Salability of a Good Design

AN interesting object lesson in the superior salability of a well designed small house was recently completed in Minneapolis, Minn. This city is the headquarters of the Architects' Small House Service Bureau of the United States, one purpose of which is to demonstrate that good design is good economy.

The method of accomplishing this object in the case under consideration was to interest a local newspaper in the news and business possibilities of a live home-build-

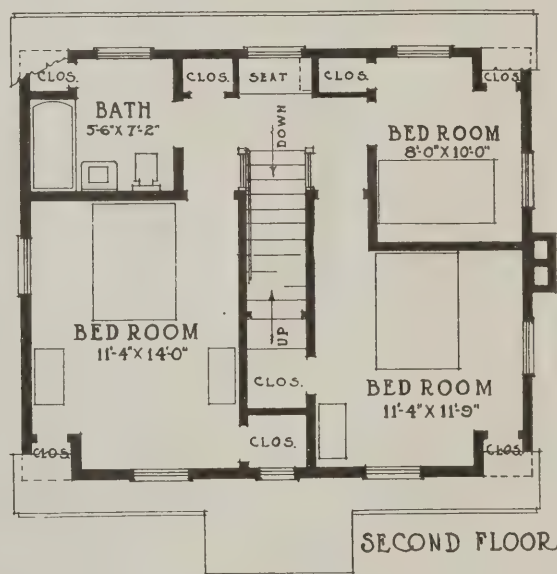
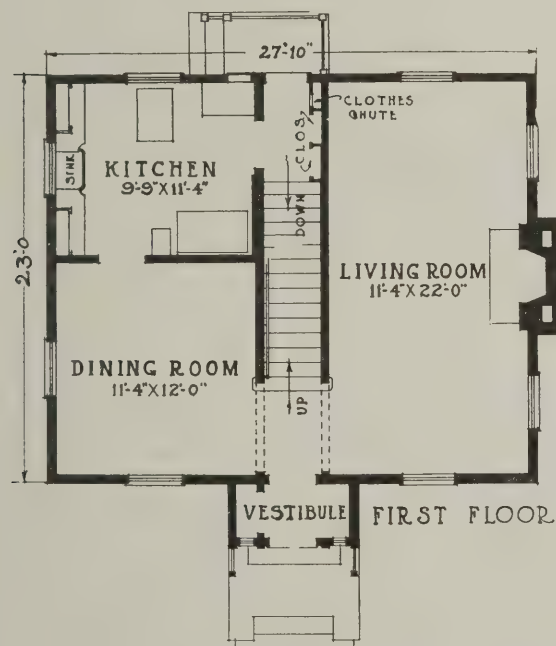
house an average of a thousand persons a week visited the job. As a demonstration in house building and as a tickler to the desires of many people to own their homes, this house is conceded to have exerted an enormous influence. Among the visitors, at one time or another, was nearly every contractor and builder in Minneapolis, who used the house as a standard in judging their own construction.

The purpose of the scheme on the part

of the newspaper, may be created at minimum cost by the use of simple finish and materials without detracting from durability or appearance."

Description of the House

The "John W. Journal" house, illustrated on page 35 of the NATIONAL BUILDER Style Sheet of this issue, was inspected by one of the editors recently and it is truly "a model in construction and arrangement. The exterior of wide siding painted white,



See reproduction of photograph of elevation, House No. 5, page 35 of Style Sheet in this issue

ing department. In order to make the story appeal to the public a fictitious character known as "John W. Journal" was created, and the newspaper, through this character, proceeded to purchase a lot and sign a contract for a six-room house, designed by the Architects' Small House Service Bureau, and erected in the regular way by a local contractor.

The building of the house lasted eleven weeks and during that time the newspaper kept up the public interest by a continued story of all the details of how the lot was purchased, the money raised, making "John W. Journal" a typical home-hungry citizen. Throughout the progress of building the

of the Architects' Small House Service Bureau was to prove that:

"Architecture is economy.

"A well designed home is not more expensive than an architectural monstrosity, in fact it is less expensive.

"Good architecture is necessary to obtain the maximum of comfortable and attractive shelter for the dollar expended.

"A builder, by using complete plans, drawings and specifications such as are furnished by the Bureau, may build with assurance that the final cost will not exceed the amount estimated.

"A beautiful interior, which lends itself readily to interesting, homelike and com-

with green-stained gambrel roof and green blinds, gives the effect of a much larger house. The interesting brick course at the foundation and the beautiful chimney emphasize stability. The fine proportions and simple lines of the house seemed to lift it far above the class indicated by its moderate cost.

"Inside, the correct use of inexpensive finish and materials create a harmonious atmosphere of substantial comfort. Pine woodwork painted in an ivory tint contrasts agreeably with mahogany finished birch doors. Heat registers were placed so as to give good wall spaces for furniture. The wood and brick fireplace of the

long living room gives promise of the restfulness of a real home. The oiled and waxed birch floors, the ivory risers and mahogany treads of the colonial stairway reflect the good taste that creates an interior of charm at the most moderate cost.

"The house has every convenience to be found in the average American home; efficient laundry facilities, a model kitchen in white enamel with built-in cabinets, well ventilated bedrooms, an abundance of closet and storage space. Thoroughly insulated walls assure winter comfort and the economical operation of the adequate heating plant."

Itemized Cost of the House

Following is a complete statement of the cost of building the Minneapolis demonstration house:

Preliminary Expense—

Small House Service Bureau plans

Lot survey

Building permit

Water meter

Total \$56.50

General Contract—

Excavating, average cost

(not actual)

Waterproofing

Lumber

Millwork

Masonry

Carpentry

Painting

Heavy hardware

Plastering

Tinwork

Margin

Total \$4,307.70

Subcontracts—

Heating

Plumbing

Wiring

Finish hardware

Fixtures

Sidewalks

Grading, average cost

(not actual)

Total \$1,153.77

Total all contracts..... \$5,517.97

Cost of lot..... 600.00

Total cost \$6,117.97

No Advertising Directly Connected with House

No mention of the materials used in the construction, nor of the equipment of the house, was used in the *Journal* by advertisers, under the agreement with the Architects' Small House Service Bureau. Neither were signs or placards allowed in or on the house. Even the contractor was prohibited from erecting the customary

sign. Nothing was done to cheapen the object lesson in the eyes of the public. Of course, the *Journal* did profit from its enterprise by attracting advertising and readers, and the contractor, Michael M.

Jalma, by being on the job about 20 hours a day, was able to meet and talk with most of the visitors, and give them his business card, thus getting a line on many prospective clients.

Profiting by a Carpenter's "Bull"



THE failure of a carpenter to leave a hole in the bathroom wall of a house in Houston, Texas, for a built-in medicine cabinet cost him his job, but it actually resulted in another carpenter devising a more satisfactory fixture. The view herewith shows how the problem was solved.

Instead of a medicine chest with a hinged, mirror door in the center of the wall above the lavatory, two hinged wings were added and the center mirror fixed. In the center of each wing is an attractive electric light fixtures. Behind the wings are rows of shelves built in the wall.

Normally the wings are swung back against the wall as shown, but when the master of the house shaves, or his wife powders her nose, the convenience of the swinging lights is evident.

Other interesting fixtures in this bathroom are the liquid soap holder, often found in hotels and clubs, but seldom in private homes like this, and the small night light in the wall at the right. This plug is equipped with a \$1.75 rheostat, which reduces the voltage from 110 to 6. The bulb is part of an automobile equipment, or an ordinary pocket flashlight bulb.

Merchandising Houses

Crystallizing the Sentiment of the Prospective Home Owner—Getting the Name on the Dotted Line—Selling Ready-Built Houses as Other Manufactured Products Are Sold

WHETHER the builder builds houses to sell after their completion, or builds individual houses for particular clients, his business success will depend very largely on his salesmanship. Even architects and other professional men are financially successful or not according to their ability to sell—their qualifications as merchants, or traders, in that commodity they have to sell or merchandise, which is professional service.

The builder has a more difficult sales problem than the architect. He must sell professional service, of course, but he must also deliver a complicated manufactured product that is satisfactory in all respects as proof of his professional service. No manufactured product is put on the market under greater manufacturing handicaps than a house.

Of all the problems of modern business none has received more time and study than salesmanship, or merchandising; and there are many established principles of merchandising which apply with equal force to any business. So in this day and generation, if one would have his share of the world's business, it is not sufficient to be a good builder, a good architect, a good designer or a good constructor; one must also be a good salesman of the particular specialty he has chosen, or is best fitted to sell.

Some Principles in Merchandising Contracting Services

In a contemporary issue of the *Warm Air Heating and Sheet Metal Journal*, C. H. Thomas has given some of the principles of successful merchandising, based, he says, on an experience gained in building up a profitable business in a rural district. With some slight changes and paraphrasing his suggestions apply equally well to a building contracting business. His suggestions, thus modified, follow:

Too many men in the building contracting business are poor salesmen and do not know how to gather in the work. Then, again, a lot of them think they have to cut the price to get work at all and do not pay any attention to overhead cost and that sort of thing. Why should any merchant contractor take a job and lose money on it just to keep himself busy? He is not working for glory. It is all foolishness. We figure the actual cost of material, labor, overhead charges, etc., and then tack on a percentage as our profit, and if the

customer is not willing to pay that price for a good job, then let it alone. It differs in particular cases, of course. All labor is not alike. A man may loaf on a job when the employer cannot be on the job to look after things personally. That is one of the faults of all trades which cannot always be helped.

In going after new work, or any work,

Keep Up With the Profession!

THIS is the second of a series of articles begun in the September issue of "National Builder" under the title of "The Problem of Co-ordinating Local Building Activities."

Manufacturers produce building materials, dealers distribute them; but they are manufactured and distributed as raw materials. The manufacturer of houses is the builder or contractor, and he, not the building material manufacturer nor the building material dealer will be judged by finished product—the house and home.

The building material manufacturers and dealers may sell their goods with the help of pictures and plans, but the builder needs more than these to sell houses. He must have a reputation based on skill, integrity and his knowledge of building. And he must not be backward in knowing how to market these abilities. They have as good a market as the other elements which go to make up a finished house.

know what you want to say, and say it in short, pithy sentences, to the point. In other words, know your subject from every angle.

Use Modern Sales Methods

If you are advertising in the local paper, place particular stress on the whys and wherefores, and show your prospective customers just why they should use your particular services, or buy your particular houses. They read in a prejudiced frame of mind to a great extent, and you must overcome this. Don't be afraid to take a

good size space in your paper. Experience proves it pays. Also get out and talk with people. It will broaden you. You will get their viewpoint, and, after all, isn't it the great public you are trying to please—a market of buyers who have to be shown? Every man in business today is a salesman in one or more ways. He is selling his ideas, his very thoughts, and his main strength to a critical public. He is buying and selling daily. He buys raw materials. He then sells what he bought as a finished, or manufactured product to the consumer, with a profit for himself.

To do this is not always easy, but in these days it is a proven fact that he can sell more and better houses, even though he be not an expert salesman, than ever before. Why and how? Just look around you anywhere, any day. That magic word advertising, or publicity in the large sense, is the true keynote. The manufacturers who are placing their wares on the market have to first advertise in order to create the demand, then to have reputable goods to fill the need created by the advertising, and third, they have to be able to interest experienced contractors and builders to use their product, so that their output can be placed in the hands of the consumer with the least expense possible, and also give the dealer his profit through his handling of these advertised goods. Surely it seems like a simple process, but this is what is happening daily, and the contractor or builder benefits according to the interest he shows in these advertised goods. This publicity is not charged to the builder, although he most assuredly does reap the reward in the houses he sells. He could not, with the limited means at his command, ever hope to sell the houses he does if the manufacturers did not aid him as above shown.

Present-day merchandising methods are doing much for the modern contractor and builder, and they can surely profit by the experience of others in using the wonderful trade aids that the manufacturer is only too glad to send him free in many cases, at costing the manufacturer thousands of dollars annually. He does not count his money wasted, for he figures that money invested wisely in this way in a campaign to reach the consumer will return him handsome profits. Mr. Builder, it is up to you who, no doubt, do make use of some of the manufacturer's helps, to grasp to the fullest what this means to

you, and to make full use of all helps which come your way. The results will surprise you. Use your newspaper. Send to the manufacturer; ask him for cuts to use. Get the full benefit of using materials and equipment nationally known by well advertised brands or trade marks.

Good Materials and Good Work—And Don't Knock Your Competitor

Your best plan of course, is to do a good job of work. Charge a fair price. Get your profit. Secure a testimonial, and see if your good work doesn't bring you more. It has been proven time and again that it will.

Don't knock your competitor. Speak well of him, if you can. A price cutter cannot do a first-class job. Common sense will tell you why. Use your best judgment on all jobs, and you cannot help but gain a foothold in any community. On even the smallest job take careful pains and time to do it right, and the business even that little job will bring you will amount to considerable. There is work for all, if need be. Point out the repair needs and suggest improvements that mean profit to your clients. The owners do not always know this real need, or else they are careless or absolutely indifferent. It is up to you to prove to them by actual facts and figures why the job should be done and how little it will cost to do. A simple talk on facts will ordinarily land the job, and your prospect will see the fallacy of his apparent neglect and wisdom of quick action. Use tact in such a transaction, and do not make him feel hurt in any way by any remark you may make about his house or buildings. This soliciting of new work can be done in time suited to you. Evenings are fine to go out and see prospects. Then the wife will also be an interested listener in your conversation, because she is interested.

Overhead expense, such as auto, gas, oil, etc., need careful figuring in order to see that you are getting the right return on your investment. If one thing costs too much, buy something else, but, above all, consider quality. Don't put in shoddy goods and have the job go back on you. Nothing hurts a man's business reputation worse, even though he thought that he had done right. The successful tradesman is a gentleman above all things—courteous, polite and ever ready to serve his patrons. He is like a doctor in many respects, as he is likely to be called most any hour to fix something.

As to collections, that is a mighty broad subject, and has been hashed and rehashed. Use tact and courtesy anyway in collecting money. Business is very sensitive. It goes only where it is invited, and stays only where it is well treated. Watch your credit relations. Isn't it better to do without a job than to wait a year for your money? It is every man's job to use his best judgment.

Most every man is, or should be, a good bookkeeper, and with present-day efficiency methods of accounting and cost keeping, there is really no excuse for mistakes.

Getting New Work

Taking up the matter of how you get the job, you cannot help but get some inquiries from your advertising. Then again, when out on a job working, some one will stop and put the question to you about the approximate cost of a certain type of house. If you cannot carry figures in your head, carry them in a note book ready for instant reference. In other words, don't let that most valuable prospect get away. Nail him then while his mind is working. He is your very valuable meat, or why should he ask for such information? Give him facts and figures, back them up with actual work which you may be doing or have done recently somewhere. Explain the various methods carefully, showing the distinct advantages of some materials over other kinds.

It will pay to take the time then while the iron is hot, rather than skimp on time and not give your prospect all he asks for. True, it is hard to carry an accurate price on materials when prices are jumping on all lines, but he is asking them for approximate information, and so hand it to him right off the bat the best you can.

Ask him questions, but be sure and get his viewpoint, and about how much he has to spend, so that when you call to see

him some evening, which you arrange for, you can then talk intelligently and possibly get the job. You then go into the matter of buying the materials and equipment he wishes, and arrange to put them together in the type of home he wants. Of course, all jobs are not so easily secured, and some are mighty hard to get with competition keen, but we do know that many are succeeding by following these general rules as above set down, with more or less variations. According to their individual needs and circumstances, many jobs are secured by first bidding on the work, the lowest bidder to get the job. This involves some careful figuring and calculations, which every contractor knows or should know about from actually doing it.

The great thing in any business is to know your business, backward and forward if necessary, to master it thoroughly. Books and trade papers are excellent aids and contain things you cannot fail to ignore if you want to keep informed. When you have finished, or while at work on the job, secure photographs of the various phases of the work. They are mighty useful, as you can use them in soliciting new work along the same line; a picture will often do more than many words in selling a house. Give these things your thought. The paper you are reading wants your ideas. How you do your work, how to get the job, how to make it pay you.

A Bridge of Brick



The Prince of Wales is here shown standing on a very unusual brick bridge in India, one of a number built by Col. Haviland to enable troops to cross the numerous water courses surrounding Shringapatnam, the historic capital of Tippu Sultan

Enamels and Enamelling

A Contributor to "The Illustrated Carpenter and Builder" of London Describes the Methods and Care Required in Using Enamel for Exterior and Interior Finishing and Decorating

By Arthur Seymour Jennings, F. I. B. D.

DURING the last ten years or so there has been a very large increase in the use of enamels for interior decoration, their remarkable durability and hygienic value being increasingly appreciated. It is interesting to notice that among skilled craftsmen a good varnisher is usually a good enameller, although he may be but a poor hand at the brush when applying ordinary paint. The reason is that the two operations are distinctly different. Paint must be well brushed out, which means that every brushful must be made to cover as much space as possible. This is not done for the purpose of economy, but because a thin coat of paint has been proved to last longer than a thick one, while there is much less likelihood of "runs" and other defects appearing.

Enamel, on the other hand, is applied just like a varnish, and is "flowed" on. Here the object is to get as much enamel on the surface as is practicable.

Success Depends on the Condition of Surface

Success depends almost wholly, however, upon the condition of the surface before the enamel is applied. Old work must be rubbed down, or, if in very bad condition, stripped off entirely to the wood. One, or even two, coats of the popular paints known as "undercoats" should then be given, but white lead should not be used, as it has a tendency to cause the white enamel to become yellow. Undercoats are relatively cheap, they cover well, are easily applied, and if of good make may be relied upon. If a colored enamel is used some of the same color should be added to the undercoats, particularly the last one, so that it may approximate in appearance the finished job. The addition of a little of the enamel is sometimes sufficient particularly when the color is light, but in other cases tube colors of the correct hue may be employed instead. Greys are frequently used under greens, and a grey can of course be easily produced by adding a little black to the white undercoat.

Tinted Enamels

There has been for some years past an outcry against the extensive use of white enamels for decorative purposes, and it has been even suggested that the explanation is that so many decorators do not know

how to mix their colors, and therefore fall back upon the white variety. Without assenting to this charge, it may be remarked that some very beautiful results may be obtained by employing tinted enamels, and they are made in a very large variety of tints, shades and colors.

What Enamel Consists of

All the best enamels are made on the base of zinc oxide, and are ground in either thickened linseed oil, or a special grade of varnish, and sometimes a mixture of both. Before enamels were introduced in their present form decorators were in the habit of mixing zinc oxide and applying perhaps as many as six or eight coats, rubbing down each very carefully to a level surface, and making the last coat flat, that is, without gloss, to receive the finishing coat, which consisted of French oil varnish in cases where a white finish was required.

On Outside Work

Enamels may also be used with great advantage on outside work, and because of their durability will be found cheaper in the end than ordinary paint. If an extra good finish is required, such, for example, as on a front door, two coats of enamel may be given, the first being rubbed down when quite dry and hard by means of a piece of felt soaked in water and dipped in finely powdered pumicestone. This removes the gloss and produces a very level surface which, after being cleaned down so as to free it from grit, is ready for the final coat.

Good Effect on Old Buildings

In London and other large cities where there are many old-fashioned houses built of brick, which are very dirty in appearance, a successful attempt is often made to brighten the front by finishing the front door in bright colors, such as malachite green, rich red, blue, or even a deep orange. This work is usually done by using enamels for finishing coats, although in some cases an improvement is made by the process known as "glazing." For example, the last coat may be finished in Indian red, and this can be glazed with crimson lake or madder, which gives a very rich effect. The Indian red gives the necessary solidity, while the lake, being to some extent transparent, pro-

duces the required richness of effect. It is quite necessary, however, to protect the madder or lake with one or two coats of first-class carriage varnish. Strictly speaking, this method does not come within the scope of enamelling, and where it is regarded as being too intricate ordinary enamels may be used instead, and if care is taken in selecting the colors a very handsome job may be produced.

Interior Decoration

Turning again to interior decoration, the objection is often advanced against the use of white enamel that it lasts so long that one eventually is certain to get tired of it, although the walls be renovated by the application of a new wallpaper of a different design to that previously used. The enamel may be very easily changed in appearance by the following simple method. It should, of course, be first cleaned very thoroughly and then be rubbed down with fine sandpaper, and dusted off. A coat of any color, preferably of a light tint, may then be applied. The surface being so good, the effect is likely to be satisfactory. The best colors to use for this purpose are those known as scumble colors, or scumble stains, which require only to be thinned down with turpentine. When dry, the surface is again rubbed down with sandpaper, and a coat of varnish is given. Another method of changing the appearance of white enamel is to apply a very thin coat of amber color, or a scumble stain intended to imitate maple will answer. Immediately this coat is given, the corners and parts of the mouldings should be wiped off with a cloth, which at these points will remove the amber, exposing the white beneath, resulting in a finish which suggests old ivory.

Another Way to Deal With White Enamel

Still another way to deal with white enamel is to use the scumble stain as before, and while it is wet to pass over the surface a dry brush, which will remove the color in hair-like lines, exposing some of the white underneath. For example, a solid black may be painted on the white ground, and if the brush is passed over the surface in the manner indicated the result will be quite a charming grey effect.

Test Your Colors

It is well to warn the reader that it is necessary in order to get a perfectly satisfactory result, to try the color which it is proposed to use on a portion of the apartment, say, the door, before proceeding to do the whole. Having selected the color which appears likely to be successful, apply to the corner of the door, and then look at it from the opposite side of the room. If it is not quite what is wanted, it may at once be rubbed off with a cloth, and another trial be made.

Contrast Flat and Glossy Enamels

The excellent effects which may be produced by the use of flat enamels side by side with those which are glossy, are not quite so well understood as they might be. An ordinary four-panel door, for example, has a much better appearance when the panels are flat and the other part glossy. The appearance, too, is improved when a thin line of a stronger color is used on the flat part of the mouldings. Flat and glossy enamels may also be used successfully on panel work in general. Of course, the great objection to flat work is that, to use a homely phrase, "it catches the dirt," but it should be remembered that in the case of a door the hands meet the finger plate, if there is one, and if not, the outer style, and not the panel at all.

The ground already described is equally suitable for glossy and flat enamels, and one coat of the former is sufficient although best results are obtained by the use of two in the case of the latter.

Avoid Laps and Joins

In performing the actual enamelling it is very necessary to carefully avoid any laps or joins which may arise, particularly in the case of quick drying enamels, if the edge is not kept "alive," that is, is allowed to partly dry. Experienced workmen differ as to how a door should be enamelled, and which part should be dealt with first. Some enamel the panels first, then the top rail, finishing up with the muntin. The writer recommends the following: Commence with the top rail at the left-hand corner, and then bring down the enamel on both styles at one time, so to speak; that is, apply the enamel, say, a foot down on one side and then a foot down on the other, until the bottom is reached. Complete by doing the bottom rail, then do the muntins and the lock rail and the panels last, excepting the mouldings, which should be dealt with last of all. If more than one color is required, this must, of course, be "cut in" with great care; even when one color is used equal care should be exercised.

Durability of Enamel Work

The writer has been asked how long an enamel should last on inside and outside work respectively. The answer is obvious, namely, that everything depends on cir-

cumstances, but one may give an average. If first class enamel is used, and it is properly applied on a thoroughly solid, well built up ground, it should last on inside work anywhere between five and ten years or even a longer period. At the end of the times mentioned the enamel will, of course, have lost a great deal of its gloss, but it should be in good condition as far as its preservative qualities are concerned. If it is desired to reproduce the glossy effect it can be done either by applying a new coat of enamel or a coat of varnish the light variety, such as French oil varnish, being selected when the work is white.

As a final word, it may be said that

enamels permit of a frequent washing down without serious detriment. In an atmosphere like that in London the surface will be found to be distinctly dirty, even at the end of a few months, and therefore, the following recommendation is added: If the work has been enamelled, but appears to be in bad condition, before anything else is done, clean it down from top to bottom and then carefully examine it. It may, and often does, happen that the enamel work will then be found in such a good condition that it can remain without further treatment. In any case, the cleaning must be done, whether the work is to be re-enamelled or not.

Sound-Absorbing Plaster

THE Cleveland, Ohio, municipal auditorium is the largest, closed, plastered construction in the United States. At the time it was being completed, last winter, there was much controversy over the acoustic properties it might be expected to have, for the architect, J. H. MacDowell had refused to use a patented sound-deadening felt on the walls or ceiling.

Instead of using felt and ordinary wall plaster a special sound-absorbing plaster was developed and applied, described by its inventor as follows: "We attribute the success of the acoustics in the auditorium to the direct result of a unselfish effort to cooperate with Architect J. H. MacDowell in producing a plaster which is non-vibrating and sound-absorbing. We worked with Mr. MacDowell for about eighteen months in which time we made a hundred or more tests of plastered panels and various composition until we finally evolved what is known as M. A. P. Macoustic Plaster which was finally adopted for the city auditorium.

"The theory upon which we obtained our result is a simple one and evolves itself into this. The one method which has been used so extensively uses hard plaster in two-thirds of the building and especially high absorbent material in one-third of the building. All we do with Macoustic plaster, which in itself is not as sound-absorbing as the acoustic materials generally used, but by covering all the area with a semi-absorbent material, we naturally produce a better result than is obtained where there are smooth hard surfaces in the room as under the old method.

"The cost is always a vital figure when it comes to building materials. The cost of our method of treating buildings acoustically is bringing the subject to the front as one which every builder can now consider in his construction.

"The reason acoustics in any building were sacrificed heretofore is that the only methods recommended to date have been so expensive. The cost of treating a building acoustically with M. A. P. Macoustic plas-

ter is only a few cents more per square foot than ordinary plastering.

"During our preliminary experiments and also toward the finale we were severely criticized and oftentimes ridiculed by well informed men on acoustics, but we realized that the birth of a new idea always does meet with opposition, and we therefore continued in the face of it all, with the result that we have produced a plaster the use of which applied under the guiding genius of Architect MacDowell, gives us an auditorium which is acoustically perfect and whose acoustic properties will always stand as the model of perfection."

This plaster is made by the Mechanically Applied Products Co., 1242 Webster Ave., Cleveland, Ohio, of which Henry Roegge is president. It is Mr. Roegge who is quoted above.

Suggestions for Designing Stucco

THE following suggestions for designers using stucco are the result of a survey of the plans submitted in the "Small House Competition" held last year by the American Institute of Architects.

1.—Stucco should not be run down to the ground without a solid impervious base course. Ground moisture is apt to be drawn up into the wall and cause the bottom foot or two to become stained.

2.—A proper overhang and drip should be provided for all sills. A stop should also be provided at the end of the sill to prevent streaking of the wall below the corner.

3.—There should be no horizontal stucco surfaces on which water can penetrate joints and get behind stucco.

4.—Before applying stucco to the chimney it should be covered with metal lath. The chimney cap should be stone or reinforced concrete.—From the "Right Angle," published by the General Fireproofing Co., Youngstown, Ohio.

National Builder Style Sheet



No. 1—Casement sash with small, leaded panes make interesting openings that are easily decorated inside



No. 2—The wooden house can be very neat and trim when its details are small



No. 3—The Spanish house uses roof tile in the right way—with practically no overhang at the eaves or gable



No. 4—Large, long windows make very pleasant rooms within and add much to the exterior beauty



No. 5—The "John W. Journal" home described on page 27 in "Good House Architecture Is Economy"



No. 6—Residence of J. W. Northrop, Jr. See plans and entrance detail, page 23



No. 7—Residence of W. C. Averill, Jr. See plans and details on page 20



No. 8—Residence of Wallace Pratt. See plans on page 23



No. 9—Residence of Clarence Kendall. See plans on page 24



No. 10—Residence of W. H. Hogue. See plans on page 20



No. 11—H. K. Humphrey residence. See plans on page 22



No. 12—Built by the Mineola Homes Company, Mineola, L. I. See article on pages 41 to 50



No. 13—Built by the Mineola Homes Company. See article on pages 41 to 50



No. 14—Built by the Mineola Homes Company. See article on pages 41 to 50



No. 15—Built by Mineola Homes Company. See article on pages 41 to 50



No. 16—A New England colonial style house in Kansas. See description and plans, pages 51 to 56

Attractive Houses Sell Real Estate

General Manager of the Mineola Homes Company Makes Good Design Serve a Definite End in Merchandising Building Lots

THE greater part of eastern Long Island, except for the ridges and hills along the north shore, is a sandy plain, or gently rolling country. To the average visitor it probably all looks very much alike. There certainly are thousands of acres where the uninitiated would have difficulty in seeing why one acre should be worth more than another.

For years this Long Island land has been subject to much speculation. It has been sold to would-be investors from one end of the United States to the other. It always sounds attractive when land is advertised as "six miles from the New York City line," and in the most densely populated area of the country. But the man who invests in Long Island real estate one, or two, or three, or six miles from the city line of Greater New York, may find, if he ever visits his property, that on the other side of the line in the city of Greater New



*Richard T. Childs, General Manager,
Mineola Homes Company*

York are farms and unbroken country 100 acres or more in extent. This is true in the Boroughs of Queens (Long Island other than Brooklyn) and of Richmond (Staten Island), so that building lots in New York City are not necessarily surrounded by sky-scrapers.

Many lots on Long Island have reverted to the state or county for non-payment of taxes; and consequently it requires a high degree of salesmanship to sell lots in many localities to bona fide home builders, or prospective home owners. In no other city in the world, perhaps, does the prospective owner have such an opportunity for selection of his building site. There are over 130 listed local communities in "suburban Long Island," within or adjacent to New York City. Of course, there are a great many more suburbs in other directions and in these 130 Long Island suburbs there are seashore and country and hills and



Typical residences built by the Mineola Homes Company

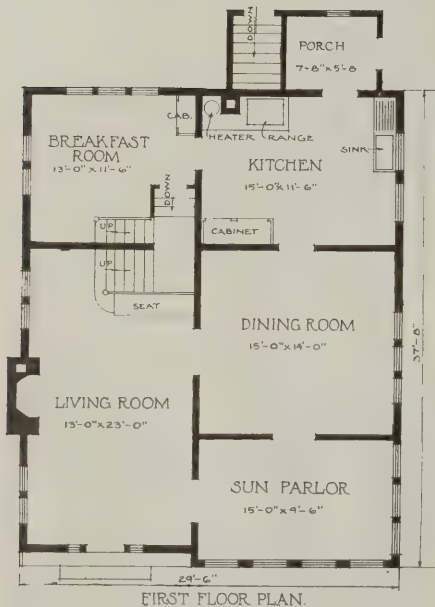


House 1

plains. There are "Parks," and "Gardens" and "Manors" and "Meres" galore.

Developing Mineola

Among this congregation of inviting suburbs is Mineola. Mineola is 20.6 miles from the heart of New York City but only "six miles from the New York City line." It is, or was, a regular country town, the county seat; for that reason it is a business center on its own account. However, it is situated on a plain, and also lacks the advantage of some of the fancy names of suburbs surrounding it. Moreover, unlike similar country to the east, that lies in the city of New York, it has no rapid transit system with 5-cent fare to any other part of the great city. It has street cars connecting with the New York rapid-transit system,



FIRST FLOOR PLAN.

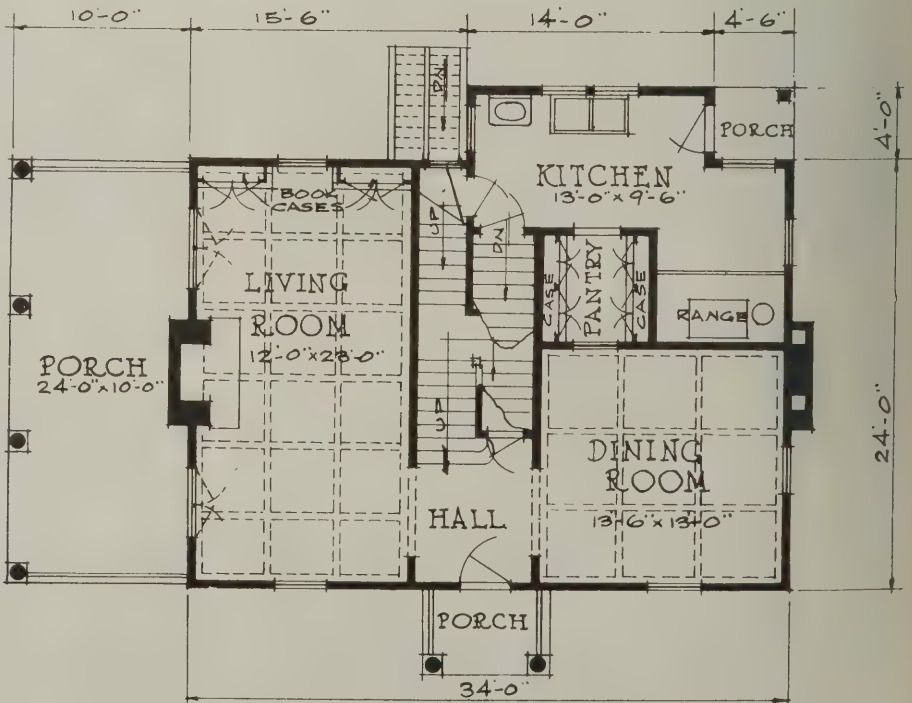


House 2



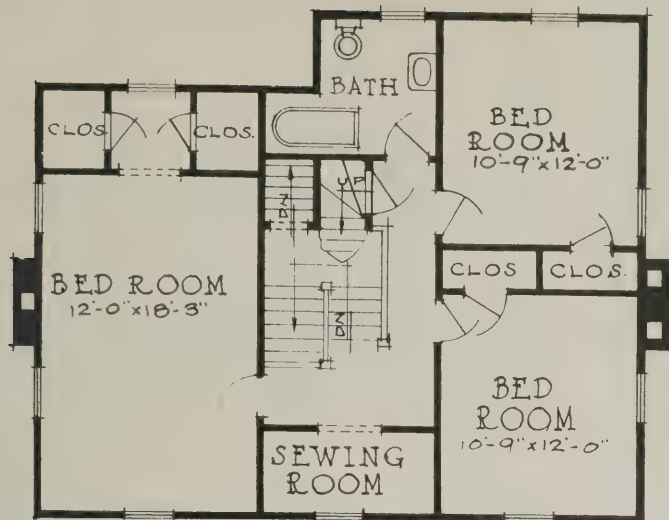
SECOND FLOOR PLAN

Floor plans of house 1



FIRST FLOOR PLAN

Floor plan of house 2



SECOND FLOOR PLAN

Floor plan of house 2

actual profit. The method he has of accomplishing this is worthy of the study of speculative builders and real estate developers in other places, because it is a sound method that can be applied anywhere and everywhere to enhance land values.

To develop 700 acres of land to the extent of building blocks of houses on a speculative basis, so far from New York City, was of course out of the question. After thorough study of his problem, Mr. Childs decided there was just one way in which he could sell his lots in competition with thousands of other Long Island lots which had possibly greater natural attractions. That way was to build them up with houses, so much more attractive than the rank and file of houses on competing property, that these houses themselves would sell the lots.

Sales Value of a Good Design

Accordingly, Mr. Childs sought out a



House 3. See details on following pages

but the principal means of transportation is the Long Island Railroad.

Some 16 years ago a number of syndicates speculated in Mineola real estate to the extent of acquiring 600 or 700 acres. These syndicates represent men in various walks of life, scattered throughout 15 or more states. Some of these men do not even know of the existence of the others. The land they own was probably purchased

at inflated values, during a highly speculative period, and in order to prevent a tremendous shrinkage in value, it was absolutely necessary to market the land to *bona fide* home purchasers.

Today, Richard T. Childs as the general manager of the Mineola Homes Co., which represents these land-holding syndicates, is successfully marketing these lots at prices which not only represent no losses, but an

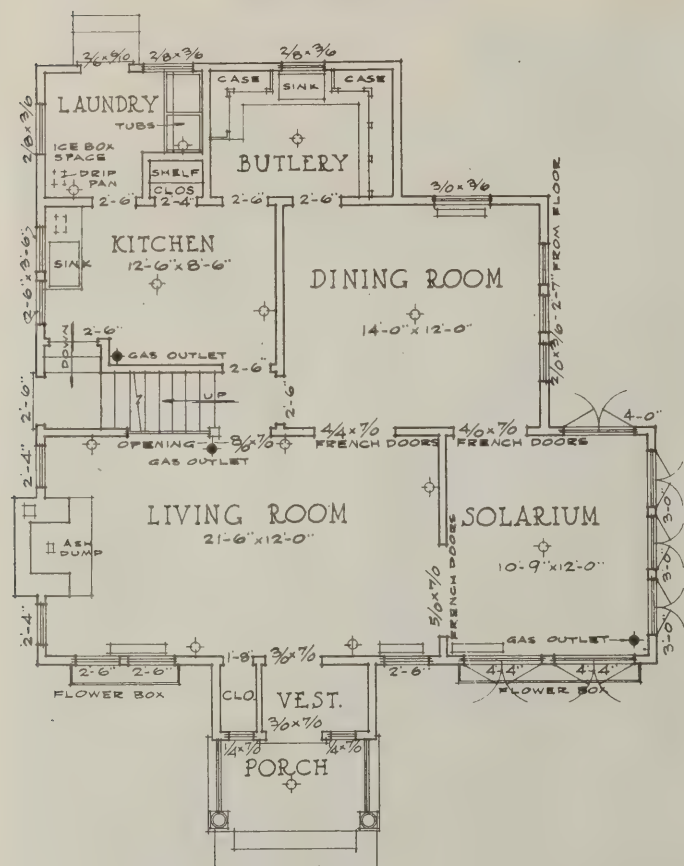
number of the best small house architects he could find and asked them to design for him their ideal of an attractive small house. He spent the sum of \$5000 on such designs before he started building. In this way he obtained the best ideas of a number of small house experts. With plans of this character he had no insurmountable difficulty persuading people to buy and build.



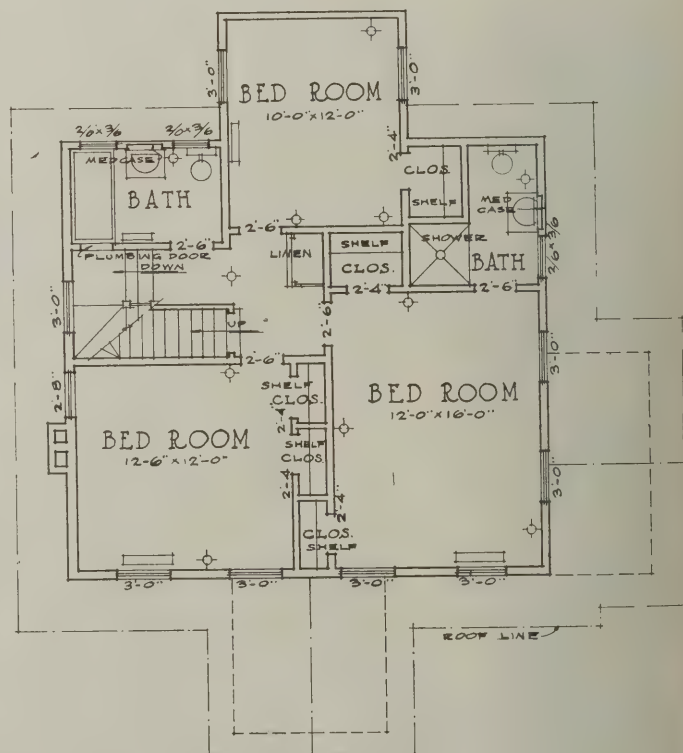
REAR ELEVATION



FRONT ELEVATION



FIRST FLOOR PLAN



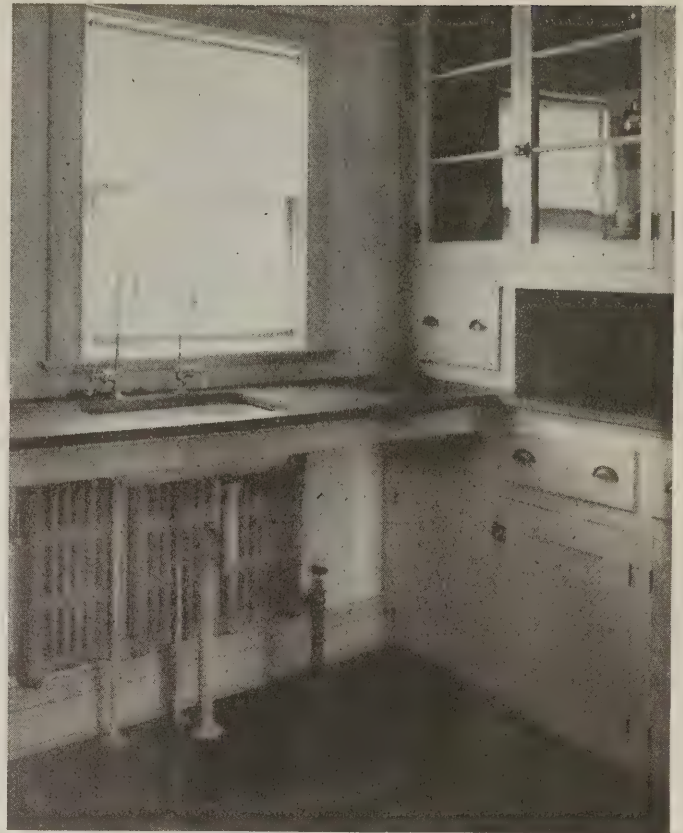
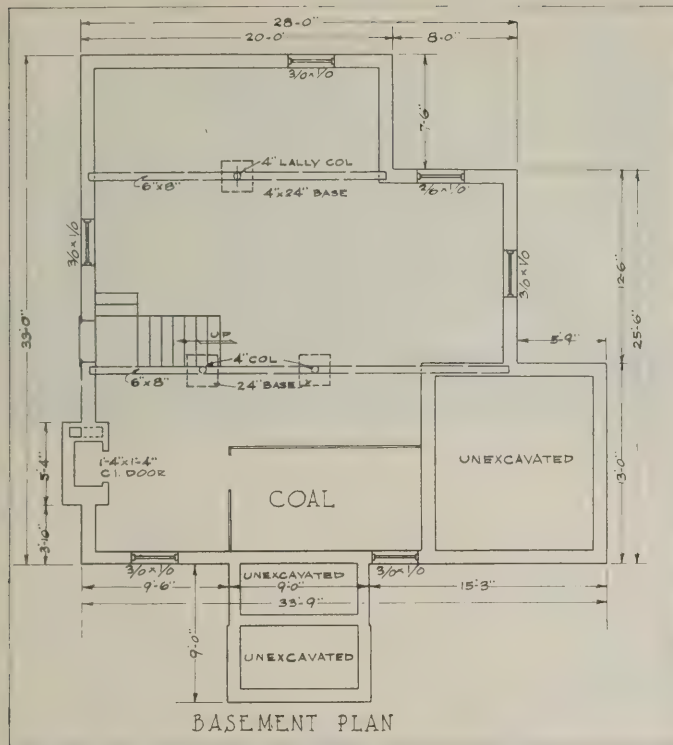
SECOND FLOOR PLAN



SIDE ELEVATION



SIDE ELEVATION

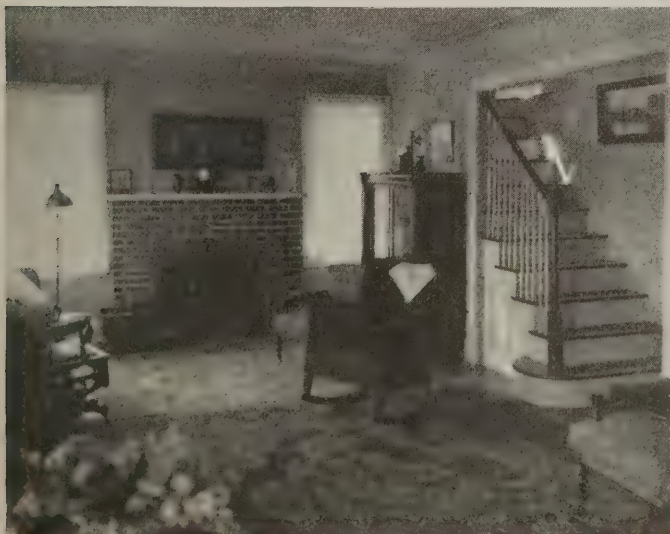


Corner of kitchen in house 3

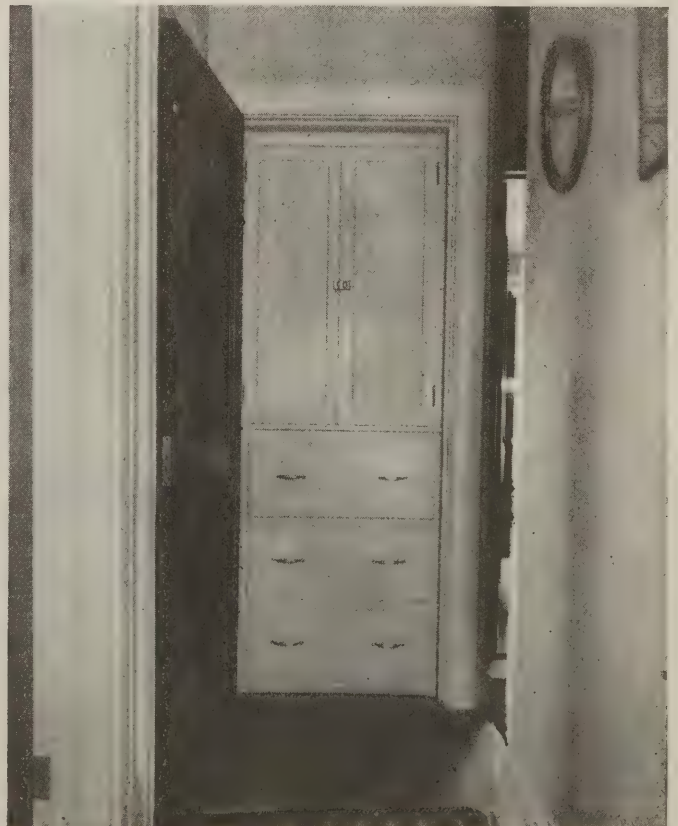
Note the wall radiator beneath the sink and the indicated convenience of the glassed-in shelves, drawers, etc. The practical character of these houses is marked by well-considered consistency in the use of the latest ideas in modern equipment



Living room of house 3, dining room at left



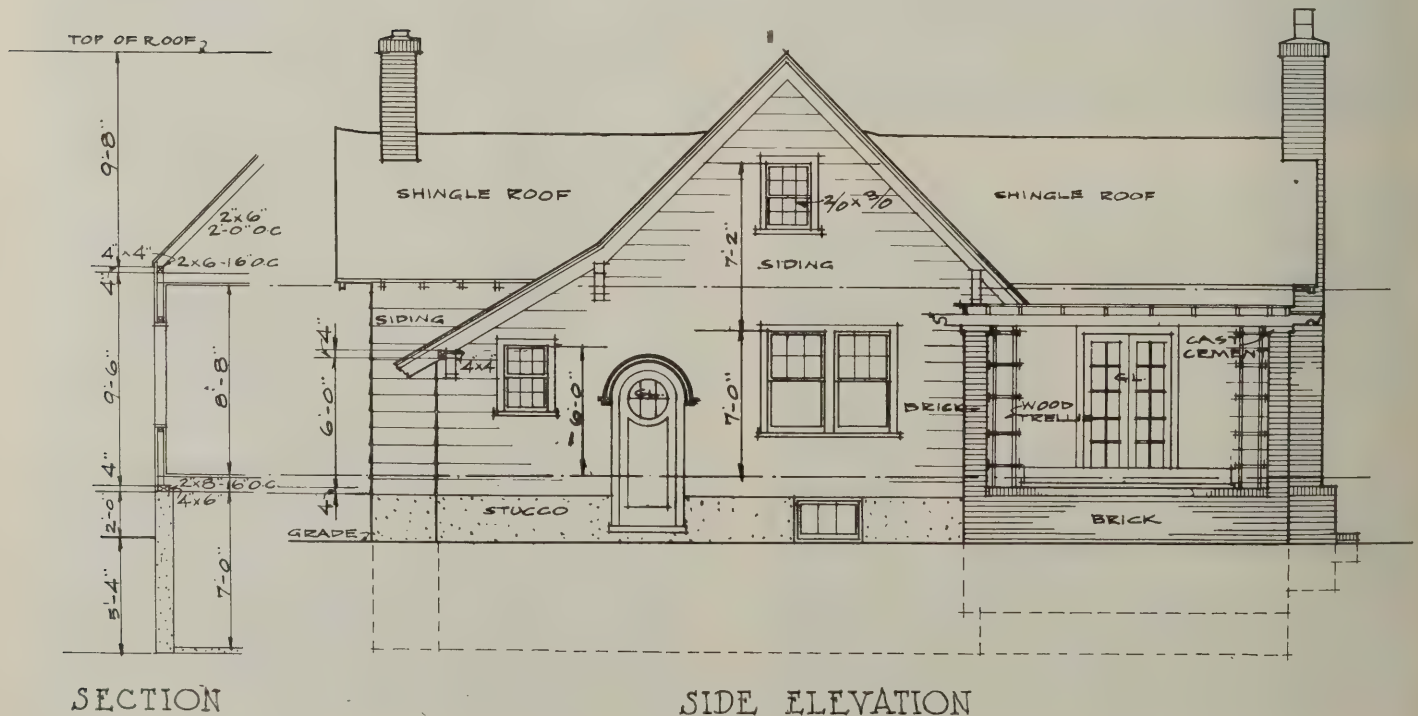
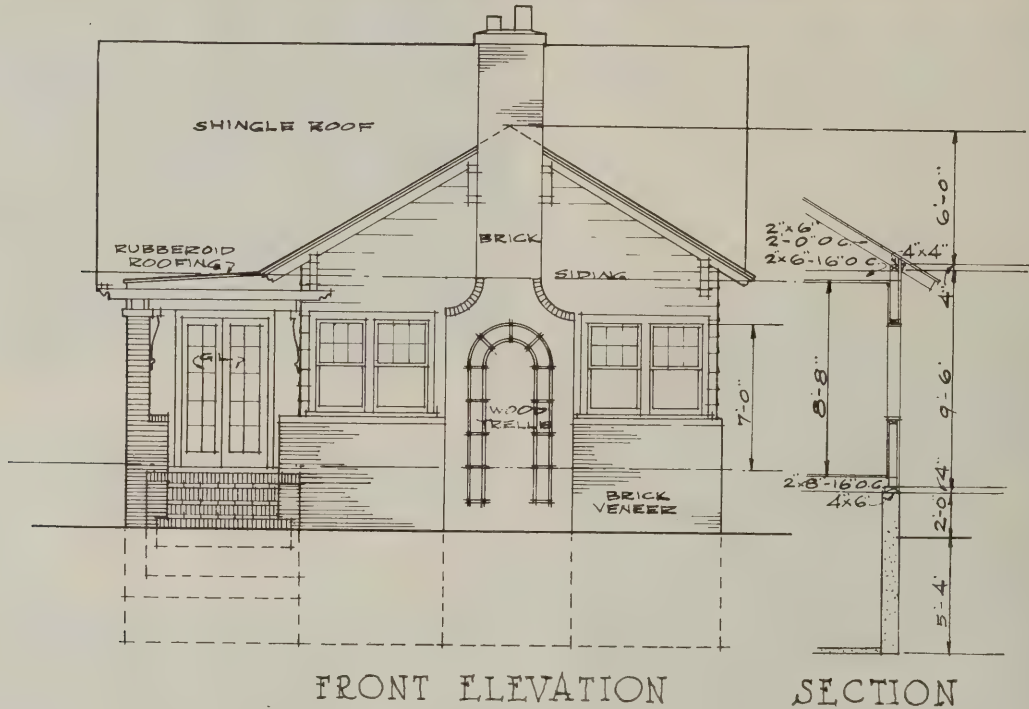
Corner of living room in house 3



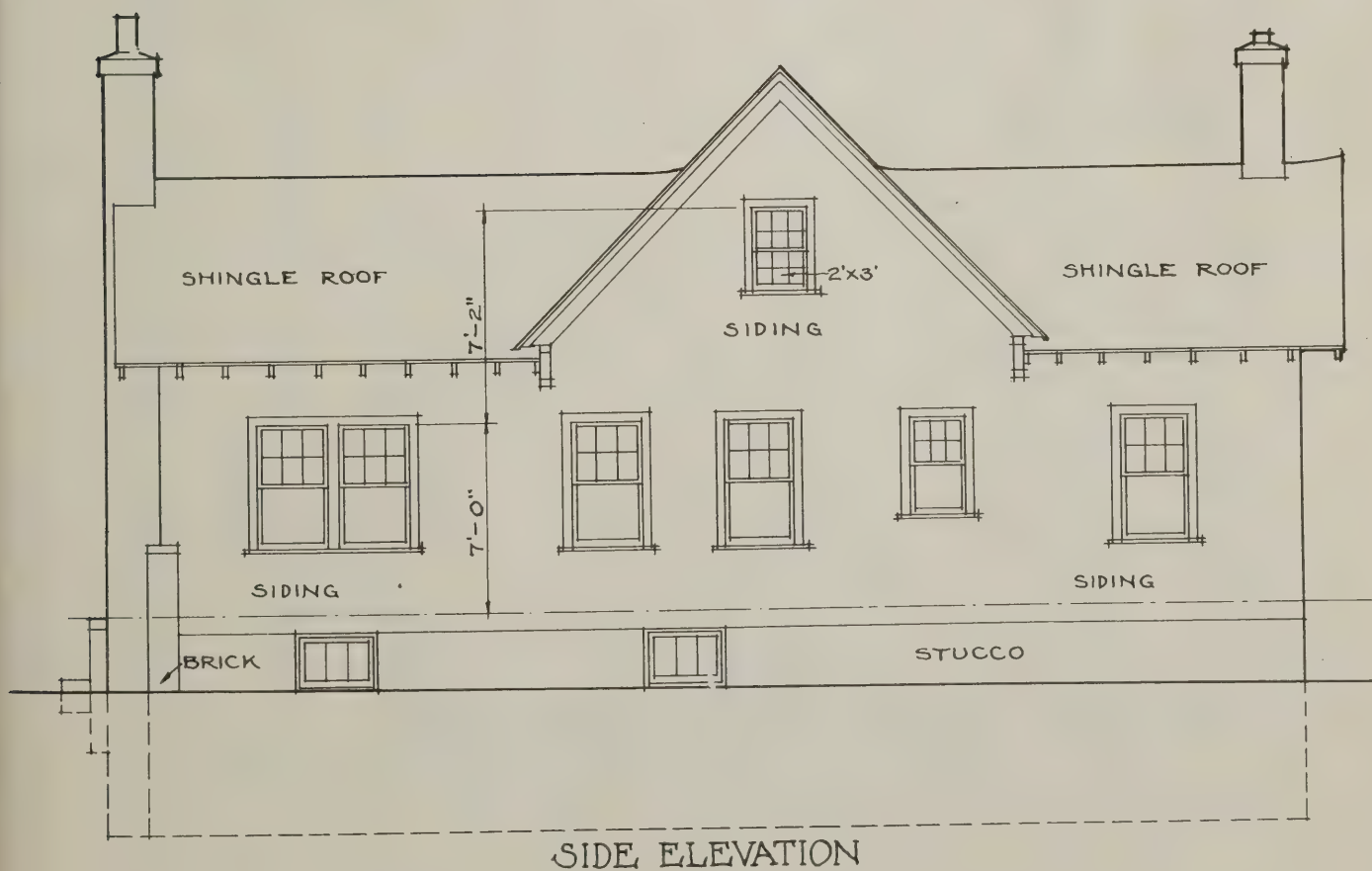
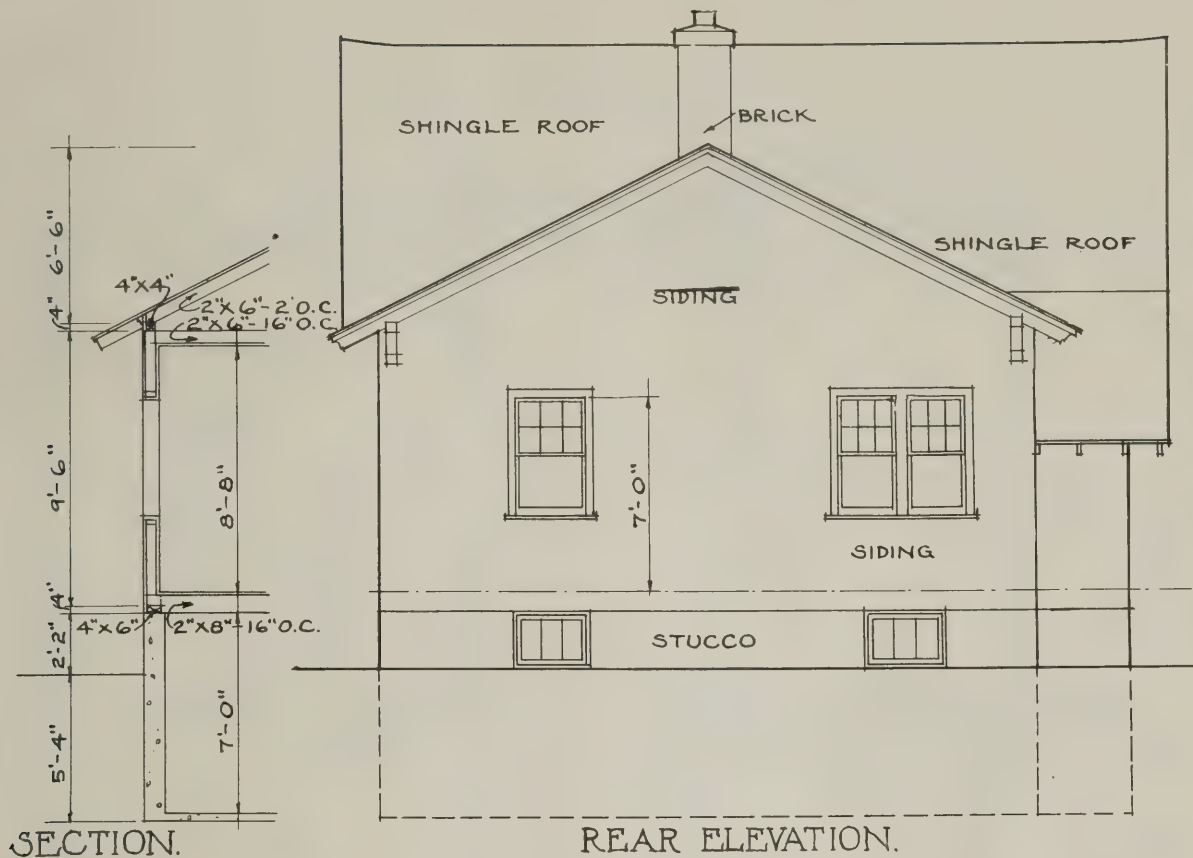
Napery closet and drawers in house 3



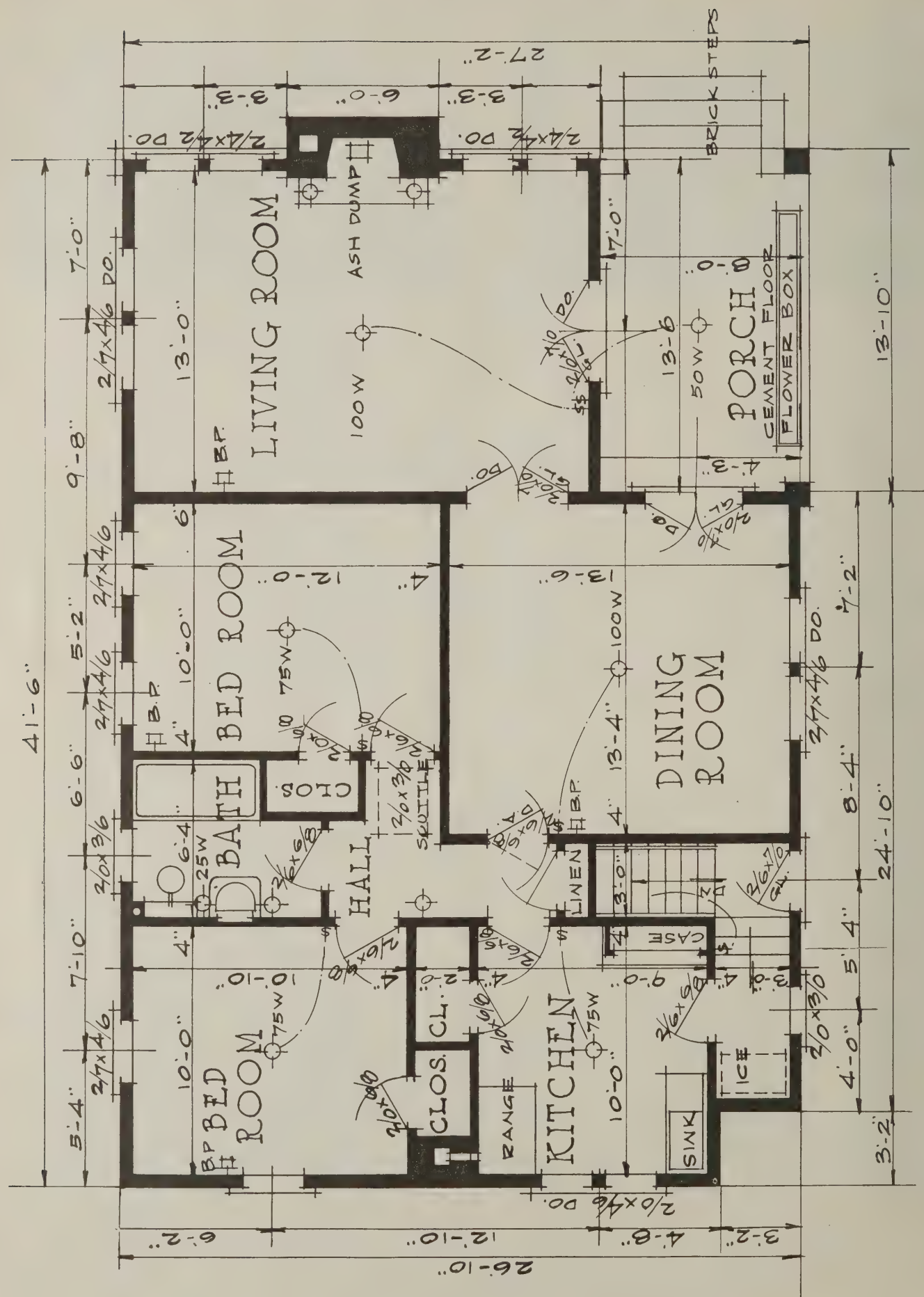
Typical houses built by Mineola Homes Company



Elevations of bungalow for Mineola Homes Company

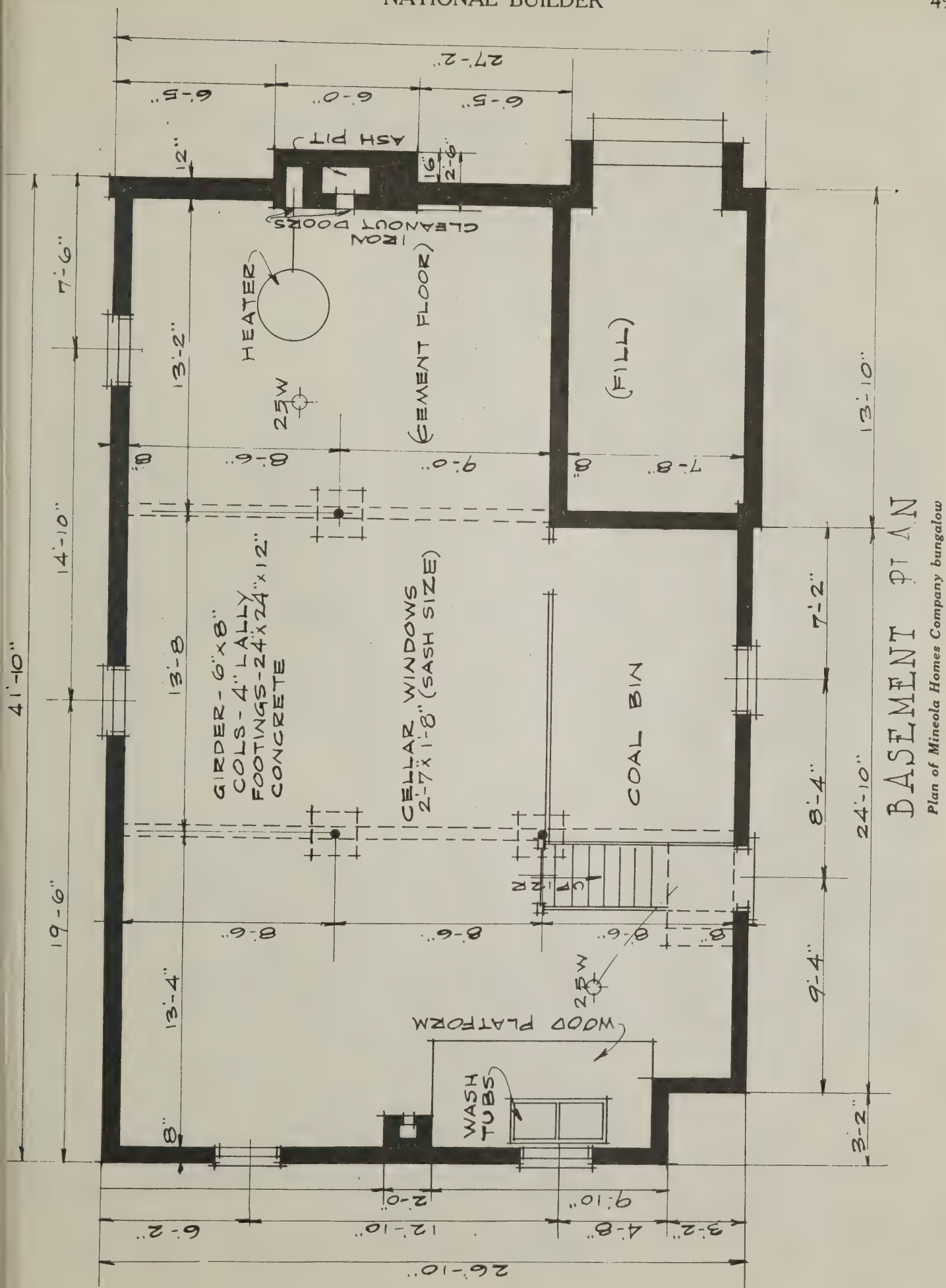


Elevation of bungalow projected by Mineola Homes Company



FLOOR PLAN

Plan of Mineola Homes Company bungalow



So far as possible these sales-producing houses have been built no nearer than 200 ft. apart, the idea being that such houses were to serve chiefly as object lessons to sell the intervening lots. The scheme has worked and during the past few years houses to the number of 150 have been built on the property, and the value of the property as a whole correspondingly enhanced. In the first nine months of 1922, 52 new structures were started on ten different streets. An interesting side light is that the land owning companies still have land for sale on every block opened but at ad-

sign of a particular bungalow that has proved popular is shown.

The prices of the houses illustrated

range from \$6500 to \$12,000, with 50x125 ft. lots. There is a profit for the Homes company in both the house and the lot.

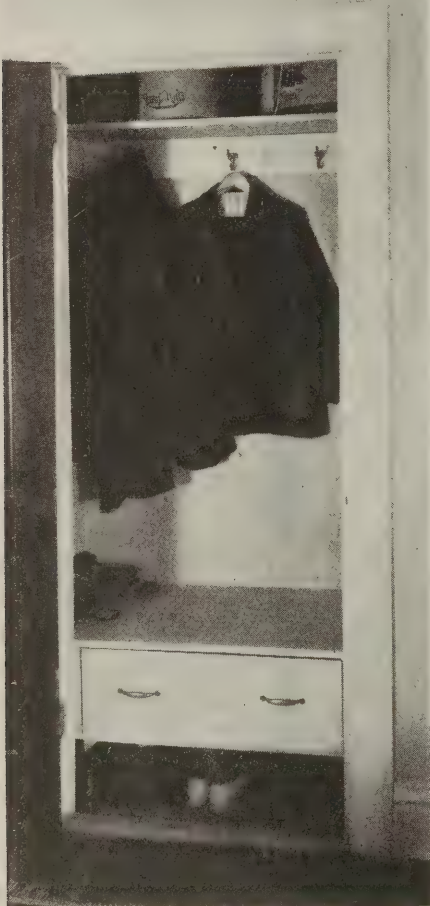
A "Better Homes" Week

UNDER the auspices of the *Delineator*, a national magazine for women, the vice-president of the United States, Calvin Coolidge, Secretaries Hoover, Wallace and Davis and other celebrities, including a number of state governors, are lending their names to the national celebration of a "Better Homes in America" demonstration week. A 54-page booklet has been published and is being distributed by the *Delineator*, containing specific instructions on how to conduct local campaigns for interesting the public in home-building and home-buying.

Of course all business men recognize that there is an ulterior motive in such campaigns, the purpose of which is to stimulate the purchase of house-building materials and house-furnishings, however public-spirited and impartial the primary purpose of various individuals may be. And, of course, there is nothing wrong in this, for the stimulation of honest business is a public benefit in itself.

While it may be good policy for those directly interested in building houses—architects, contractors, builders and real estate men—not to take too prominent a part in these publicity campaigns, they certainly should give them support and be alive to the opportunities that such stimulation of buying offers to get lines on new or prospective clients. Too often the contractor and builder takes little or no interest in such publicity work, and as a result he likewise plays second fiddle to the material dealer, the real estate dealer, and other factors in the house-building industry, who in the last analysis are no more essential to it than himself.

The "better homes demonstration" week is scheduled for October 9 to 14. Copies of the booklet or "Plan Book" on how to conduct demonstrations may be obtained for the asking from the publishers of the *Delineator*, 223 Spring Street, New York City, N. Y.



Clothes closet, house 3, Mineola Homes Company

vances of 50. to 60 per cent over original prices.

Possibly none of the houses could be said to represent the work of any one architect, but as a whole they represent the best ideas of a number of architects, and are a profitable example of the sales value of a good design.

Examples of Mineola Houses

Herewith and in the "Style Sheet" of this issue are views of a number of the houses through which the Mineola Homes Co. has marketed lots on the plains of Mineola. As a general rule two-story houses are far more popular in this part of the country than bungalows, although the complete de-

Drainage Across Excavation

NOT infrequently a builder has occasion to tear up street paving near the curb and if a rain comes he is confronted with the problem of keeping his excavation from filling with water and at the same time not obstructing drainage. This problem has been successfully solved by a Los Angeles concern by building a 6 in. concrete wall (easily removable) and on top of the pave-

ment, completely surrounding the hole, or on three sides, while the fourth side is protected by the curb. Into this wall or dam at the lowest possible level and extending across the excavation is set an iron pipe 3 or 4 in. in diameter, which serves to carry the water across the excavation and thus prevents it backing up behind the retaining wall.



Illustrating a satisfactory method of protecting an excavation from being flooded. The pipe extends across the hole and is sufficient to carry all water that may flow along the gutter without interfering with the work or permitting water to back up

New England Colonial Type House in Kansas

Popular Style Even in the Plains City, Topeka

EVIDENCE of the great popularity of the colonial type of house may be found in nearly every section of the United States. A part of this popularity may be due to the sentiment of New England descendants and to the wide publicity given this style of house, but much is also due to the "homey" atmosphere and convenience

proportions and symmetry of the house are very pleasing. It is truer to type than many modern colonial designs.

The placing of the dormer windows in the rear of the roof instead of the front makes it possible to provide light and ventilation on the top floor without spoiling the simple dignified appearance of the

of the master-of-the-house, with a door on the opposite side, giving ready access to the pantry and the refrigerator—just as it should be. The den can also be entered from the main hall.

The kitchen, pantry and dining room arrangement is unusual and very handy. The bedroom layout on the second floor



Residence of Judge J. D. Hamilton, Topeka, Kan. Frank C. Squires, Architect. Another elevation is shown as No. 16, page 40, of Style Sheet

of the modern colonial type. Moreover, it is a simple type to construct and when properly designed to correct proportions both architect and building contractor may be proud of their jobs.

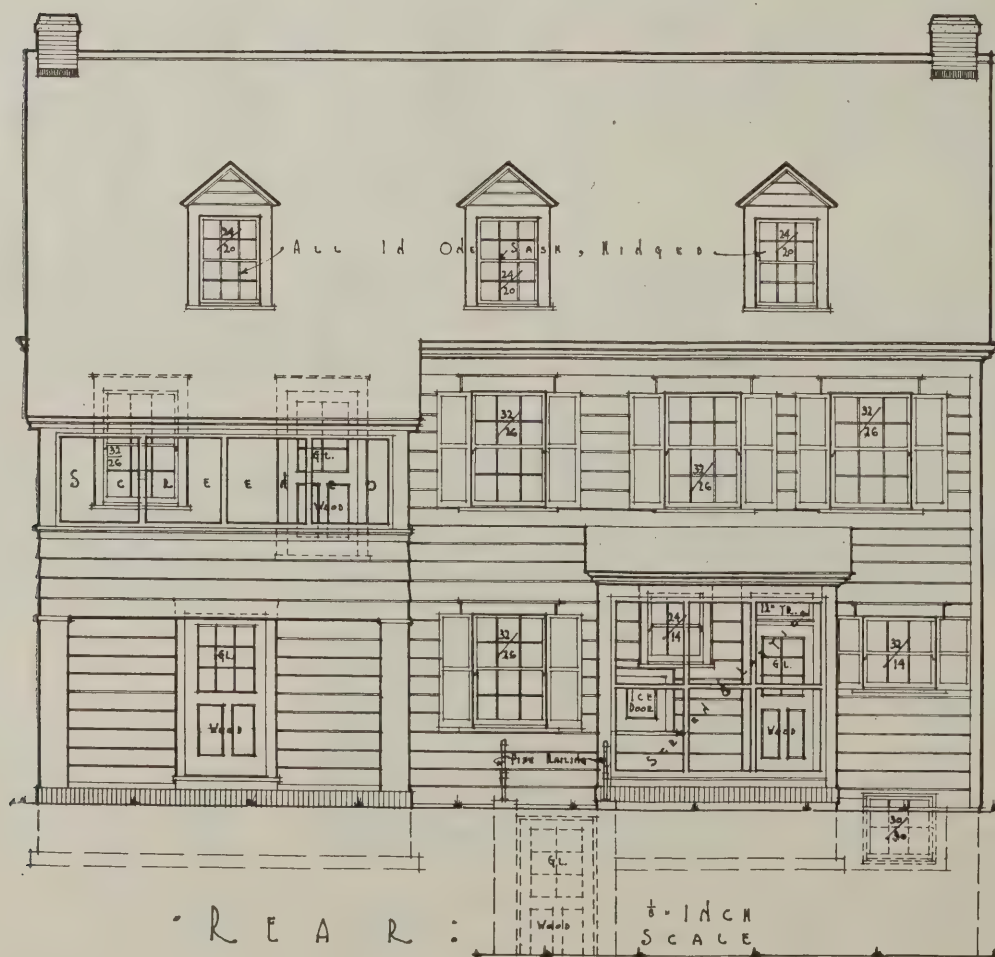
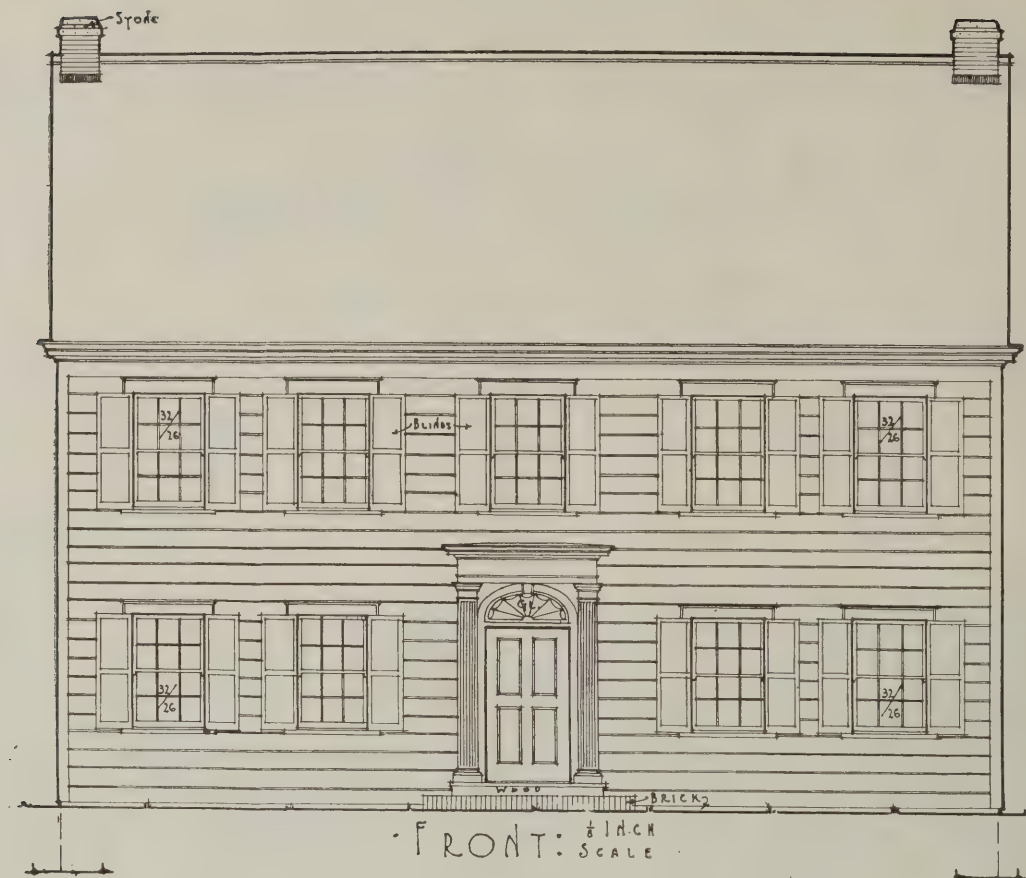
Such a house is that shown herewith, designed by Frank C. Squires, architect, of Topeka, Kan., for Judge J. D. Hamilton of that city. It will be noted that the

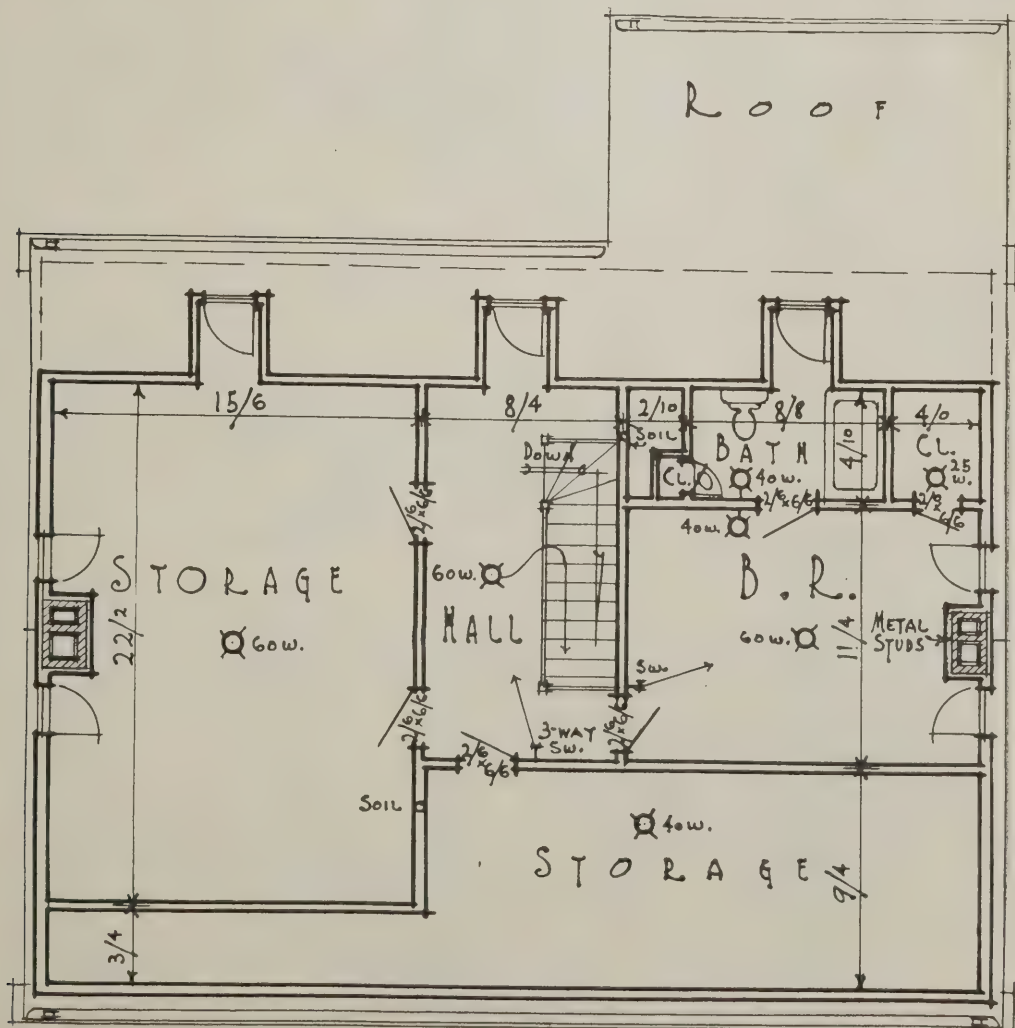
front. The sleeping porch and the kitchen porch, both modern features, are similarly taken care of.

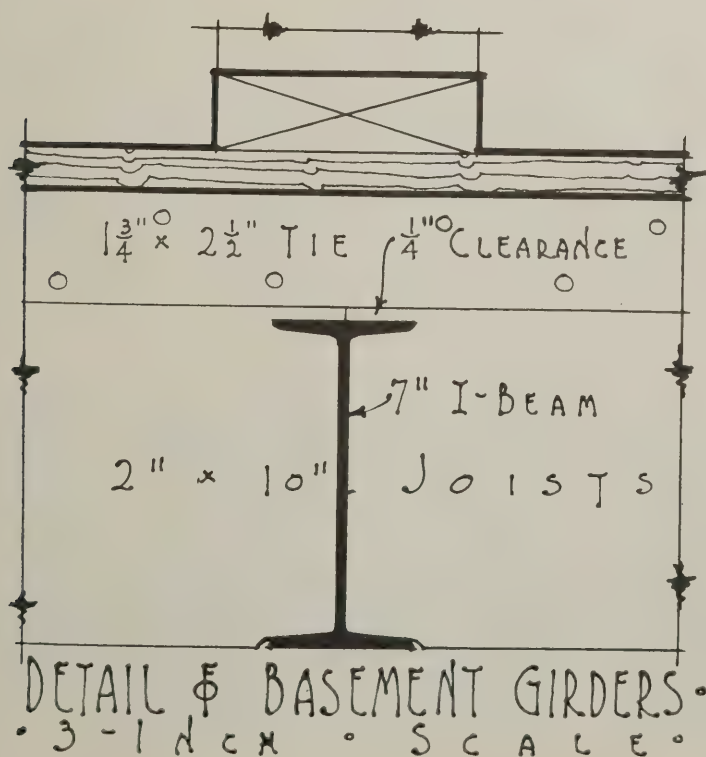
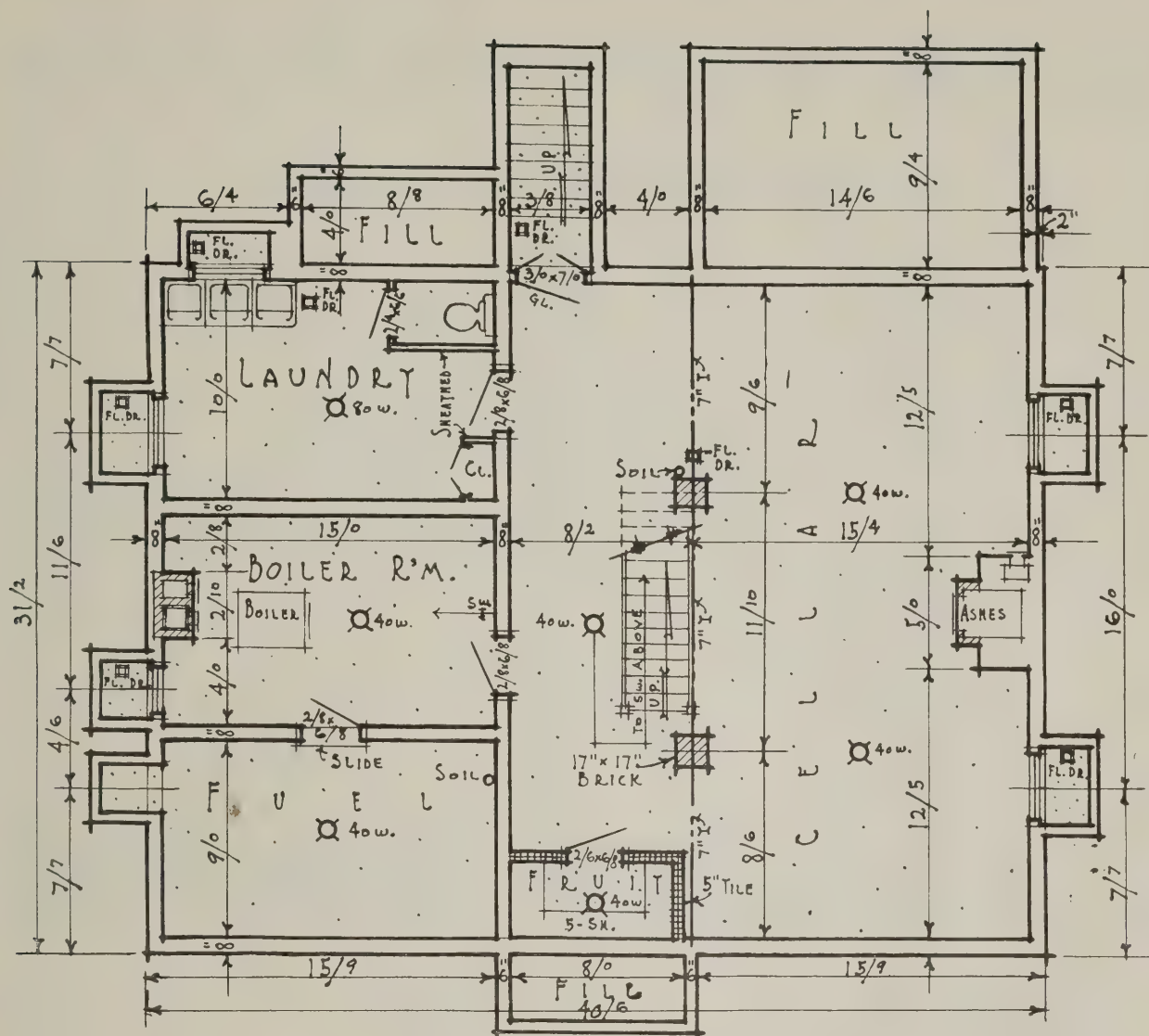
In the interior, the living room comes up to the hospitable atmosphere of the street front. This room is 15x30 ft. with a 5 ft. fire place, with window seats, banked on each side by book shelves. Opening out of the living room in the rear is the den

also shows every attention has been paid to convenience and comfort. Every room but the one nearest the bathroom is provided with a lavatory. The closets are unusually deep, and in the case of the two left-hand bedrooms, one closet provides an inside passageway from one bedroom to the other.

The convenience of this is evident. The







large bedroom, the smaller bedroom and the sleeping porch are the master's suit, providing entire privacy for a small family, were the two other bedrooms to be occupied by guests; or in the case of a larger family providing convenience for the parents and the baby without disturbing the rest of the household.

The attic floor layout is also unusual and attractive. One dormer lights the bathroom, one the hall and the other the large plastered storeroom.

All in all, Mr. Squires has provided a remarkably true example of the New England colonial type and has given its interior all the modern conveniences of a high class home without sacrificing any of the charm of the genuine old colonial home.

Farm Sells for \$6,617.65 An Acre

THE Mahoney farm, a 34-acre bit of real farm land on Lake Michigan in Kenilworth, just north of Wilmette, a suburb of Chicago, was sold recently for \$225,000 to a real estate firm, who will subdivide the tract. In the 50's this farm was bought for \$1,750.

The Ideal Hog House and Why

By R. S. Ekholm

Chief, Architectural Department, Hudson Mfg. Co., Minneapolis, Minn.

THE handling of hogs with the least amount of labor, and in the most sanitary way, are the main things to consider in a modern hog house. The plan here shown was designed by an architect who has spent many years planning farm buildings only and who has made a special effort to show his idea of a strictly, modern sanitary hog house. The orientation, or the placing of the building with respect to geographical direction, is very important.

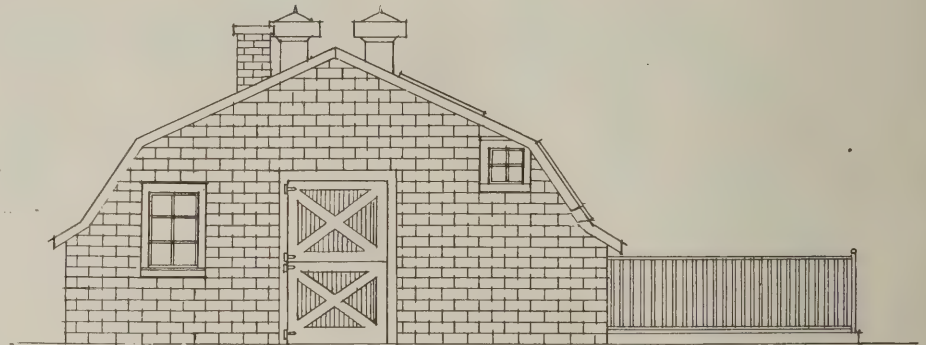
The walls are built of hollow tile 4 ft. high with a low self-supporting roof. This roof at first sight looks to be more expensive than the other more common types, but is actually cheaper in both labor and material, besides having the advantage of a clear span with no girders or posts to obstruct the view or light. The rafters are 5 ft. and 9 ft. long and are spaced 30 in. on centers with 1x6 in. ties all cut from even length lumber.

A low building of this kind has many advantages over higher buildings. It is much warmer by being down out of the wind. The low roof keeps the warm air down nearer the floor where it is needed and the round slope allows the wind to blow over with the least amount of resistance. The walls and ends being built of 5x8x12-in. hollow clay tile with a double air space afford wonderful protection against cold as well as being permanent and sanitary.

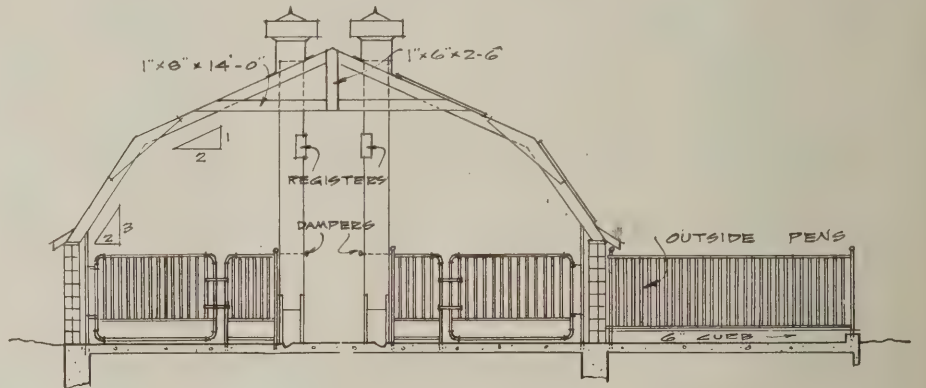
The floor is of concrete with a slight slope to the center, where the gutters carry off all the liquids to floor drains in the center of the house. These drains connect with a drain tile to a cesspool or out into a sand or cinder pit dug at least 10 ft. from the building and about 4 ft. below the surface.

At the west end of the building is a feed room in one corner, with a high window to admit feed or grain, and a built-up section or slide door to hold back the feed. In the other corner of the west end is a room for cooking feed and storing sacked feed. There is a chimney and one large window in this room.

The remainder of the floor space is divided into 12 pens, 6x8 ft., with six on each side. The six pens on the north side are for farrowing, being equipped with farrowing brackets and have no doors to the outside. With this arrangement there are no openings to the north to allow the cold winds to blow in. The farrowing rails can be locked down or locked up out of the way as shown in Fig. 1. When down, they afford a protection for little pigs, as



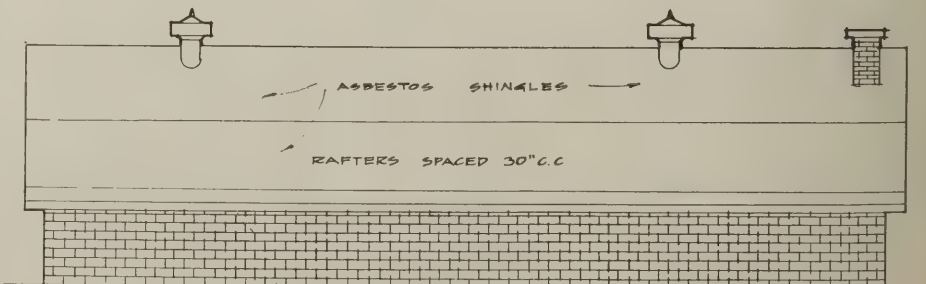
WEST END ELEVATION



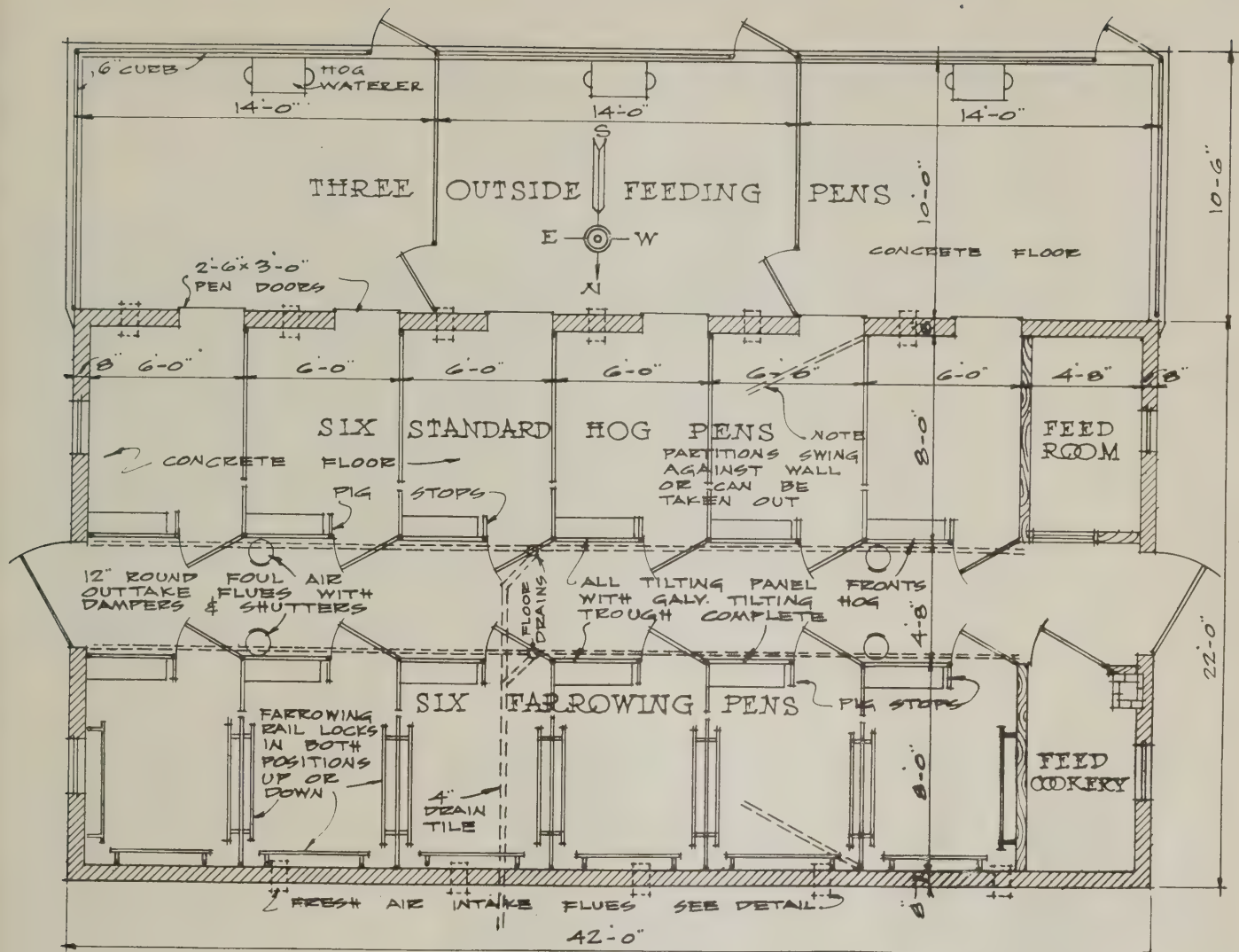
CROSS SECTION



SOUTH SIDE ELEVATION



NORTH SIDE ELEVATION



GROUND FLOOR PLAN

it is a known fact that a sow will seldom lie down in the center of a pen, but prefers to lie up against a wall, where she is very apt to smother her young. These farrowing rails when raised lock themselves in this position and the entire partition can be swung back against the wall or removed entirely and stored away, thus throwing two or more pens into one large pen for small pigs.

Pen Equipment

The fronts of all pens are constructed

with a tilting arrangement by means of which the pigs are kept back until the trough is filled, as shown in Fig. 2. Note how the pig stop and tilted panel effectually keep pigs from reaching trough.

After feeding, the trough is tilted forward, as shown in Fig. 3, and the panel lowered, allowing the trough to drain directly over the gutter or be flushed out with water and kept out of the pen until next feeding.

All steel panels are provided with a gal-

vanized sheet-iron bottom. This is to prevent small pigs from crawling between the uprights or getting caught in the panel, as the sow in the adjoining pen will generally eat a little pig that gets hurt or starts squealing.

The six pens on the south side are of the same construction less the farrowing rail, but with a swinging or drop door leading outside to the three concrete feeding floors inclosed with a panel set in a 6x6-in. concrete curb. A floor of this kind will pay

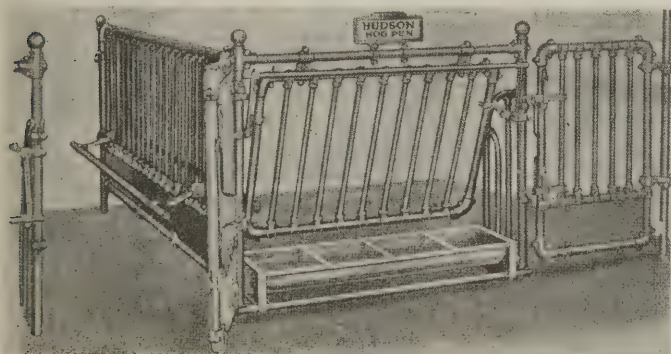


Fig. 1—Pig stop on front of pen

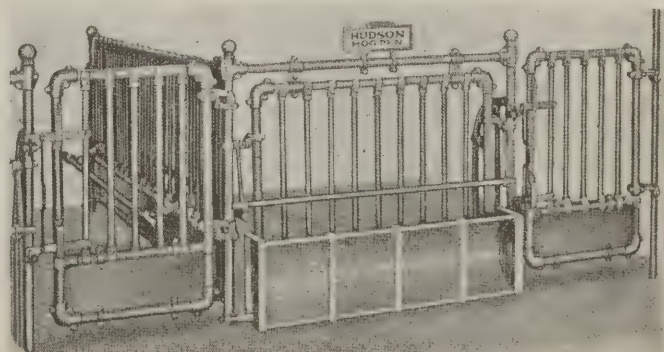
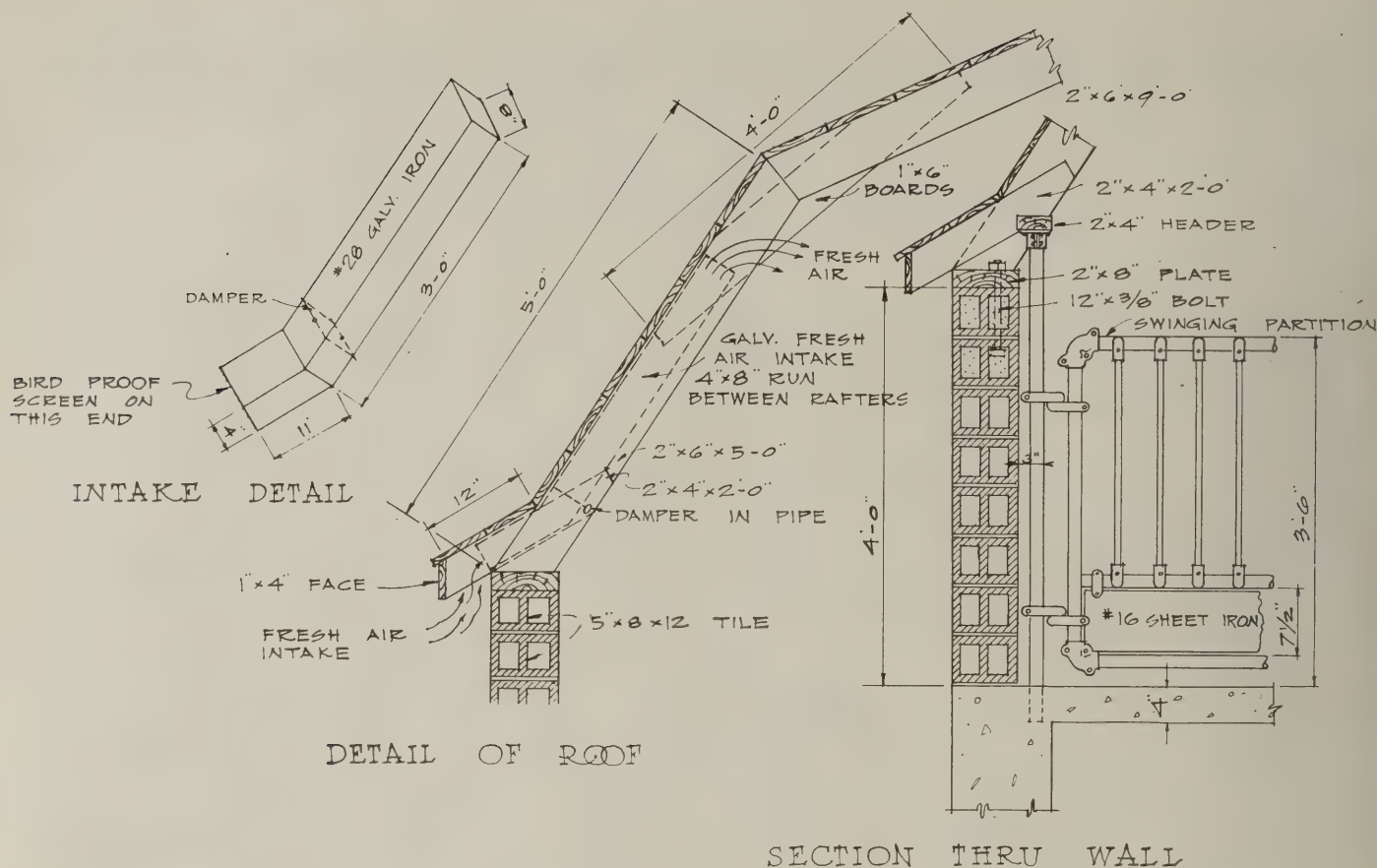


Fig. 2—Tilting trough for cleaning



for itself in a short time. It saves the entire amount of feed thrown on it and is a great deal more sanitary than to have the hogs digging in the ground looking for corn.

An automatic hog waterer is shown in each outside pen, which will allow the hogs a sufficient amount of water at the time they want it.

The entire house as well as the outside feeding pens are provided with a sufficient number of hog proof gates to allow free access to all pens.

Ventilation

Heretofore the ventilation of a hog house was thought unnecessary, but modern science has shown that it is one of the biggest money savers that can be installed. It creates a continuous movement of air, taking off the heavy carbon dioxide gas and foul air from near the floor and supplying fresh air near the ceiling.

There are four round 12-in. foul air flues located near the center of the house with twelve 4x8-in. fresh air intakes at intervals, six on each side. The foul air flues are constructed of heavy galvanized sheet metal and are run straight to the roof, the same as a chimney, and are equipped with heavy channel iron legs which hold them 16 in. off the floor. A damper is provided to close off the flue if required and a register is located near the ceiling to take off the hot air on warm summer days. Each flue is also provided with a thermometer so that

the temperature of the house can be watched and regulated. The top of each flue is fitted with a special designed vent cap that extends up, clearing the roof, and prevents down-draughts, no matter from which direction the wind may blow.

The fresh air intakes, as shown, are set between the rafters and are equipped with dampers and bird-proof screens at the lower ends.

The sun light, which is a very important detail in any building, is taken in through

two large windows on the east end, and 26 large roof windows on the south side of the roof. These windows are 28 in. wide by 48 in. long and make a continuous run of glass with only a 2-in. break at each rafter. The glass is slightly frosted, which breaks up the bright glare and throws an even light on the inside, avoiding all shadows.

This building is placed east and west to allow the sun to shine on the floor during all times of the day or year. It affords warm, sunny outside pens on the south side. It keeps out all cold winds or draughts from the north side, making as near as possible a modern sanitary hog house.

A Construction Building

A \$2,000,000 building, intended to house the many associations, societies and clubs of the building industry of Los Angeles is now being planned by these various factors of the industry in that city.

Interested in this project are the Southern California Chapter of the Associated General Contractors, Builders Exchange, American Association of Engineers, American Institute of Architects, American Society of Civil Engineers, Portland Cement Association, Building Material Dealers' Credit Association, Brick Manufacturers' Association and a score of master building trades' organizations.

Needham Concrete-Unit System Applied to Apartments



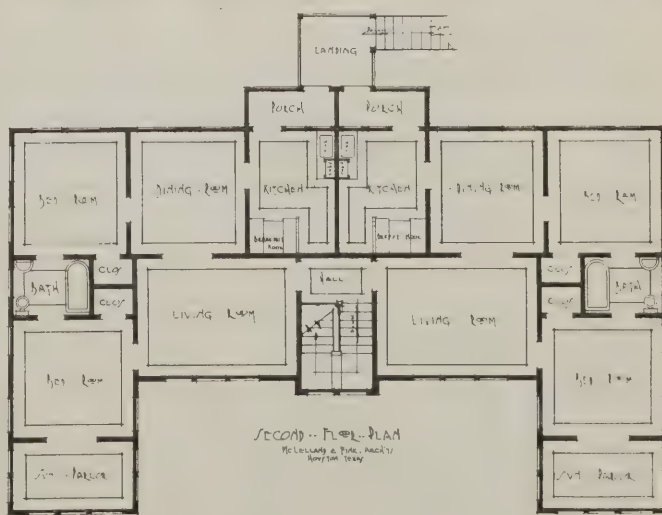
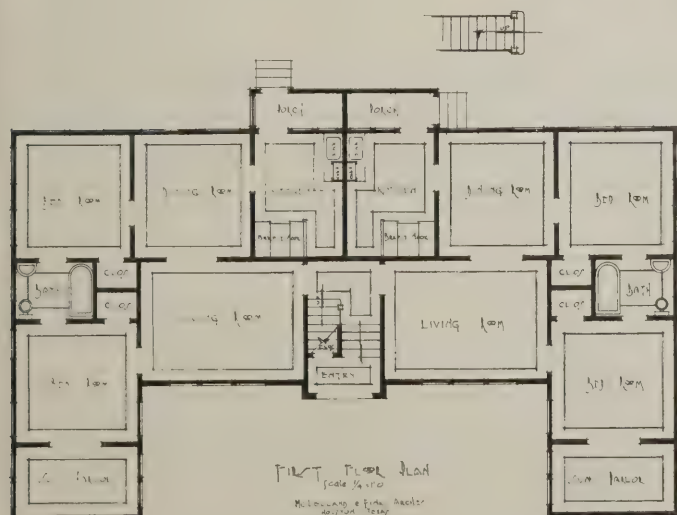
Charlton Apartment Building. Started November 12, 1921. Progress as of November 21, 1921

THE Needham system of concrete construction, using pre-cast wall units of channel shape, described in detail in the June issue of NATIONAL BUILDER, as applied to bungalow construction, has also been successfully applied in the construction of apartment houses. The view herewith shows the Charlton apartment house in Houston, Texas, both during construction and completed.

This building was designed by John McLelland, a Houston architect, and while its lines are necessarily simple, it illustrates the flexibility of this system of construction, where the unit members are much larger than in wood or steel frame construction.



Progress to December 15, 1921



The classification, distribution and appli-

cation of these expenses will be discussed in subsequent articles.

The totals posted to this account must be given effect in detail by posting to Expense Ledger (Fig. 28), and the aggregate of the totals as shown by such Expense Ledger sheets must be agreed with this account monthly.

This account will be closed into "Profit and Loss—Current" account at the end of the month by journal entry.

Administrative Expense—Controlling Account

To be charged monthly with the total administrative and general office expenses from the "Administrative and General Office" column of the Purchase Analysis (Figs. 7 and 7A), which are posted in detail to Expense Ledger sheets. The total of such Expense Ledger classifications must be agreed with this account monthly.

At the end of the month this account will be closed into "Profit and Loss—Current" account by journal entry.

Interest Earned

Credit this account with income from interest earned.

It will be closed into "Profit and Loss—Current" account monthly by journal entry.

Discount Earned

Credit this account with income from purchase discount earned.

Close it into "Profit and Loss—Current" account at the month's end by journal entry.

Interest Paid

Charge this account with all interest paid and with interest accrued at the time credit is passed to the "Accrued Interest" account.

At the end of each month this account will be closed into "Profit and Loss—Current" account by journal entry.

Discount Allowed

This account will be charged with all cash discounts taken by customers.

Monthly, by journal entry, it will be closed into "Profit and Loss—Current" account.

Balance Sheet, and Profit and Loss Statement

It will be noted that every account in the "Income and Deductions" section of the General Ledger, as shown by "Chart of Accounts" presented in a preceding article, is closed into "Profit and Loss—Current" account at the end of each month.

By this means, the profit for each month is determined, which serves to balance the "Assets" and "Liabilities" sections of the General Ledger.

A Balance Sheet and Profit and Loss Statement can then be made up, which will give a clear, concise and easily read statement of the true condition of the business.

Southern Achievements and Prospects the Best Ever

Building Permits for the First Six Months of 1922 Total \$215,531,428 in 84 Cities—Gain of 42 Per Cent Over 1921*

By G. L. Miller

President, G. L. Miller & Co., Atlanta

BUILDING permits in the south for the first six months of 1922 increased 42.7 per cent in value over permits issued for a similar period in 1921. In 84 cities of 16 southern states where comparative figures are available, \$215,531,428 of new building was begun, representing a gain of \$64,563,723 over the figures of the previous year.

In these brief, cold, statistical statements, there is a marvelous romance of progress which has seldom been equaled in the history of America; there is a story which should challenge the attention of every thoughtful business man and investor in the nation.

The south is forging ahead. It is awake to its opportunities. It now realizes its vast, potential resources—resources that are incalculable in variety and extent. What is most significant of all, it has greatly increased capital with which to develop them and a faith in the future that is rapidly attracting more capital and more development.

The Survey Diagnosed

The basis of the present survey is very broad. It includes every source of digested information which could be obtained, and in addition, the chambers of commerce of the larger towns and cities have contributed additional statistics. The *Manufacturers' Record*, perhaps more closely in touch with all forms of southern development than any other agency, has been of invaluable assistance. The federal reserve banks at Richmond, Atlanta, Kansas City, St. Louis and Dallas have furnished concise information relative to building progress in their districts.

A diagnosis of the statistics reveal in a graphic way the development of the various states. The 42.7 per cent increase for the entire section is not evenly distributed. Because of Baltimore's slump, Maryland shows a decrease of 22 per cent, while Mississippi's rapid development is revealed in an increase as high as 198 per cent.

The most striking fact to be gathered from this compilation is that those states which in the past have been most undeveloped are now at the forefront of building operations. Florida, which, 40 years ago, was scarcely less than a continuous stretch of swamp, hammock and pine barren, shows

the way with an expenditure of \$52.72 for each person living in the state. It is also interesting to note that while it leads the other states in per capita building, it shows practically no increase over the previous January to June period, which indicates that the unusual building program has been in effect for some time past. Those who are in close touch with the affairs of the state realize that there is little likelihood of any abatement in the near future.

Oklahoma, ranking second in per capita building, is another example of a race against time to take advantage of boundless resources.

In 1900, Oklahoma's largest city was Oklahoma City, with 32,452 people. Muskogee came next with 14,418. Today the former has a hundred thousand, while Tulsa, a small village of 20 years ago, approaches the 90,000 mark. It is little wonder that building figures are mounting with incredible speed to keep pace with such development.

North Carolina, coming third in the list, now leads all southern states in its manufactured products, and industrial villages are rapidly expanding into cities.

It is in states where the ancient cities are to be found that building is lowest per capita—where Charleston, Savannah, Mobile and New Orleans have built their structures gradually from year to year, or some of the older inland cities maintain a steady growth.

"A History of Architecture," by A. D. F. Hamlin, professor of the history of architecture in Columbia University; 5½x7½, 479 pp., 235 illus. New and revised edition of work originally published in 1895. The purpose of the book is to sketch the various periods and style in architecture in a very broad, brief way for the benefit of those who want accurate information in a small compass. The majority of technical terms used are defined or explained in the context, and the small remainder in a glossary at the end of the book. A treatise like this should be valuable to every one who builds, as well as to professional architects, because any work is much more interesting to the workman if he knows something about its character in addition to knowing how to solve its construction details. Published by Longmans, Green & Co., 55 Fifth Ave., New York City. Price \$2.50 net.

*Summary made for the "Atlanta Constitution," Atlanta, Ga.

An Attractive Suburban Furniture Store

SHOWN in the accompanying illustrations is a suburban retail furniture store which, besides presenting a very attractive outside appearance in general, possesses a number of points of quite exceptional interest. One of these consists, for

The building, as regards construction, is built principally of brick. The entire front, however, is given an exterior finish of deep cream cement-stucco. The roof covering, except for the tile-roofed entrance, consists of roofing composition. The main part of

the building is two stories in height, but the display rooms on the front are but one story high, with their roofs comprising balcony-like appearances. A flower-box is featured at the middle group of second-story windows, and black iron railings are introduced in the roof enclosures of the display rooms.

The building is located in Los Angeles, Calif., at 444 North Western avenue, in a suburban business district, and is occupied by the Root Furniture Co.



A suburban furniture store in Southern California

instance, of a charming bed of flowers effectively placed before the front entrance. The entrance, as will be discerned, is designed in the nature of a sort of recessed courtyard, with a red-tiled porch roof over the back part of the space; and it is in the center of this recessed area, which is paved with cement, that the flower bed is prominently and attractively featured.

Another very interesting feature of the building is comprised of the forward-reaching extensions or wings which enclose the courtyard on the sides. These provide two especially attractive and practical show rooms, their large plate-glass windows permitting views of the interior from both the sidewalk and the recessed courtyard. The rooms are of quite ample dimensions to permit home-like treatment, and consequently are usually so furnished as to represent, for instance, either living rooms, dining rooms, bedrooms, or some other home division. They are accessible from the main part of the building through French doors, and hence displays of drapery effects are also made possible.



A bed of living flowers is a feature of the recessed entrance

An Inhabitable Garage

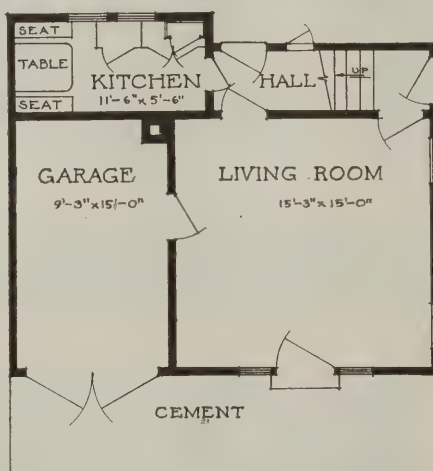
THRIFTY persons often invest their savings in the purchase of a city lot long before they are able to finance the building of a home suitable to their expectations. Once they obtain possession of the lot, however, they frequently find it can be utilized to good advantage in saving for the house they ultimately expect to build.

The way they do it is to put up a garage on the back of the lot and live in it. This has become so popular a method of saving in Houston and Dallas, Texas, that "knocked-down" garage manufacturers have developed a considerable business in advertising a particular type of garage suitable for temporary habitation.

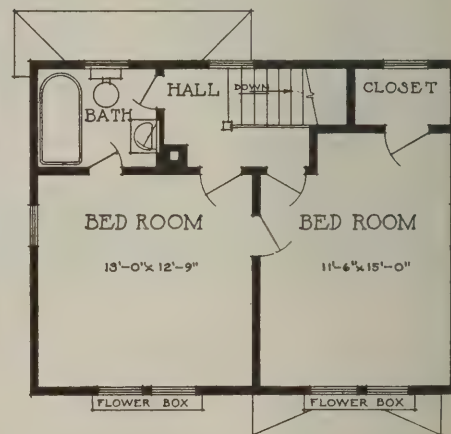
In the South a back-yard garage with one or two living rooms on the second floor is the standard type of construction. Negro maids, or house servants, are invariably housed thus. Consequently a garage with living rooms is a safe investment for the family which intends to inhabit it temporarily, but has dreams or expectations of greater affluence.

One of the most elaborate garage-houses of this type is shown in detail herewith. It was designed and built by A. R. Eckert, contractor and builder, of Dallas, Texas, for one of his clients. It will be seen that when the family mansion is built the garage-house can be easily converted into a two-car garage with servant rooms above. The total cost of the building was \$2750.

It is interesting to note in this connection the report of the *Index* of the A. G. C. which shows that out of 208,000 buildings of all kinds in 196 cities in 1920, 93,000 or 45 per cent, were garages. The number of dwellings was 75,620. "This great preponderance of garages," says the *Index*, "may seem surprising until we reflect that it means only one garage for each 13 auto-



FIRST FLOOR PLAN.



SECOND FLOOR PLAN.



NORTH ELEVATION



WEST ELEVATION.

*More house than garage**More garage than house*

mobiles added to the registration lists of the United States during 1921. Although

these 196 cities include but one-third of the population of the United States, we

cannot help wondering where all the automobiles are housed."

Make the Private Garage Artistic

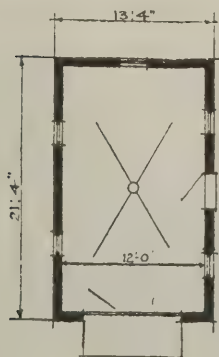
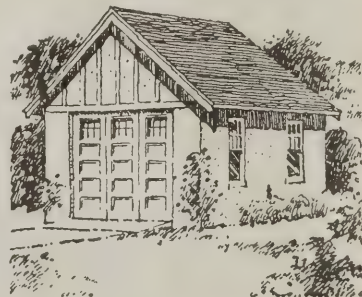
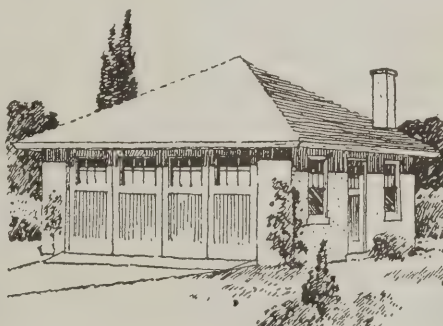
THOUSANDS of small garages have been put up which are architecturally so bad as to mar the harmony of the home surroundings and with no apparent thought as to the valuable nature of the contents

theft and fire. Every owner should realize that a garage which increases the fire risk on the property may prove more of a menace than a convenience.

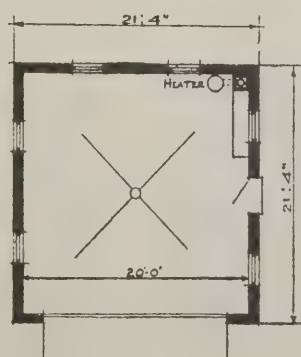
The home owner can reasonably expect

with the owner's house.

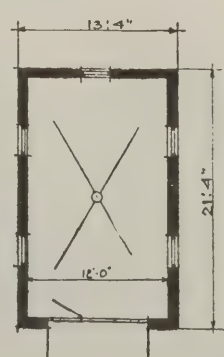
Garages shown in the accompanying illustrations furnish suggestions for simple types of little buildings of reasonably good appearance and of practically fireproof and



FLOOR PLAN



FLOOR PLAN



FLOOR PLAN

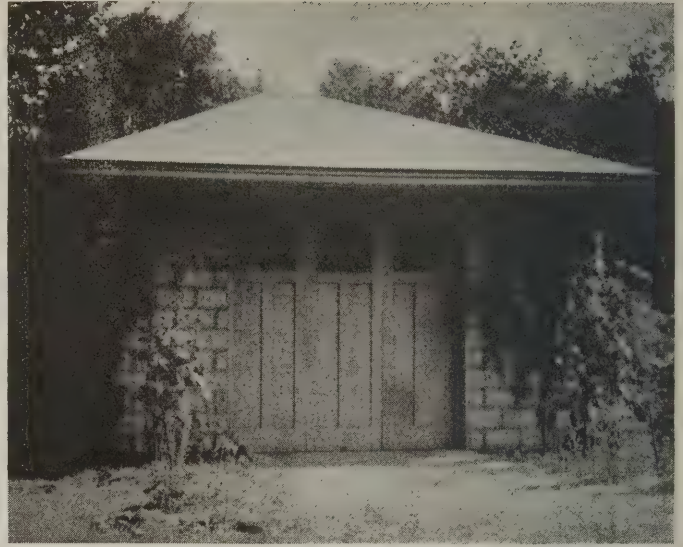
nor the likelihood of fire through the presence of electrical apparatus and gasoline. The amount of money invested in the average automobile justifies a substantial garage that will afford protection against weather,

to use and have to look at his garage for a long time, and at only a little more expense he can have a structure that is well located, correctly scaled with respect to the surroundings and agreeable in architecture

permanent construction. The wall surfaces of the latter are either of exposed surface block or portland cement stucco. Being a service structure, only modest ornamentation is appropriate for these. The garage



*Fig. 1—Plain but attractive garage in Watertown, Wis.
A large single-car type*



*Fig. 2—Broad, overhanging eaves, such as these protect the owner from rain while unlocking the doors in wet weather.
This garage is at Carthage, Ill.*



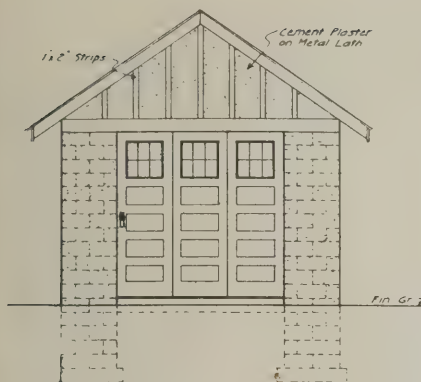
Fig. 3—Two private garages in Auburn, Ind., with roofs and lines corresponding to those of the residences



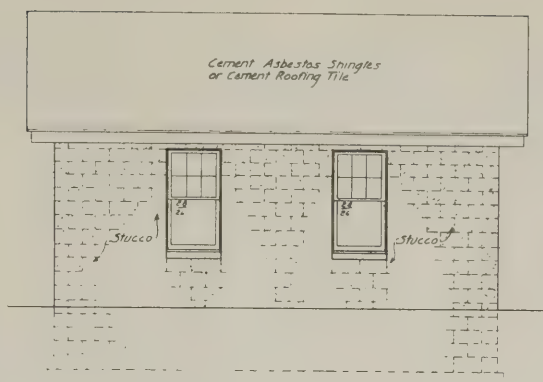
Fig. 4—Garage at Duluth, Minn., made more attractive by setting at an angle and locating in a flower garden



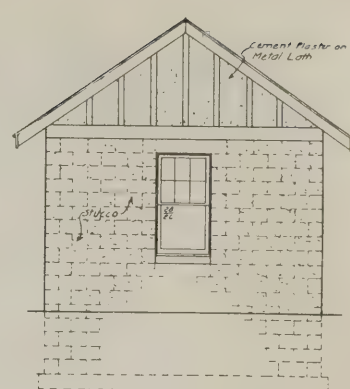
Fig. 5—Two-car garage which harmonizes with a duplex apartment house. A simple and practical type



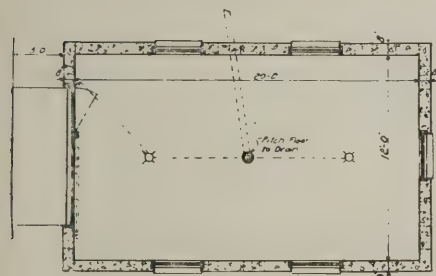
Front elevation



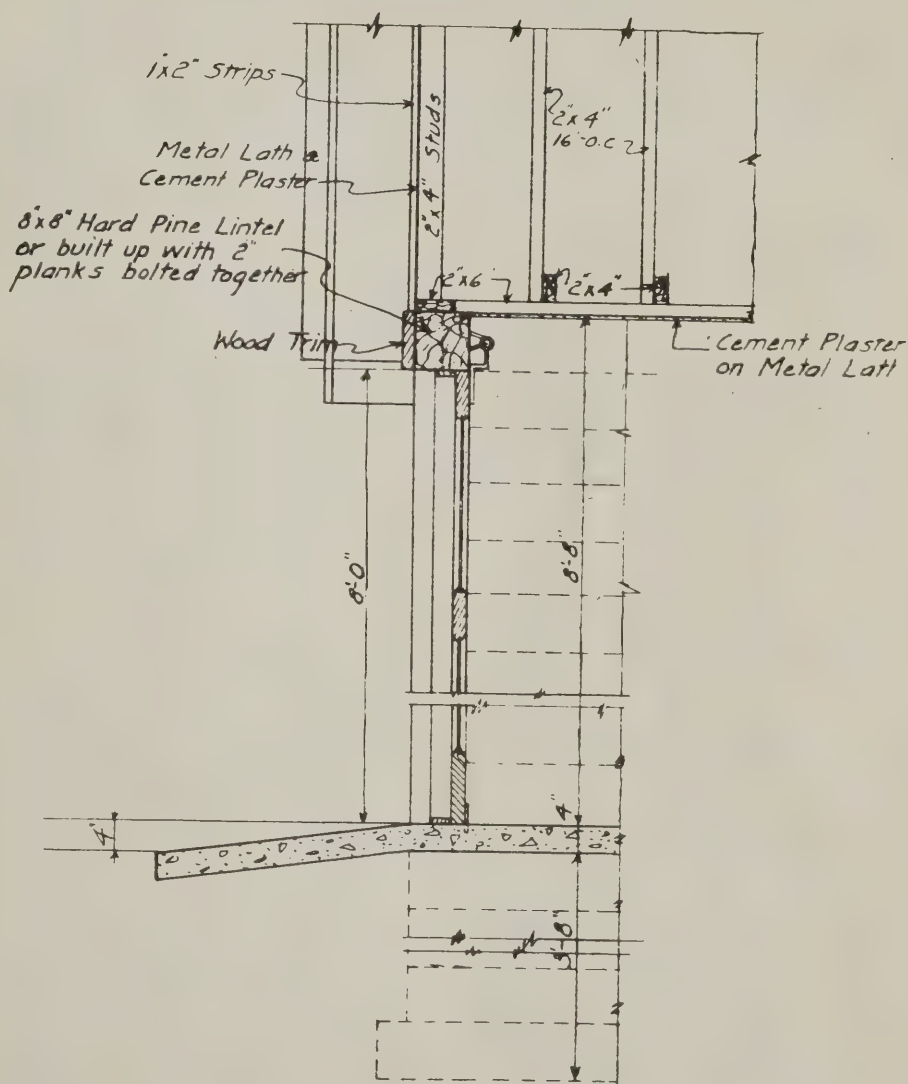
Side elevation



Rear elevation



Plan



Section through garage doors

is best made plain and conservative in design, depending on good proportions and good quality of materials and workmanship to produce pleasing effects. A planting of shrubs and vines, well arranged, will relieve even the plainest structure.

The plans for the garages shown suggest a recommended method of building suitable for use in garage construction of various kinds. The walls may be plastered on the inside if desired, but are usually left without covering. Cement plaster on metal lath is used on the ceiling so that the interior is practically fireproof. Metal lath and cement plaster are also made for the overhang of the eaves.

Deep Joists of Poor Lumber Better Economy Than Shallow Joists

IN determining the size of joists and the grade of material to be used, the following points should be borne in mind:

The stiffness of the floor is quite important if the dishes are not to rattle and the plastering to crack. The stiffness of a joist of a given span under a given load increases as the cube of the height, that is, a little more than three times as fast as the height increases. This is true so long as it is not so thin and high that it buckles sidewise under the load.

The stiffness of a joist is but little influenced by the grade of the material. The load which a joist of a given length will hold without breaking varies as the square

of the height. The load which a beam or joist will sustain is dependent upon the defects and the quality of the clear wood. It is not good economy to skimp on the height of joists since the lower grade material with a greater height will probably give a more satisfactory floor at the same price than could be obtained from the higher grade material and correspond-

ingly shallower joist. It is not usually good economy to use joists over 16 feet long since it requires additional bridging, a greater depth of joist, and there is usually a considerable advance in the price per board foot of the lumber.—*Preliminary Report of the Building Code Committee of the United States Department of Commerce.*

Questions, Answers, Kinks and Discussions

Edited by V. L. Sherman

Herein is a Department of Mutual Help for the Exchange of Experiences and Ideas. It is Not Only Well Worth Your While to Give Your Experiences for What You Get Back from Others, but National Builder Pays You for Doing So in Good Hard Cash

Remedy for Valley Leaks

H. A. P., of Magee, Miss., writes: "The man's valley troubles shown on page 80 of the NATIONAL BUILDER for September are very easily avoided, but will necessitate the ripping off of some roofing to remedy. It seems a common error in laying prepared roofing of the strip or single type.

"The error is in cutting the shingles out to a point on the upper edge in coming up to or starting away from a valley, as the case may be. I have avoided this error in my own work, but have been called on to stop leaks in valleys done by others. In one case I stopped seven leaks in one valley about twelve feet long.



Fig. 1



Fig. 2

"The remedy is to clip off the upper end when you have cut your shingles to fit the valley. You see, these points coming out flush with the roofing in the valley will naturally pick up some water, and in a heavy rain and windstorm will pick up a good deal of it, and this upper edge lying close to the valley iron, and holding the next shingle above off the iron, forms a

dead level passageway for water across the iron, thus forming the leak. There is no remedy for the work done but to rip it up and do it over. I make it a rule to cut this point back at least two inches from the valley edge of the shingle next above. This trouble may occur with the roll roofing the same as the shingle type.

"Fig. 1 shows the wrong way to cut and Fig. 2 the correct way to cut."

D. S. A., of Chicago, has another remedy for valley leaks which he says may occur as well with most any type of roofing where the pitch is steep. "In such a valley the center of its entire length should be crimped or beaded to dam the water as it flows down and prevent its loading only one side of the valley. You will find such valleys common even with low pitches on tile roofs."

Asks for Kerfing Rule

L. C. R., of San Bernardino, Cal., wishes to know if he can be given a rule for kerfing. In one way this can be made a nice little problem in mathematics; but, on the other hand, we believe there is an old rule among the Scotch which gives excellent results: "The kerfed face is to form an unbroken surface." How about it?

Argumentum Ad Ignorantiam?

From Nebraska City, Neb., C. S. M. writes: "There are a couple of articles in Questions, Answers, Kinks and Discussions department of the NATIONAL BUILDER for August, 1922, with which I do not agree. The first one is headed 'An Archaic Method?' in which Mr. McC., of Indianapolis, puts up an argument against diagonal sheathing. Almost any carpenter knows that diagonal sheathing braces a building and holds it plumb. When a builder raises the corner posts of a building he always puts on temporary diagonal braces to hold them until the whole frame is put together and made rigid by permanent work. This is on the same principle as diagonal sheathing, the principle of the triangle.

"Wooden buildings must be braced in some way in this part of the country which is subject to strong winds, and for ordinary frame dwellings diagonal sheathing is the best and cheapest way to accomplish it. Mr. McC. sends two drawings to prove his point, but anyone can tell you that the method shown in Fig. 6 will stand up better than that shown in Fig. 5, even with the fewer number of nails. Talking about nails, why not put three nails in a board on the diagonal sheathing, which would be but little closer together, on the studding as the 6-in. board would be about 8½ in. on the studding. He says plastering and stucco will crack much worse on diagonal sheathing. That is the same as saying that plastering and stucco will crack more on a solid, rigid structure than on one that vibrates and sways in the wind. It doesn't stand to reason. He is wrong, that's all.

"The second article that I can't agree with is headed 'Mitering Siding Joints,' by W. E. B., of Grand Island, Neb. He says that in order to make a square cut across the siding board he reversed a piece of siding and put it behind the one he was cutting, in a miter box, I suppose, and it gave him a square cut across the face of the board. Now that is all right, but in mitering siding he does not want a square cut across the face of the board. It will not fit. I have a plan for mitering siding, and enclose a sketch to show what I mean.

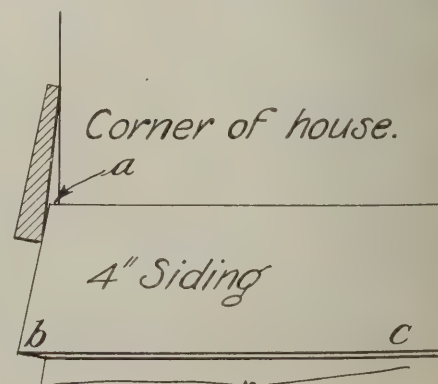


Fig. 3

"Fig. 3 shows how the siding would look as applied to the square corner of a building, and it is very evident that the cut across the face of the siding is the angle shown at *a*, *b* and *c*. To get this cut take an ordinary miter box, as shown in the

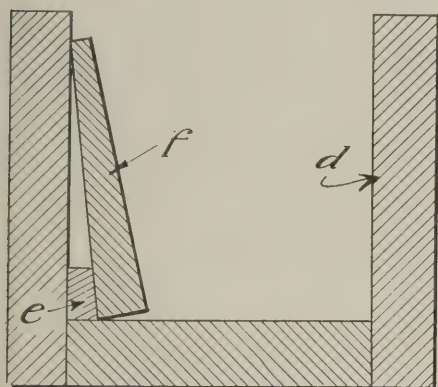


Fig. 4

cross section at *d*, Fig. 4, and rip off a strip from the thin edge of a siding board and as wide as the part of the boards that is covered by the board above when nailed on the building. That is, if the siding is 4 in. wide and is laid 3 in. to the weather, the strip would be 1 in. wide. Place this strip in the miter box as shown at *e* and place the board to be mitered in the box as shown at *f* and saw at 45 degrees on the box. This will work on any other angle as well as a square if you bisect the angle and make the cuts in your miter box accordingly. A regular iron miter box is more

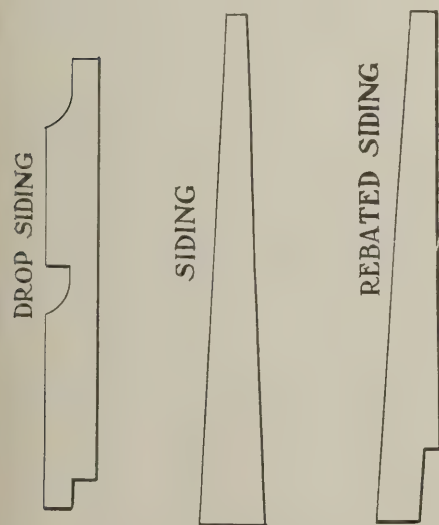


Fig. 5

convenient to use, and is apt to be more accurate, but, except for 4-in. siding, the commonly used backsaw is not wide enough."

The editor's home town is in a valley and fairly well timbered. Few houses lack a wind-break. As a consequence only the stiffest of gales is likely to cause vibration in a house. But he remembers a friend

who tried to spend a summer with a brother on the South Dakota prairies. The gentleman came home after three weeks with a wild look in his eye and an edge that made his former good nature seem a myth. "I had to come back home or I should have killed my own brother. Every time I opened a door the wind slammed it shut. Every time I left the house the wind blew my hat off. Pitching hay was a joke. What they call a breeze I'd call a gale. It has nearly broken my nerve." And the nerve of the average house would go the same way in that locality. Unless the corner of a house is well braced from the plate by a ribbon or through the studs, we believe in diagonal sheathing.

In regard to the second objection, the one concerning the mitering of siding, we wish to qualify the proposition a bit. The slightest deviation from 45 degrees would, of course, spoil the joint unless the pieces were cut in reversed position. We took it for granted W. E. B. used rebated siding (see Fig. 5), and we presume he did. With the ordinary siding C. M. S.'s objection is sustained. There seems to be great variety in the names of types of siding or clapboards. Strictly speaking, clapboards are both thinner and shorter than siding, and are quarter sawed. Rebated siding lies flat and is provided with a channel for the reception of the piece directly below. Drop siding, sometimes called novelty siding, is still another sort, but not so popular as it was some years ago.

Flashing for Dormer Windows

A. R., of Sheboygan, Wis., writes: "I have a good way of making water-tight flashing for a window that sets on a porch roof or for occasions with dormer windows set on roof. Take a 10-in. tin, cut it the length of the dormer, and bend it in center. Mark where the window comes

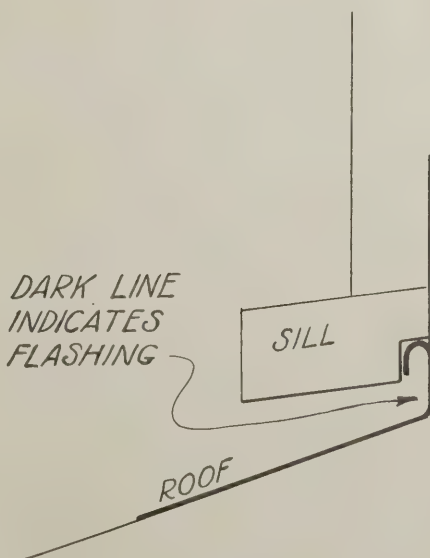


Fig. 6

and cut out the extra tin where it must go in the groove of the sill. Allow $\frac{1}{2}$ in. more tin than required. This $\frac{1}{2}$ in. I bend toward the outside as shown in the drawing, Fig. 6. You will notice that any water splashing beneath the sill must go right back. The way I work this is to set the frame temporarily, the way it should be, plumb and level and the right height. Then I take the measurements. I also let the full flashing go in back of outside window casing up to jamb. Then place tin and set frame. I have had good success and wish some of the other readers of NATIONAL BUILDER would try this stunt."

An Easily Made Vise

G. A. R., Oak Park, Ill., writes: "Your bench stops as shown in the NATIONAL BUILDER for September put me in mind of a handy stop or vise which we used to use years ago in dressing stock sizes. It is very easily made and can be made to take

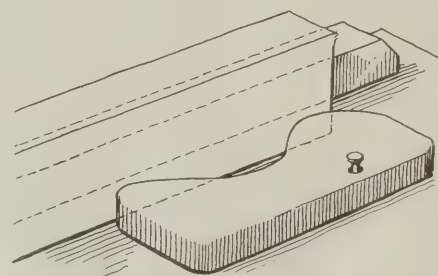


Fig. 7

pieces of various thicknesses simply by varying the position of the nail as shown in the drawing, Fig. 7. The curves should be easy so that the block will work without jamming. It will wedge the piece tight if properly cut."

Comments on Winders

C. O. J., Chicago, writes: "In the NATIONAL BUILDER for August you show three stair plans given as problems in stair building by Mr. Van Gaasbeek in the *Carpenter*. You also speak of the criticism by Mr. Cooper of all three plans. I showed the plans to a few of my friends and no one seemed to admire them, but the third set isn't such a strange idea as some seem to think, and it isn't new either. To quote from Mr. Kidder, whom you seem to like: 'Although winders are generally drawn as shown (winders radiating from a common center), the stair builder often builds them as shown in Fig. —, the winders not radiating to the center but converging to different points, as also two or three steps on each side of the winders. This makes a much easier stair than the regular winders. The English term for steps arranged in this way is 'balanced' or 'dance' steps; there does not appear to be any term for this arrangement in common use among American stair-builders.'

"Speaking of the circular or geometrical stairs, Mr. Kidder says: 'In geometrical stairs—owing to the winding steps having the same rise as the others, but a much narrower tread at the inner end, the inclination of the line of nosings of the winders is much steeper than that of the other steps, which gives a sudden and ungraceful change to the inclination of the handrail. To avoid this and also to give some additional width to the narrow end of the tread the steps are 'balanced,' each riser converging to a different point.'"

Weather-Guarding Outside Doors

C. J. T., Dunedin, New Zealand, has adopted the idea some use in casement windows for weather-proofing outside doors of any thickness and in operation

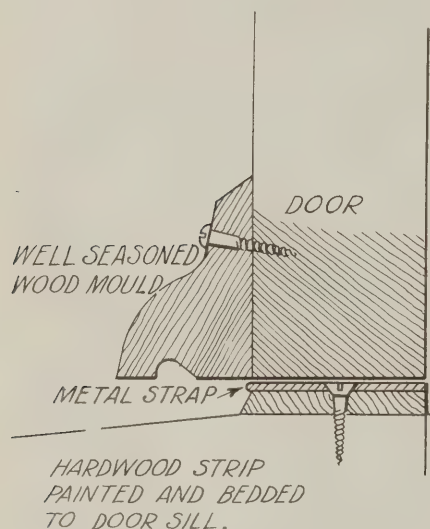


Fig. 8

gives perfect satisfaction. It is simple to make and easy to fit. In the drawing, Fig. 8, you will notice that the mould may be of any section, but the plainer the better. It must be the full width of the door and scribed into the stops on either side. Plough groove as shown, with back corner eased off, paint back of mould and bottom, and bed to door, and fix with round-head screws. Method of fixing is:

"1. Take a pair of compasses and set $1/32$ in. wider than the thickness of hardwood strip and metal strap. Then with door shut mark off sill. The door can be taken off then, cut, and rehung.

"2. Bed down hardwood strip and fix with a few small nails.

"3. Screw on metal plate.

"4. Cut mould full width of door.

"Mould should be cut from stock $3/4$ in. longer than stock size of doors. This allows for the cutting to act as a template to mark out stop, thereby gaining a good fit for mould."

Cabinet Drawers That Never Stick

W. M. C., of Tulsa, Okla., writes: "Most cabinet builders use a guide and slide on each side of drawers. Many owners will testify that the drawers when pulled out, one side at a time, will stick or bind. The method I herewith submit reduces friction to a minimum, as the only place for friction is on the $7/8$ -in. piece at the bottom and

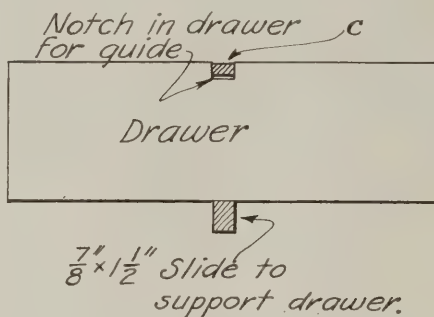


Fig. 9

top. Both of these are placed in the center of the drawer. See Fig. 9. The guide "C" is the whole secret. This holds the drawer so that it is impossible to pull out one side at a time. Cabinet drawers made like this will never stick regardless of weather or climate. I have been using this idea with success for over four years. Paraffine wax rubbed on where friction comes will make any drawer slide more freely."

A Saving by Expense

The writer of the following says he wishes to add a few remarks to that which has gone before on the advantages of employing a thorough architect in small house building:

"Many builders no doubt realize the fussing which seems eternal when a home is built for an owner who is 'fussy,' and when the builder is dealing direct with the owner over plans supplied by the owner, or worked out with his or her help. The old story of wanting a house which 'looks like this one, but having certain changes which I have in mind.'

"Many builders would like to be able to refuse to build under such circumstances, knowing that they may be called on at any time after the house is started to make changes which must be made to satisfy the builder or cause ill feeling, but regard refusal to build as impossible. The average builder is busy enough to resent loss of hours in arguing points which should have been settled when the plans were made, and dislikes to spare workmen from other tasks to make changes. Perhaps what he dreads most is the probability that after he is finished the owner will place all the

blame on the builder as a 'a short-sighted and obstinate man.' On top of that builders know what little sense most prospective owners have for the third dimension.

"Now I am rid of all that trouble. Before building the owner takes the plans to a friend of mine, an architect, and is there shown all the possibilities of error. This architect does not try to revise the plans, but for some reason he is able to draw out the owner's ideas and change the bad ones without inflicting any offense. I suppose he talks to him much as a good doctor does to a patient, and he doesn't seem to take much more time about it either. When it is over and the changes are noted I go ahead, and the curious thing is that the haggling is gone. Either the patient is not so sure of his likes and dislikes, or he hesitates a long time before questioning a point. The expense is exceedingly moderate and saves money both to the owner and to me. I certainly think that all plans should receive the O. K. of an architect, and I am convinced that it will be a money and time saver."

Importance of Thorough Bracing in Frame Buildings

PROPER bracing of a frame building is of great importance. In a building with sheathing there is no better bracing for the exterior walls than to put the sheathing on diagonally and thoroughly nail it to the studs. When the sheathing is thoroughly dry it can be put on horizontally and a rigid wall obtained. As a rule, however, walls with horizontal sheathing and without other braces will ultimately skew somewhat out of shape. Not infrequently a single sheathing board run diagonally from corner to corner of a wall and thoroughly nailed to all the studdings, about two ten-penny nails in each, will make a more rigid wall than the entire side covered with partially dry horizontal sheathing, nailed in the same manner as the diagonal plank.

It is exceedingly important that the building be thoroughly tied to resist the thrust of the rafters. When it is not feasible to tie the building together at the foot of the rafters, the thrust may be transferred to the end walls by a system of diagonal bracing on the underside of the rafters. This in reality makes trusses of the two halves of the roof which are nailed together at the peak.

In small barns this system of bracing may be used to eliminate very objectionable ties across the center of the barn, or in a garage the end containing the doors will not get out of shape if a proper system of bracing is used on the roof or underneath the ties and if the other three walls are well braced. —Preliminary Report of the Building Code Committee of the United States Department of Commerce.

What Do You Know About These?

Here are a number of things some subscribers are asking for. If there is anything in the idea of mutual help and co-operation in the building arts here is a chance to put it in practice. Some of the things wanted should be paid for, but there is a whole lot of information that can be supplied by those who have gone through the mill, and their compensation must lie in the consciousness of having helped a fellow builder out of a difficulty or in the idea that they will get help from the same general source when stating their needs in this column. Questions received after the 20th of the month will have to hold over one issue. Get them in early. Answers the same.

Broadcasting the requests of inquirers for information has the advantage of gathering practical experiences and of showing what attempts are being made to promote, improve or simplify construction or the business of construction. Who has suggestions to offer to the following:

100. Weatherstripping for Bottom of Garage Doors.—I want to obtain something which I can put on the rear of garage doors in winter time to keep the wind, snow and rain out, and at the same time allow the doors to be opened without tearing the "something" to pieces.

101. Resurfacing a Large Brick Church.—E. D. G. asks, "What is the best manner in which to resurface a large brick church—paint, stain and tuck-pointing; stucco, tile, or stone refacing?"

102. Composition Flooring.—Would like information on handling composition flooring for bathrooms and kitchen floors.

103. Golf Club Buildings.—I want plans and information regarding golf club buildings and will appreciate communications in that regard.

104. Small Armory, Masonic Temple and Elks Lodge.—Architect desires suggestions for a small armory, for two companies, approximately 150x100 ft. Also for small Masonic temple and an Elks lodge.

105. House Plan Supplements of "National Builder."—Is it possible to obtain a few copies of house plan supplements and back numbers of NATIONAL BUILDER. Mine have recently been destroyed, and I prized them very much.

106. Fireplace and Brick-Work Designs.—Please advise if you have available drawings, photos, etc., of brick, fireplaces etc., showing designs.

107. Corner Fireplace with Three Flues.—Wants sketch of corner fireplace with three flues.

108. Attachment for Cutting All Sizes of Circles.—Who is offering an attachment that can be used on a band-saw for cutting all sizes of circles from 1-in. radius up to 12-in. radius, to be used in the making of wooden pulleys?

Cost of Materials

AT this writing the effect of coal shortage and freight embargoes on building materials in favor of the movement of coal is not fully seen. The producers of sand, gravel, stone and other building materials requiring the use of open-tou, or so-called coal cars, are fighting strenuously, and with some success, any attempt to deprive them of their rightful use of transportation facilities. High freight rates and local shortages of material due to the railway shopmen's and coal miners' strikes are having far more influence on the prices of building materials than the seasonal demand.

The following average prices of common building materials, for the country as a whole, should be of value to contractors in determining how far out of line their own costs may be on account of such local conditions. The lowest price for brick is \$10 a thousand at Tuscon, Ariz., and the highest \$24 at Newark, N. J.; the average of 50 cities is \$16.24. The lowest price for yellow pine or Douglas fir flooring is \$66 per M. b. f. at St. Louis, Mo., and the highest \$125 at Baltimore, Md.; the average is \$83.15. The lowest price of hydrated lime per ton is \$13 at Fairmont, W. Va., and the highest is \$30 at New London, Conn., with an average of \$19.24. The lowest price of Portland cement is at Pontiac, Mich., \$2.29 per bbl.; the highest at Tuscon \$4.40. An average price is around \$3. The lowest price for dimension lumber is \$22.50 per M. b. f. at Columbia, S. C., and the highest \$55 at Tuscon. The average is \$40.97. The lowest price of common boards is at Columbia, \$20, and the highest at Tuscon, \$50, with an average of \$39.09. The price of reinforcing bars for concrete is lowest at Fairmont, W. Va., at \$3.15 per 100 lbs., and highest at St. Petersburg, Fla., at \$5.50. The average is \$3.15 per 100 lbs.

New Joist and Rafter Span Data Now Available

THE National Lumber Manufacturers' Association, through its Architectural and Building Code Bureau, has just issued a comprehensive series of tables from which may be readily determined the safe lengths

of wood joist and rafter spans with a wide range of load and strength elements.

In many cities ordinances are in effect that require floors of buildings to be of sufficient strength to support a given number of pounds per square foot in addition to the weight of the floor itself. Those additional pounds are referred to as the live load, and cover the weight of furniture, merchandise, people, etc. This load requirement, for instance in dwellings may be 30 lb. in one city and 70 lb. in a city only 10 miles distant. To meet these conditions the association has supplied tables for loads of from 30 to 70 lb. for main floors, 20 lb. for attic floors and 30 to 50 lb. for roofs. It is planned to issue additional tables for greater loads to provide for stores and warehouses where heavier loads are encountered and where wood joist floors are generally used.

Spans are given in the tables for joists 2x6 to 2x14, 3x6 to 3x14 and 4x6 to 4x10, these being the sizes generally used in joisted construction.

Spans are given for these sizes spaced 16 in. on centers and also 12 and 24 in. on centers.

As the stresses on which the calculation for the various species of wood are different, spans are given for each joist and each spacing, based on stresses of from 900 to 1800 lb. When spans are to be limited to prevent deflection or sagging of the floor the calculations are based on what is known as a modulus of elasticity. Many designers use a modulus of 1,000,000 lb. and apply it to all kinds of wood. This is inaccurate, as some species are stiffer than others. To provide for this the tables, in addition to the spans for the several stresses, give the span limited by deflection based on four different moduli of elasticity for each size and spacing of joist.

Spans for both plastered and unplastered ceilings are given, as well as those for attic floor joists, ceiling joists, roof joists and rafters.

These tables are meeting with favor among building officials who are using them in checking plans submitted to their departments for permits. Architects are finding them of advantage in the design of buildings, as they give the length of span for a given joist for a given load. They are of value also to the retail lumberman who may wish to have information about safe floors in localities where efficient building designers are not located.

Practically all other tables in various handbooks give the total load which a joist of given size and length will carry. To apply those tables the designer must make additional calculations. The tables of the National Lumber Manufacturers' Association go a step further in service by supplying without further calculations the answer the designer seeks.

Copies may be secured from the National Lumber Manufacturers' Association, Washington, D. C., and Chicago, Ill.

Announcements and Publications

The Southern Pine Association is starting a vigorous fall advertising campaign to get distribution for a number of new publications. One of these, advertised in the *Saturday Evening Post*, is entitled "Southern Pine—What It Is—What It Is Used For." In the farm papers a new booklet is announced on "Farm Buildings," including discussions of such subjects as foundations and footings, location of buildings, hay-storage sheds, combination barns, natural lighting, proper materials, sewage disposal, implement sheds, poultry houses, self-feeders horse barns, dairy barns, farm houses, hog houses, excavation, windbreaks, granaries and garages. In advertising to reach lumber dealers, twelve important publications of the association are featured. Other advertising matter in preparation are: A garage booklet; a wall hanger for dealers emphasizing the qualities of southern pine as a flooring material, and a new and revised edition of the booklet, "Beauty Plus Service in Floors." Contractors and builders can utilize such popular advertising campaigns as that described by timing their own job hunting for certain kinds of work to coincide with these efforts made in a national way to interest people in the same kinds of construction.

Rocbond Company to Begin Operating New Magnesite Stucco Plant at Harrisburg, Pa.—Announcement of the imminent operating of the new modern magnesite stucco plant of the Rocbond company at Harrisburg, Pa., is another interesting proof of the rapid development of the uses of magnesite stucco, of which the Rocbond company is one of the oldest exponents, starting at Van Wert, Ohio, in 1912; establishing a second plant at Cedar Rapids Iowa, in 1918, and now the Harrisburg plant, the three factories meeting the needs of 30 states or about 1,000,000 square miles of territory. Many new and beautiful stone surfacing combinations are being introduced, providing 25 or more different tones.

"Modern School Houses," by W. W. La Chance, 7x10, 262 pp., illus. A book on design with plans and illustrations of the newest in school-house architecture, according to Canadian practice—more especially intended to help in planning small rural school buildings. It is a book rich in floor plans, perspective sketches and photographic reproductions, and builder and architect alike will get many suggestions from its study. Apparently Canadian school architectural practice differs in many respects from some recent developments in that field on this side of the boundary line. Conservation of teachers has developed school buildings in Canada where one teacher may be all the

instructing force required for quite an elaborate school, with class room, manual training and household science room, library, assembly room and other up-to-date features. Published by William Briggs, Toronto, Ont. Price 5.

"Details of Cabinet Construction," 5¼x7½, 203 pp., 296 illus. The sixth of a series of books known as "The Woodworker Series." The author's aim has been to deal specifically with the separate and distinct detail parts which go to make up pieces of ordinary furniture, and to treat each detail in a way that will guide the reader through its construction in any style and in any size. If, for example, one would build a table, there is a chapter on table and chair legs, another on tops, and a third on drawer making. The details cover large furniture as well as small pieces, ornamental as well as plain. In no case is the construction of any one particular article of furniture described; but, by dealing with each detail separately, the book is intended to provide the reader with all the information required to tackle successfully the construction of any design of which he has the scale drawing or dimensioned sketch. It is believed that this kind of treatment makes the book of particular value to builders and carpenters, for a comprehensive knowledge of cabinet work details is far more valuable to the house builder than directions for building a particular piece of furniture. Very few modern houses are erected without built-in features, the proper construction of which requires some knowledge of cabinet work. Published by J. B. Lippincott Co., Philadelphia, Pa. Price, \$1.50.

"How to Read Blueprints," by H. R. Bigelow, 8½x10¾, illus. A paper-bound pamphlet giving an explanation of the laws of projection with an explanation of the usual symbols for various materials, etc., published by the Chicago Technical College, Chicago, Ill., as an introductory lesson in plan reading for builders.

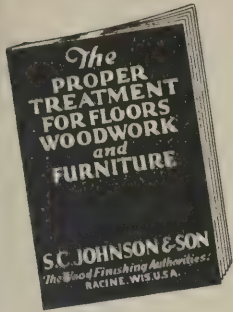
"Small Homes of Character," 8½x11, 61 pp., illus. Perspective sketches and floor plans of 50 small houses, four to seven rooms, of which complete detail plans and estimates can be obtained from the publishers. A very good variety and some very attractive designs are shown in this booklet. Published by the Architectural House Planning Service Co., Philadelphia, Pa. Price \$1.

"Modern Plumbing Illustrated," by R. M. Starbuck, 7¼x10¾, 407 pp., illus. Intended for "plumbers, architects, builders, property owners, boards of health and plumbing examiners." This is the fourth edition, revised

and enlarged, of a standard work. There are 70 plates of details especially made by the author, which are well done as to clearness and detail. Changes in plumbing fixtures in the last few years have been quite radical, and this book is particularly valuable to those who have not kept pace with these changes, in clearly pointing out what they have been. The text is in large type, short paragraphs, clear and easy to read. There is no waste of language. In addition to the usual details of plumbing fixtures, such subjects as the water supply and sewage disposal of country houses are also treated in considerable detail. A very complete index makes the book particularly valuable for ready reference. Published by the Norman W. Henley Publishing Co., 2 West 45th Street, New York City. Price \$5.

"Better Built Homes," Vol. XVI, published by Curtis Service Bureau, Clinton, Iowa; 9x12, 40 pp. An admirable book of plans and designs of 46-room houses of Colonial and English type, illustrated in colors and photographic reproductions of houses that have been built and supplemented by illustrations of their interiors. The houses in this book were planned and designed by Trowbridge & Ackerman, architects, of New York City, and represent a significant effort toward putting good designs into the hands of the average builder of the small house, and designs that can be built entirely of stock materials, with their resulting economy. In nearly every case there are two exterior expressions for the same basic floor plan, a point of interest to the contractor or builder, who frequently is confronted with the problem of satisfying a customer set upon one particular layout of rooms, with an exterior design that will please. The professional builder, who has sensed the growing demand for better designed houses, will find this a splendid source book for houses of six rooms. The gambrel roofed or Dutch Colonial designs in the book show a fine discrimination that should be instructive to those who are building houses of this type in great numbers. The beautiful proportions and nice details of all these "Better Built Homes" lead one to hope that many of them will be built without attempted improvement in every community in the country.

Scheid Engineering Corporation.—Announcement is made that the Scheid Engineering Corporation, 90 West Street, New York City, has been appointed metropolitan and export representative for the Franklin Moore Company, Winsted, Connecticut, manufacturers of material handling machinery for industrial plants.



FREE—Book on Wood Finishing

This book is full of practical information on finishing new floors and trim and re-finishing old work of this kind. Written by experts—profusely illustrated—contains color charts—gives covering capacities, etc. We will gladly send it free and postpaid to contractors and builders. Fill out and mail this coupon.

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With Johnson's Wood Dye soft woods can be finished so that they are as beautiful and artistic as hard wood. Johnson's Wood Dye is very easy to apply—goes on easily and quickly without a lap or streak—penetrates deeply—brings out the beauty of the grain without raising it—dries in four hours—and does not rub off or smudge.

Johnson's Wood Dye is conveniently put up in glass bottles with a reseal top—all sizes from half-pints to gallons. Comes in fourteen popular shades, all of which can be easily lightened or darkened. Explicit instructions on every label.

Johnson's Wood Dye is a dye in every sense of the word. It penetrates so deeply that the natural color is not disclosed if the wood becomes scratched or marred. Varnish or wax may be applied over Johnson's Wood Dye for the finish.

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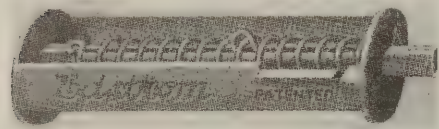
"The Wood Finishing Authorities"

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New Devices, Methods and Improvements in the Building Industry

A Window Roller Stop

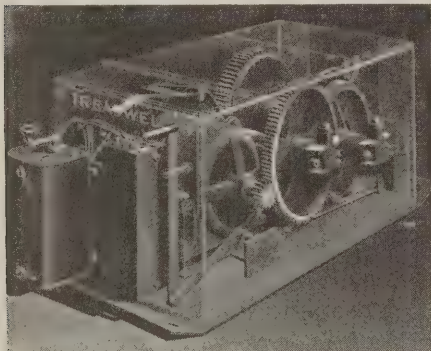
BUILDERS are taking a deeper interest in the interior equipments of houses, finding that a knowledge of things heretofore regarded to be out of their line and the consequent ability to suggest the advantages of new conveniences wins them confidence. Such a matter as the new win-



dow stop put on the market by the Edstrom Products Manufacturing Co., 1421 South Michigan avenue, Chicago, is a case in point. It is figured that about 8 per cent of window shades are torn, not worn. This simple device inserted in the pin end of the roller prevents the shade from being pulled off, stopping the shade at any desired point, and also regulates the upper movement, stopping the shade before the slat reaches the roller, and prevents the hem or seam from tearing and the spring from unwinding.

An Unusual Small Hoist

A SMALL hoist of all-steel construction except the barrel of the rope drum combining great compactness and efficiency for all kinds of construction work is announced by the Treadwell Engineering Co., of Easton, Pa., who explain its special



Small all-steel hoist

features to lie in its "fool-proof" design. The hoist is wholly enclosed in a heavy sheet steel-plate casing, mounted on a ½-in. steel sole plate. The unit casting forms the support for the drum and gear-shaft bearings, which latter are electric steel castings, fitted with renewable bronze bush-

ings and lubricated from a waste-packed oil reservoir. The controller box and resistance panel are, of necessity, mounted on the exterior of the casing. All other mechanism and the motor are entirely enclosed. The hoist is provided with a clutch manipulated by a lever at the operator's end of the hoist. The lever is automatically locked either "in" or "out." Control of the load is effected by a hand-brake with the controlling hand-lever conveniently placed. The brake lever is normally latched in an "off" position, allowing the hoist drum to run free. A removable door or cover is provided on the top of the casing to give easy access to the mechanism within.

The 8x12-in. drum has a capacity of 1,500 ft. of ¾-n. wire rope and the rated hoisting capacity of 1,500 lbs. at a speed of 100 ft. per minute. The standard motor employed is of 5-hp., operating at 1,200 revolutions per minute. The entire hoist measures 2x2x4 ft. 6 in. over all.

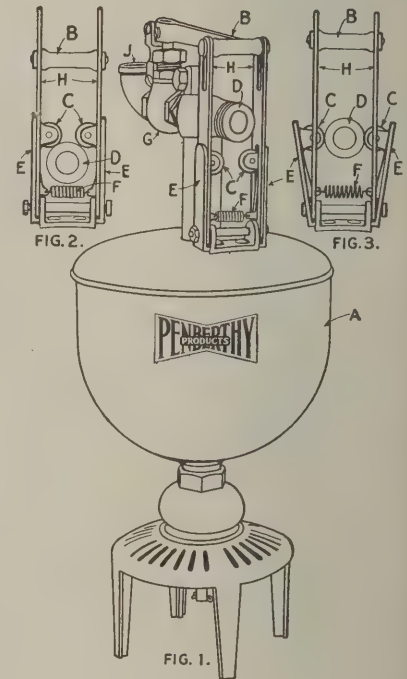
New Attachment for Automatic Cellar Drainer (Ejector)

CELLAR drainers have been in use for years and is of distinct service for installations, such as office buildings, residence or factory basements, elevator pits, scale pits, etc., or wherever it is desirable to remove seepage water from a point below the natural drainage level of sewer.

For conditions such as these, the Penberthy cellar drainer is claimed to offer a very desirable solution, as it operates by city water pressure and the drainer itself is constructed to occupy the least possible space. It is also entirely automatic and requires no attention after installation.

Installed in a sump below the level of the surface to be drained the drainer valve is normally in a closed position. As the water rises in the sump it lifts the float until when sufficient water has accumulated, the float buoyancy opens the valve and starts the ejector. The ejector pumps rapidly, until the level of water in the sump has lowered to a point where the float in descending with the level of the sump water, automatically closes the valve. The cellar drainer now remains inactive, using no pressure water, until the sump has again filled with seepage water.

When the sump water rises very slowly, the float acts upon the valve so gradually that the valve often opens but a very little,



just far enough to pump out enough sump water to prevent the float from rising any further. This in turn stops the valve from opening any wider and a dead center position is established.

To overcome this source of trouble, the Penberthy Injector Co. of Detroit, Mich., have developed a new attachment that can be substituted on all their drainers now in use and operates as follows:

As the water accumulates in the sump, the float (A) rises the slotted member (H) to a point just short of engaging the lever (B) which operates valve (G). Here it is stopped by a pair of rollers (C) engaging the lower side of web of the ejector casting (D) with a scissors grip. It is held at this point until the seepage water in the sump has risen around it and built up enough buoyant force to overcome the grip of the rollers and open the roller arms (E) against the tension of the helical spring (F) (See Fig. 3). The float (A) now freed from the restraining rollers (C), pops upward to its normal flotation level and in so doing, engages the valve lever (B), which instantly opens valve (G) to maximum capacity. This starts a full flow through the ejector (D) and overcomes the "dead center" trouble mentioned above.

The return action is just the reverse, but the principle is the same. As the water is pumped out of the sump and the water re-

(Continued on page 76)

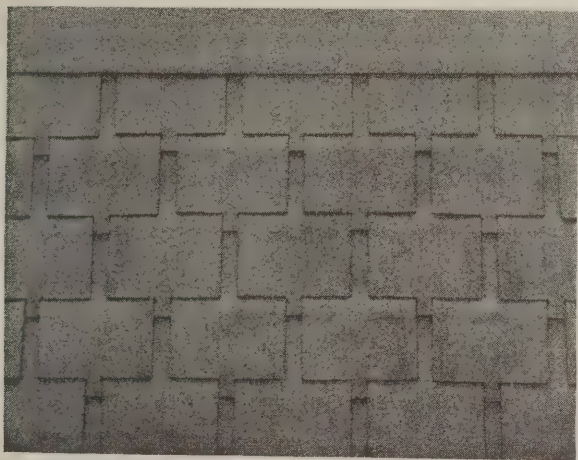
A Better Roof at Less Cost

The Servicised "GIANT"

GIANT Shingles are 50% heavier and thicker. 100% stiffer than any standard shingle.

GIANT Shingles are particularly adapted to laying 5 in. to the weather, and they are specially well adapted to laying over open sheathing.

Our trade-mark guarantees you a product of the best quality.



The Servicised "MAMMOTH"

The Servicised "Mammoth" Shingle, 10x14 in. in size, represents the last word in a super roof covering.

This effective and economical roofing is brought within easy reach by Servicised Application Methods.

The dependability of this roofing is unequalled. It will endure, not simply for a month or a year, but throughout the entire life of the building it protects.

INDIVIDUAL INTERLOCK SHINGLES

Servicised Individual Interlock Shingles make a roof of beautiful design.

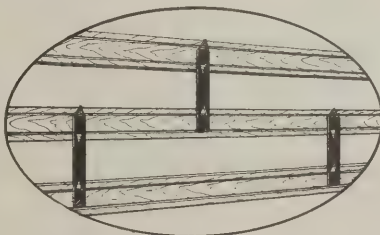
The shingle ends are locked to prevent blowing up in the wind, and at the same time impart a beautiful interwoven pattern. The expansion and contraction is taken up from one row to the other over the entire roof surface, through the interlocking ends.

These shingles are self spacing, and can be laid a greater length to the weather.

The Servicised Shingle Span

Open Sheathing Method

This simple and effective method means a better roof at lower cost. It will save better than three dollars per square, and to the Builder who builds to sell, this should be an impor-



tant consideration, particularly as the use of this method assures a more dependable roof. There is less warping and consequent damage than by any other known method.

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If your dealer cannot supply you with
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cedes, the float drops the length of the slots in the arms (*H*) to a point where the rollers once more engage in the *upper* side of web of the ejector casting thereby holding the valve (*G*) open. (See Fig. 2). As the water recedes still further the weight of the float (*A*) overcomes the resistance of the spring tension (*F*); the roller arms (*E*) open and the float drops to its normal flotation position, thereby *instantly* closing the valve (*G*).

This drainer is also being fitted with a new improved ejector which will operate on much less city pressure water than has been used in the past.

When installing any water operated ejector the main considerations are to apply the maximum of city water pressure against the minimum of discharge head. Or, in other words, always arrange to lift the water the least possible height and provide a full flow easy passage throughout the discharge pipe.

Wood Cattle Stanchions

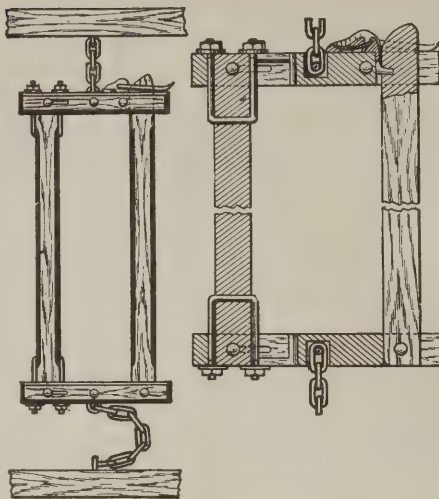
A CATTLE stanchion known and used in the East for many years, and recently improved and perfected, is made by Wallace B. Crumb, Forestville, Conn. The sketch herewith shows its construction features. One of the claims made for it is the ease of operation and the readiness with which the lock can be released. As proof of this Mr. Crumb quotes a New York state farmer as follows:

"There were 60 cows in my barn that was recently burned. It was all afire overhead when I discovered the fire at 2 o'clock in the morning, but on account of the ease in opening your stanchions I got them all out alone."

Directions for using the stanchions are: They can be used without front manger or partitions if so desired, but the following arrangement gives better satisfaction:

Give each cow a space of 3 to 3½ ft. wide on a floor, 4 ft. 6 in. long from the front edge of the manger, or for very large cows 2 to 4 in. longer. Make a gutter along the outer edge of the floor of sufficient depth to catch all the droppings. The manger should be 2 ft. 6 in. deep and separated by partitions running back to the floor 2 ft. from the line of the front edge of the manger and sloping on the front edge from the floor to top timber.

Make the bottom sill of 4x4-in. timber, with the top edge 7 in. from the floor, exactly 4 ft. 5 in. above the top edge of the bottom sill place a 4x4-in. timber; bore an inch hole in the bottom sill, 3 in. deep in center of the stall; bore a ¾-in. hole crossways of the bottom sill, 2 in. from the top edge, passing through the inch hole; bore a ¾-in. hole through the top timber on a line with the first hole; take the fastener and pass the eye-bolt through the ¾-in. hole in the top timber; place the washer on the top side of the timber, and then turn the nut tight, insert the chain in the inch hole in the bottom sill, pass the 4½-



Improved wood cattle stanchions

in. bolt through the ¾-in. hole and through the first link of the chain and turn the nut tight.

Stanchion should hang 1½ in. above the bottom sill, thus leaving the lower chain slack.

Concrete Blocks Made from Coal Ashes

THREE concrete-block plants are now operating in New York state—at Buffalo, Lockport and Rochester—at which

blocks, which differ from the ordinary sand-mortar, or gravel-concrete, block in being considerably lighter, and, it is claimed, stronger. An ordinary concrete-block machine is used, and standard sized blocks are produced. The color of the blocks is a dark gray, almost black.

The profit in the operation comes not merely in the manufacture of the blocks, because the makers are often paid for taking the ashes away from boiler plants, so the aggregate used for the blocks is an asset instead of a liability. Moreover, owing to the extravagant waste of fuel in nearly all boiler plants about 25 per cent of the coal used remains unburned. A large part of this is recovered in the washing process and can be sold wherever there is a market for slack coal.

The view herewith shows a concrete-block house under construction at Lockport, N. Y., using these ash-concrete blocks. Because they are porous and light they are claimed to make a much better insulating medium for walls than the ordinary concrete block, and also that they will take and hold the exterior stucco facing better.

The trade name "Bo Brick," "Bo Block" and "Bo Tile" has been chosen to describe these products, for it is intended to use this aggregate in the manufacture of all kinds of concrete products. Burnett-Wilson-Pfohl, Inc., are owners of the process and of the three plants in New York referred



House made from coal-ash concrete

blocks are made of ordinary boiler ashes. By a patented process the ashes are first washed and treated with milk of lime (a mixture of lime and water) to remove all traces of sulphur dioxide, for it is sulphur dioxide, chiefly, that makes ordinary soft coal ashes or cinders so corrosive.

In the same washing machine the unburned coal contained in the ashes is supposed to be settled out by gravity and collected in the bottom of the washing tank, from which it is removed automatically. The ashes or cinders are then put through a crusher and reduced to the consistency of ordinary building sand.

These ashes are mixed with portland cement and made into concrete building

to above. The Buffalo factory and office is at the foot of Ferry street.

A New System of Concrete Floor Forms

ABOUT a year ago a system of reinforced-concrete floor construction, using a special shape of gypsum tile, was first tried in a seven-story building in Buffalo, N. Y. The details of these gypsum tile are shown in the accompanying sketches.

The only wood form necessary in this construction is a supporting platform on which to lay the tile, the tile themselves forming the trough into which concrete is

(Continued on page 78)

Kellastone's High Plasticity Is Scientifically Regulated

NO one of experience will gain-say the statement that the plasticity, or lack of it, in a stucco, governs the life and character of the finished work.

In ordinary stucco, for instance, it has been found that it is impossible to maintain the degree of plasticity necessary to good workmanship without at the same time creating a mix so rich that early cracking is the inevitable result.

On the other hand, long experience has proved that **Kellastone** magnesite stucco retains a desirably high plasticity even when the amount of magnesite present is held within the limits necessary to give low volume change.

Furthermore, the plasticity of **Kellastone** can be regulated by the addition of certain fibrous inorganic mineral fillers. And as it is well known that only the most expert workman can handle a non-plastic mix on a vertical surface, this easy working property of **Kellastone** practically assures superior workmanship.

Kellastone Interior Plaster is also highly plastic. It is immune to internal shrinkage stresses, works easily and freely and is much lighter and more durable than lime or gypsum.

Kellastone literature represents the most advanced thought in modern construction materials. Write for it.

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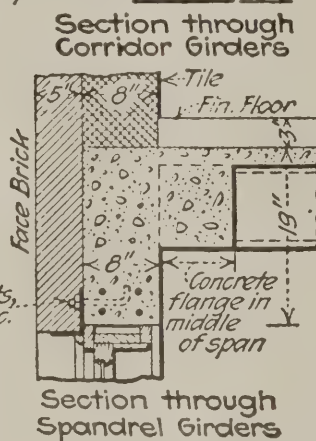
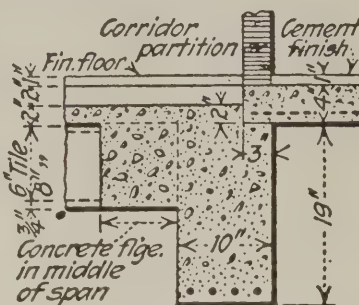
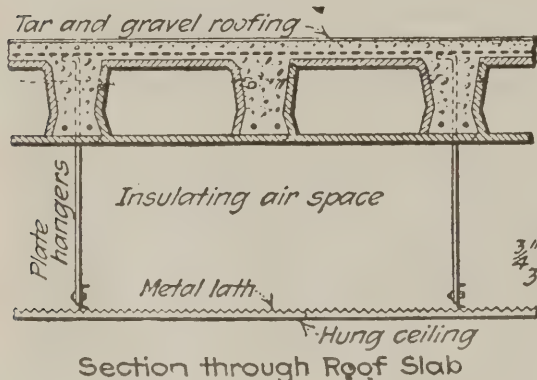
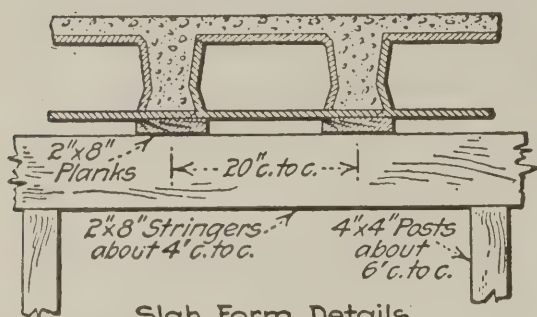
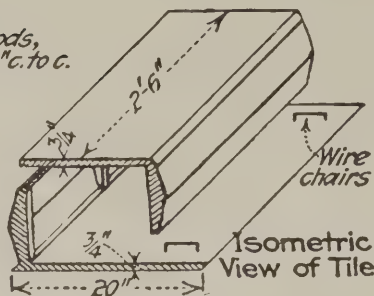
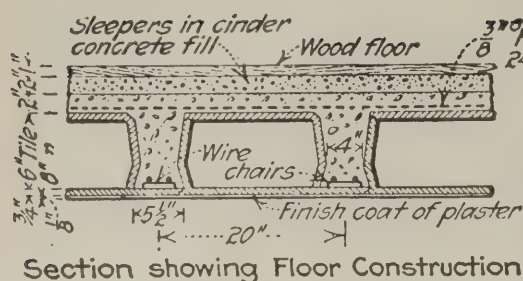
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New system of concrete floor forms

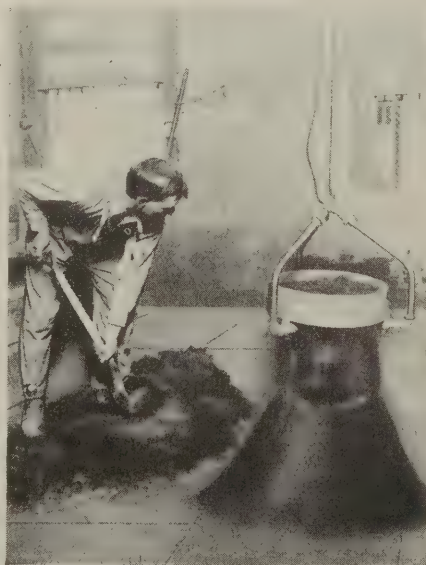
poured to make the beams and floor slabs. The tile, of course, stays in the floor and forms the ceiling of the story below.

The patent rights for this construction are now owned by the Ellok Corporation, 956 Ellicott square, Buffalo, and the forms are known as "L-Lock tile." This company is at present perfecting a machine to make these tile of reinforced-concrete, so that the completed floor system will be of concrete exclusively.

An Electric Sifter

AN electric sifter for sifting sand or similar material, and with modifications, straining and mixing liquids, is announced by J. D. Wallace & Co., 1401 West Jackson Boulevard, Chicago, Ill. The machine is said to sift a ton of soft molding sand in four minutes through a No. 2 riddle, delivering the sand perfectly cleaned and thoroughly mixed. An attachment for straining liquids makes the sifter applicable with similar efficiency as a strainer and mixer for liquids and chemicals, without forcing or brushing. Lumps are rapidly broken up, and the machine's capacity is indicated in the fact that 800 to 1000 gallons of clay-milk

is passed by it through an 8-mesh screen in 60 minutes. Semi-liquids and liquids such as clay-milk, water-colors, oils, paints, varnishes, porcelain enamels, chemicals, inks

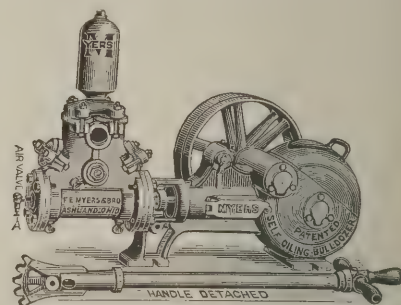


Electric sifter which can be converted to a liquid strainer and mixer

and rubber in various factory processes are efficiently treated. The light weight of the sifter allows it to be hung from any convenient support at any desired height. The capacity of the sifter is explained by the unusual electric motor which is directly connected to the middle. It is a vertical G. E. motor in which the armature and shaft remain stationary and the field and housing revolve at high speed. The housing, being weighted on one side, gives an extremely rapid and regular vibratory motion similar to an eccentric flywheel. A minimum of power is required, no power being lost through transmission of friction. The motor is equipped with specially designed ballbearings of the self-oiling type.

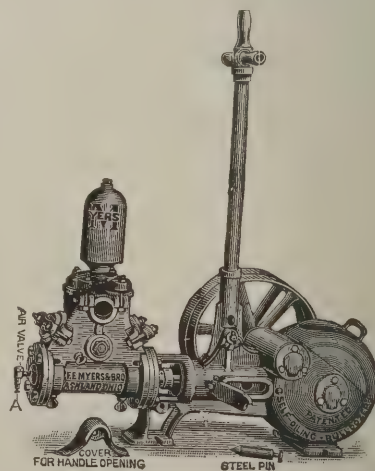
Self-Oiling Hydro-Pneumatic Pump

DESIGNED especially for use with gasoline engines in supplying water and air to pressure tank systems, a new pump is announced by the F. E. Myers & Bro. Co., of Ashland, Ohio. The pump is complete



Self-oiling power pump

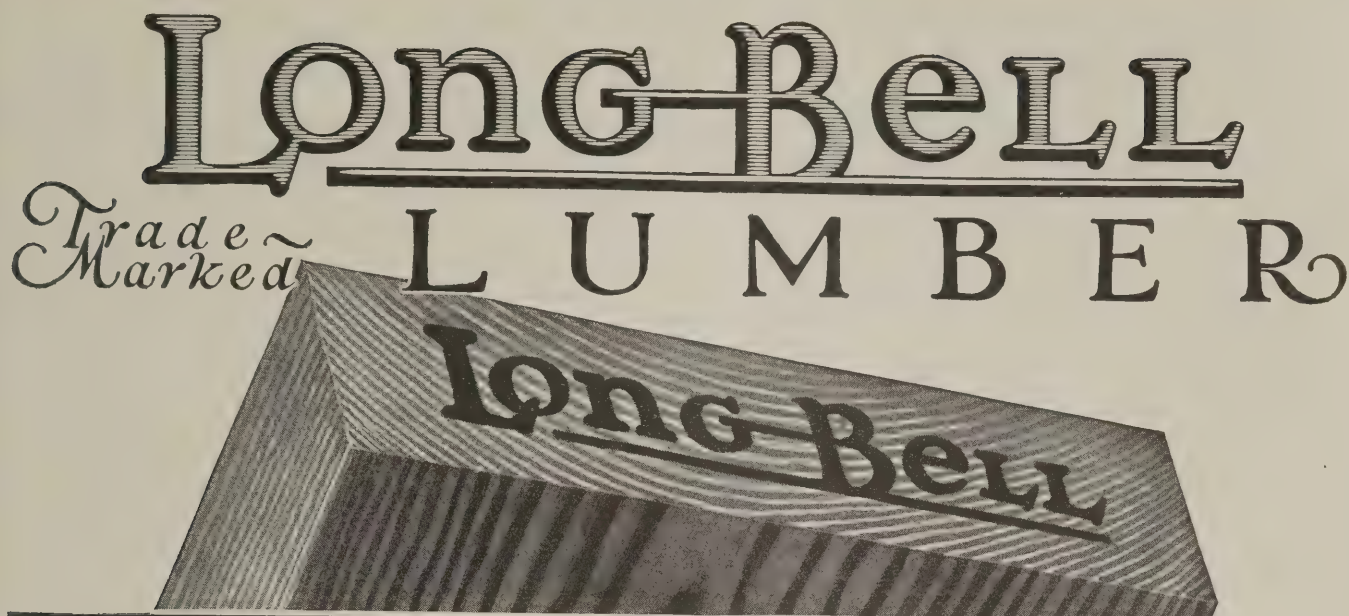
within itself and is adapted for both hand and power. The power end has a one-piece casting forming the base of the pump and oil reservoir. It encloses all working parts,



Self-oiling power pump with hand lever in position

insuring safety of operation and protection from dirt or injury. Oil is carried from the reservoir in the base by the main gear to

(Continued on page 80)



More homes!
Yes—but *better built homes*.
That's the important thing.

This is the age of quality. "Not how cheaply can I build, but how well," should be your thought when you pore over home plans, when you consult architects, contractors and lumbermen.

Inferior materials are an extravagance none can afford. For a home, to be a real investment both in *money* and *satisfaction*, must last as long as you care to live in it.

□□□

Almost everything that can go into the building of a home bears the trade-mark of some manufacturer who has said to himself:

"If I am to realize my ambitions in building a permanent business, I must put into what I make the best of my skill and knowledge, must label it with my trade-marked name, must win for that name an honorable place and must keep it so."

□□□

Trade-marks are guides to good merchandise. You have proved it for yourself in buying the food you eat and the clothing you wear.

The most widely used building material that goes into homes is *lumber*. You should *know* the lumber you buy—and you *can*.

For it, too, is trade-marked. You can buy it by brand with the same assurance you buy other trade-marked goods.

The name Long-Bell on lumber is your guide-mark to lumber and lumber products of uniform quality.

Long-Bell Lumber has back of it 47 years of honorable enterprise.

Long-Bell Lumber comes from exceptional stands of virgin timber; manufactured in modern mills.

Long-Bell Lumber is made by skilled workmen—men who take a personal pride in a product bearing their company's name.

Long-Bell Lumber is manufactured and graded under the supervision of experts who work to a standard. Each log is cut for purposes for which it is best adapted.

□□□

*Long-Bell Lumber is trade-marked. This means **unmistakable** identification—the same kind of a buying guide you demand on other merchandise.*

Ask Your Lumberman

The Long-Bell Lumber Company

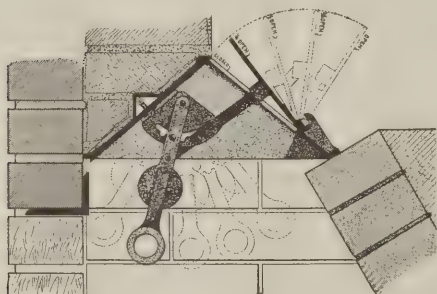
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the highest parts of the pump and by a system of channels distributed to all moving parts and returned again to the reservoir, thus proving a system of flood lubrication that makes quiet operation and long life of the pump with a minimum of attention. The cylinder is brass-lined and a one-piece casting attached to the power-end by bolts, and large rubber valves on bronze grid seats are located above the cylinder to insure priming. The suction and discharge valves are easily accessible for inspection and repair without disturbing pipe connections, and may be taken from either side. An air intake valve controls the admission of air. It is adjustable to admit the air or cut it out by moving a thumb-nut backward or forward. The change from power to hand involves the removal of a connecting pin and placing the handle. The pump has a capacity of 150 gallons per hour and occupies a floor space of 15 by 33 inches.

Improved Colonial Head-Throat and Damper

INCORPORATING, it is said all the quality features of Colonial styles in a head-throat and damper, the Colonial Fireplace Company, 4611 Roosevelt road, Chicago, introduces a widely adaptable head-



Improved Colonial head-throat and damper, Type "E"

throat and damper, in five styles of twelve sizes each. It can be used in any style of fireplace without cutting through the facing or the end (return) for a key, and may be set in any desired position in the chimney throat. The draft control is on the lever principle and gives five positions, as shown in the illustration. The lever is operated by a key, positioned in the style required either at the side or center, or without a key. In the latter case a large ring in the end of the lever permits a poker to be hooked in and the draft may be regulated without stooping.

Thickness of Basement Walls for Houses

THE economical thickness of basement walls will depend to a large extent on soil conditions. The actual loads coming on basement walls of dwelling houses not

more than three stories high would not require walls nearly so thick as those in common use. The thickness of monolithic-concrete basement walls for houses need not be greater than 8 in. except that they should not be thinner than the exterior walls of superstructures. Concrete hollow block or concrete tile walls 8 in. thick have been used extensively to carry two-story dwellings where soil conditions are normal. The committee, however, feels that this is not good and safe practice in general and therefore they have made their recommendations for 12-in. walls.—*Preliminary Report of the Building Code Committee of the United States Department of Commerce.*

A Live Suggestion from a Live Builder

"THERE was no building here in this city this year until I started it in June. I'll tell you how I started it. We were all in despair, lumbermen as well as us builders. I went to one lumberman, hardware man, mason, plumber, etc., and told them I had a prospective client ready to build and asked all of them to figure with me down to the lowest notch, so as to start the ball rolling. They did. And the scheme worked like magic. This is one of the busiest years—since June—we have ever had."—Howard Barclay, Viroqua, Wis.

There is a good suggestion in this for getting winter work, where winter work has not ordinarily been done. Go to your lumber dealer, hardware man, etc., and get their co-operation in "keeping the ball rolling" through the winter, as well as starting it again next spring, if the occasion demands.—The Editors.

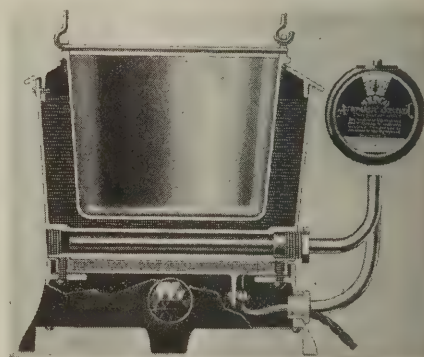
Fletcher's History of Architecture

THIS notable work now in its sixth edition has been rewritten and enlarged, with about 3500 illustrations, by Sir Banister Fletcher, collaborator with his father, the late Professor Banister Fletcher, on previous editions of the work. The comparative method employed in the several editions serves to present the characteristic features of the architecture of each country and to treat of those influences which contributed to the formation of each special style. To bring out the effects of these influences and also the qualities of the styles themselves, a comparative and analytical method of treatment is used, so that by the contrast of qualities

the differences may be the more easily grasped. Architectural styles themselves are analyzed and contrasted on the basis of the essential parts which every building possesses. Each period of architectural development is divided into five sections, as follows: (1) the six leading influences (geographical, geological, climatic, religious, social, and historical) that help shape the architecture of a country; (2) the character of the architecture, its special quality and general effect; (3) examples of the chief buildings in each style; (4) a comparative analysis of the essential features of each style as the outcome of the methods used to solve certain problems, and (5) a list of reference works where the reader can pursue the subject in greater detail. This history is of more than ordinary interest to builders because it is a history of building construction as well as of art of their design. Published by Charles Scribner's Sons, 597 Fifth Ave., New York City. Price, \$12.

Glue Pot With Automatic Heat Control

REQUIRING no attention from workmen, being wholly automatic in action, are claims that give a peculiar interest to the announcement of a new electric automatic glue pot placed on the market by J. D. Wallace & Co., 1401-17 W. Jackson boulevard, Chicago, Ill. The new device is adapted for heating any substance that requires a definite working temperature. This



Sectional view of automatic electric glue pot

peculiar advantage admits of its use for glue or other substance as a water bath, hot-air or dry-heat pot. Losses through spoilage of work due to overcooked or underheated glue are eliminated, as the glue is kept always at correct temperature for maximum strength and viscosity. The device is made in two-, four- and eight-quart sizes and weights range from 20 to 40 pounds. The pot operates from any electric lighting circuit. The temperature gauge registers the heat and with the jewel set in the base casting acts as a check on the heat maintained.

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"Pushers and Leaners"

WILLIAM A. DURGIN, personal representative of Secretary of Commerce Hoover, quotes his chief as saying that American business men have won success as Pushers rather than Leaners.

* * *

A Pusher goes after business. A Leaner waits for it to come to him.

* * *

A Leaner may have all the powers of a Pusher in him, but his personal experiences have shown him only one way, and knowing no other, he is a Leaner.

* * *

Acquirement of a broader vision is the first thing necessary to make a Pusher out of a Leaner. Where does a broad vision come from and where can it be had? From the collected experiences of others.

* * *

"National Builder" is the collector of experiences in building in all its phases. Last week's mail brought the following testimonials, among others. We quote these because they come from such widely separated sources.

* * *

From a Contractor in England: "In remitting a further subscription to your journal I would like to congratulate you on its general excellence. In an extensive acquaintance with technical literature I know of nothing on either side of the Atlantic better produced."

* * *

From a Builder in Michigan: "I enclose check for another two years' subscription to 'National Builder.' I could hardly do business without the 'Builder.'"

* * *

From a Contractor in New Zealand: "I send money order to renew subscription to 'National Builder.' The 'Builder' is splendid, and I look forward to its arrival every month."

* * *

From a Builder in Portland, Ore.: "I have taken an interest in 'National Builder' ever since I first subscribed for it. The house plans are what I am after most of the time. The greatest kick that I have is that I only get the paper once a month."

* * *

There will be something in the way of a big advance next month. Get in on it now, for, as we have dinged at you again and again, when this paper is out it is Out, and there is no cold storage supply. Consider what you get for \$3! Two years of the best and latest information on all that pertains to building. Join the Pushers and Do It Now!

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NATIONAL BUILDER

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CHICAGO, NOVEMBER, 1922

Number 11

A Combination Building

Stores, Offices, and Living Apartments Combined in One Building
Demand Unusual Considerations to Make a Successful Structure

By Jim T. Pomeroy

THE design of a combination building of the type illustrating this article, offers complications that are often unsuspected. On account of the stores and, to a less extent, the offices, it must express commercial influences. On the other hand, the presence

The real complications, however, enter into the problem when such a building is to be erected within the jurisdiction of a building ordinance or code. In such cases three sets of rules must be adhered to; one set governing stores; another set for office

82-foot frontage is one story in height and contains three stores. The remaining 32 feet is two stories in height and contains a large store on the first floor with a suite of two offices, reception room and toilet room, and two kitchenette apartments



Fig. 1—Four stores, two offices and two apartments are included in this combination building. Jim T. Pomeroy, architect

of living apartments should be recognized by a somewhat domestic character in the appearance of the building. This latter condition is not wholly due to any stretching of architectural prejudice or rules, but is rather an economic factor which recognizes that desirable tenants for the apartments will only be attracted by quarters which, at least in some degree, express home life.

buildings, and yet another for apartments or dwellings. These rules differ, one from the other, in various particulars and must be co-ordinated so that the laws will be respected and, at the same time, undue complications be avoided in the construction and design of the building as a single unit.

The building under discussion is 82 feet long by 60 feet deep. Fifty feet of the

above. The portion under the two-story part is fully excavated for a basement.

The exterior exposed walls are of brick, slightly variegated in shades of red, fairly smooth texture and laid up in white mortar with flush joints. The portion of the walls under the hoods and along the second story is of hollow tile finished with white portland cement stucco to which a small amount of yellow sand was added to produce an



Fig. 2—Tile floors, metal ceilings and high class fixtures attract profitable trade to the corner store

ivory tone. This surface was floated to give a fairly smooth, or eggshell texture.

Extra precautions were taken to make this stucco durable and to prevent cracking. The hollow tile backing was painted with waterproof paint, and over this surface poultry netting was stretched tightly to form additional bond for the stucco as well as reinforcing it against temperature and other stresses.

Terra cotta was used sparingly, the main reliance for trimming being placed on soldier and sawbuck courses in connection with the brickwork and brick arches above the windows and doors. The use of terra cotta is confined to the upper part of the corner entrance and to the hood over the street door leading to the second story. The large hoods are of sheet metal; the cornice of which is painted ivory to match the woodwork, and the upper part painted slate gray.

The wrought iron balcony above the corner entrance, together with the shutters and

flower boxes at the side of the building give a slightly domestic character to the building without unduly detracting from its commercial uses. The window muntins are also an aid in this respect. The electric lanterns are also of wrought iron.

In connection with the corner entrance it is interesting to note that this method of splaying or flattening a corner instead of running the walls out to a point, increase the apparent size of a building considerably. In the present case it is hard to believe that the two-story portion is almost twenty feet narrower than the one-story portion.

The electric sign which disfigures the corner has no relation to the design of the building. The exposed stay rods and conduit are common to this sort of art (?) and are one reason why many designers refuse to take the time and trouble necessary to produce an attractive design only to have its effect spoiled by excrescences added by others.

The roof of the one-story portion is supported between the walls by two lines of pipe columns and I-beam construction. Four-inch gypsum block walls between the rows of columns, form partitions between the stores. Where the columns occur in the walls the exposed metal is covered with metal lath to provide bond for the finished plaster. The walls between the one and two story portions is of brick, as is the fire wall around the main stair.

The basement under the two-story portion is divided into two parts by a concrete block fire wall which, together with a line of pipe columns and I-beams toward the front supports the first floor joists. The front portion of the basement serves the store above. One side of the remainder forms the boiler and fuel room. The other side contains the laundry and storage rooms which serve the two apartments. Owing to the fact that the street sewer is higher than the basement floor, an automatic cellar drainer was installed to take care of surplus water from the floor drains.

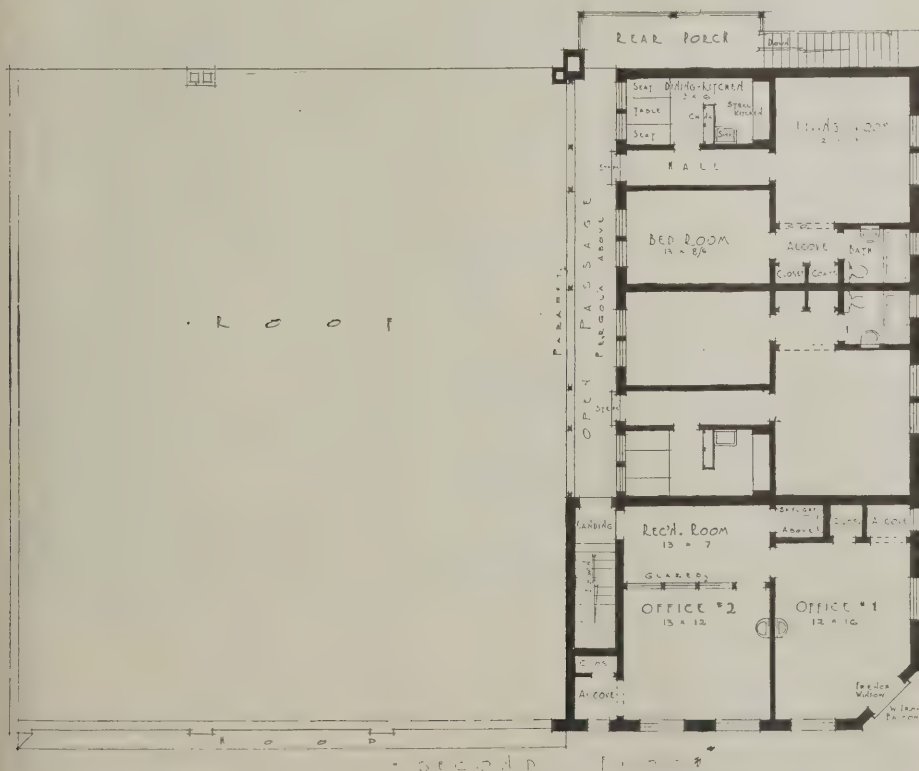
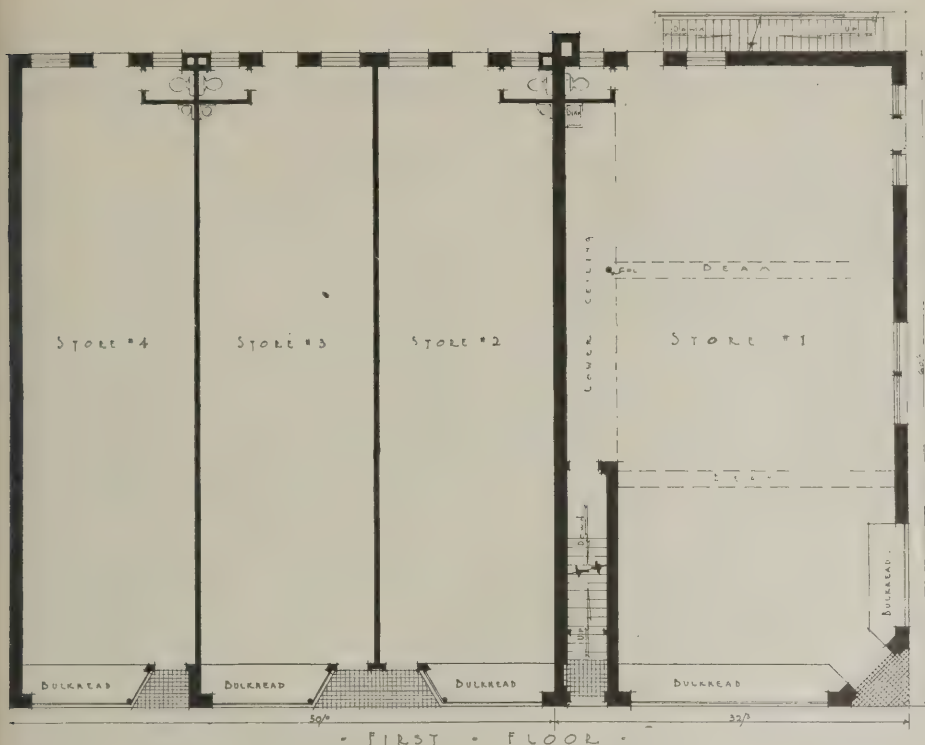
The main entrance to the second floor is by means of a stair leading from the street. The stair hall contains a small vestibule with a brick pattern wainscot and a tile floor. Individual letter boxes with bell push buttons and speaking tubes in the vestibule serve each office and each apartment.

From the top landing of the stair, doors open into the office suite and onto an outdoor passage which leads to the apartments beyond. The employment of an outdoor passage such as this makes it possible to provide two small apartments where otherwise it would be practicable to have only one. Of course, the one apartment would be larger, but it could not be rented for as much as the two small ones, which are of a size much in demand by young couples and by employed people who like to keep house on the light housekeeping plan.

The passage leads to a wooden porch at the rear of the building which has a stair to the side street, these serving as a rear entrance as well as providing an additional exit in case of an emergency. The passage has a fireproof floor of reinforced concrete and the walls are faced with face brick. A pergola overhead and shutters at the windows help to form an attractive entrance to the apartments.

The office suite and each apartment are separated by fire walls which are carried on heavy steel girders running across the store below. These girders also support floor joists and are fireproofed with cement mortar on metal lath.

The two offices open from a reception room which is lighted by a glazed partition through which light is admitted from one of the offices. A small toilet lighted by a ventilated skylight also opens from the reception room. Each office contains a closet for coats and each is provided with a small alcove which forms a convenient and slightly



Floor plans of combination store, office and apartment building

place for book cases or for dentists' or physicians' instrument cases. The office suite has maple floors, birch-mahogany trim and sand finished plaster walls and ceilings.

Each apartment is identical with the other in size and arrangement, except that the plans are reversed to throw the bath rooms back to back, thus resulting in economy in the plumbing layout.

In each case a hall leads from the outside passage to the living room and opens at one side into the combination kitchen and dining room. A combination of this sort is often considered as being justified only when space is at a premium as in the present case. As a matter of fact, however, many people actually prefer this arrangement instead of a separate dining

room. This is evidenced by the popularity of apartment-hotels where these combinations are the rule and whose tenants are usually more than able to afford more extensive quarters if such were desired.

These dining-kitchens are about the last word in compactness. At one end is the enameled steel kitchenette with gas stove and refrigerator built-in and fitted with drawers and shelves complete. The small sink is placed at one side, whereas if the room were wider it would be placed between the two units which form the kitchenette. The china cabinet projects from the wall at one side to form a sort of separation between the two portions of the room. The dining alcove has built-in seats and table and is placed against the windows to provide maximum light and ventilation. The seats are hinged to provide for storage space below.

At one end of the living room is an alcove which opens into the bed room on one hand and into the bath room on the other. Two closets—one for the bed room and one for coats—also open from the alcove.

The bath room has the usual three fixtures and is warmed by a wall radiator which is used to save space. The floor is of tile and the tub is of the recess or built-in type.

The kitchen has a maple floor, and the other floors are of oak. The bath room and the dining-kitchen are finished in genuine enamel and the walls are finished with oil paint. Elsewhere the trim is birch-mahogany and the walls and ceilings tinted.

This building is located in Oak Park, Ill., and was built for Angelacos Brothers and designed by the writer.

Oldest Frame Building

WHAT is said to be the oldest frame building in the United States is the old Quaker meeting house at Easton, Md. Local histories place its date of erection in 1684, giving the ancient structure an age of 238 years, and it is said that William Penn attended service in the meeting house while he was trading with the Indians.

This old Quaker meeting house stands just where it was built and as it was built, without any change. An occasional replacing of the shingles on the roof and of the weather-boarding are all the repairs it has had since it was erected. Its frame inside and woodwork and some of the weather-boarding are the same as when built.

The only preservative used on the wood has been old-fashioned whitewash on the outside. Seven of the original plank seats and the woodwork inside have had no paint whatever. White oak, white pine, cypress and Southern pine from the Maryland forests were the woods used.—*The Labor World*.

Modern County School Building

Construction Details of a Type of School Building Rapidly Growing in Favor in the Central West—Ward School Building, Brookfield, Missouri, Hulse and Company, Architects, Hutchinson, Kansas

HULSE & CO., of Hutchinson, Kans., are well-known architects who have specialized largely in school building. Their work has extended widely through all the states between the Mississippi River and the Rocky Mountains. A township school of their design, at Lyndon, Kans., was shown in detail in the April issue of *NATIONAL*

verse reinforcement was used only where the footing slabs extend 12 in. or more from the sides of the wall proper. The thickness of the footing slabs varies from 10 to 18 in. Under the chimney is a concrete slab 72 in. square reinforced each way with $\frac{1}{2}$ -in. square bars 9 $\frac{1}{2}$ in. c. to c.

The concrete mix used was 1:3:5, the

hardening compound. These floors are reinforced with $\frac{3}{8}$ -in. bars, 24-in. centers.

The top of the wood finish on concrete floors was made flush with the top of finished concrete and composition floors by means of a metal "bull nose" installed in the intersection as shown in one of the details herewith.



Modern county school building, Brookfield, Mo. Hulse & Co., architects

BUILDER, 1922. Another example of their work in the design of a larger high school and grade school building is shown herewith. This is the Ward School, Brookfield, Mo.

Construction Details—Foundations

All foundation walls and column footings are of reinforced concrete. The wall footings were reinforced by two square bars laid longitudinally, their size and spacing varying with the width of the wall and footing; and in some instances the footings are also reinforced by transverse square bars spaced 10 in. on centers. The trans-

verse reinforcement was used only where the footing slabs extend 12 in. in footings, $\frac{3}{4}$ in. in floor slabs, columns, beams, etc., and $\frac{1}{2}$ in. in the lighter slabs. The outside steps of concrete have a surface $\frac{3}{4}$ in. thick of 1:2 cement-sand mix. This surface was floated and not troweled to a finish. All outside steps and platforms have a pitch of $\frac{1}{8}$ in. to the foot. All exterior concrete foundation walls, interior retaining walls and all concrete floors resting on the ground were waterproofed by use of an integral waterproofing paste. The concrete floors have a troweled finish of 1:2 mix, and where the exposed wearing surface is concrete they were treated with a floor-

Floor System

The auditorium and gymnasium in the basement has a clear opening 36x58 ft. The reinforced-concrete floor over this opening is carried on a system of two parallel steel girders through the center, spaced 11 ft. 8 in. apart with 37-ft. spans. The more central one of these is a 24-in. 140-lb. Bethlehem girder beam, and the other a 20-in. 140-lb. beam. The steel girder over the stage is a 30-in. 200-lb. section. All other beams and girders are reinforced concrete.

The concrete floor itself is of slab and joist construction, the slab being 4 in. thick, 2 $\frac{1}{2}$ in. of which is rough concrete and



Rear elevation of Brookfield school building

1½ in. finish concrete. Pressed steel forms were used for the floor system giving 4x12 in. joists, spaced generally 20 in. c. to c., but with spacings varying from 10 to 20 in., due to the widening of some joists to 6, 7 and 8 in. to carry partition walls. The maximum span of these joists is about 29 ft. One of the details illustrated shows the manner of joining the concrete joists to the steel girders.

The second-floor system and the roof framing system are practically the same as the first floor. With the exception of a few 8x8 in. wood posts in the basement, supporting parts of the balcony, all the interior structure is reinforced concrete or steel, and therefore fireproof.

Ceiling Details

The ceilings are plaster on metal lath attached directly, by means of wires, to the bottoms of the concrete joists. The ceiling under the roof joists, however, is suspended from the slab overhead as illustrated in one of the sectional details. This leaves an open space of about 2 ft. between the bottoms of the joists and the top of the metal lath, and in this space is part of the piping system for heating.

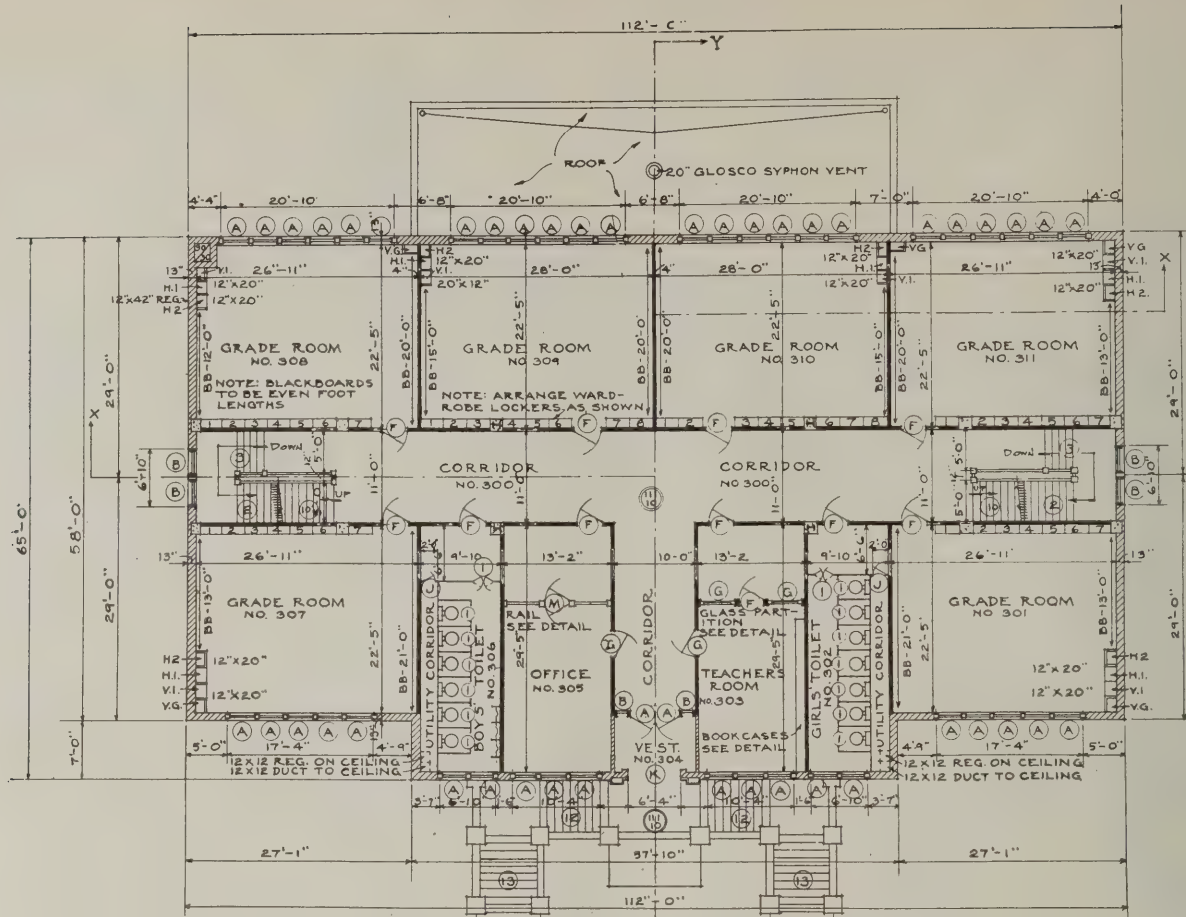
The method of fastening the metal lath to the floor system above was as follows: No. 10 gauge wires were anchored in the center of the floor slab between joists. To the bottoms of these wires ¾-in. channel were secured, running transversely to the joists. Round rods ¼ in. in diameter, spaced 12 in. c. to c., were run crosswise to the ¾-in. channels and tied to each

channel with No. 18 gauge galvanized wire. The metal lath was securely wired to the ¼-in. rods. The suspended ceiling of the second floor was constructed in the same manner, using ¼-in. round rods for hangers in place of the No. 10 gauge wire fasteners; and using 1½-in. channels longitudinally of the joists in place of the ¾ in. channels in the first floor ceiling, and ¾-in. channels in place of the ¼-in. round rods.

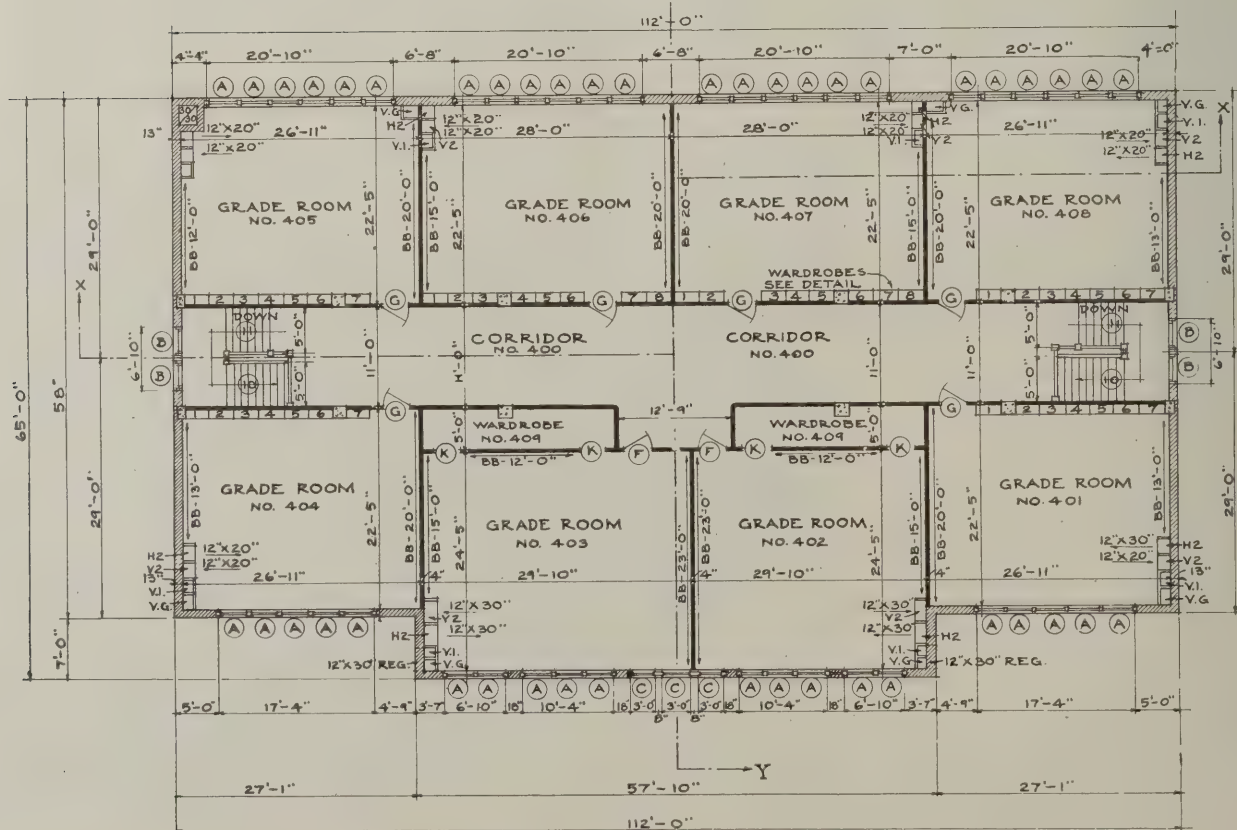
All exterior walls except bearing piers for lintels, beams, etc., are backed with hollow tile as shown in the detail plans. The face brick are bonded to the tile with galvanized wall ties. Interior partition tile are gypsum tile 3x12x30 in. Heat and vent stacks are constructed of 2-in. solid tile. The partitions are wedged at the ceiling and slushed in with mortar. Where gypsum-tile partitions intersect brick or concrete walls they are bonded into pockets



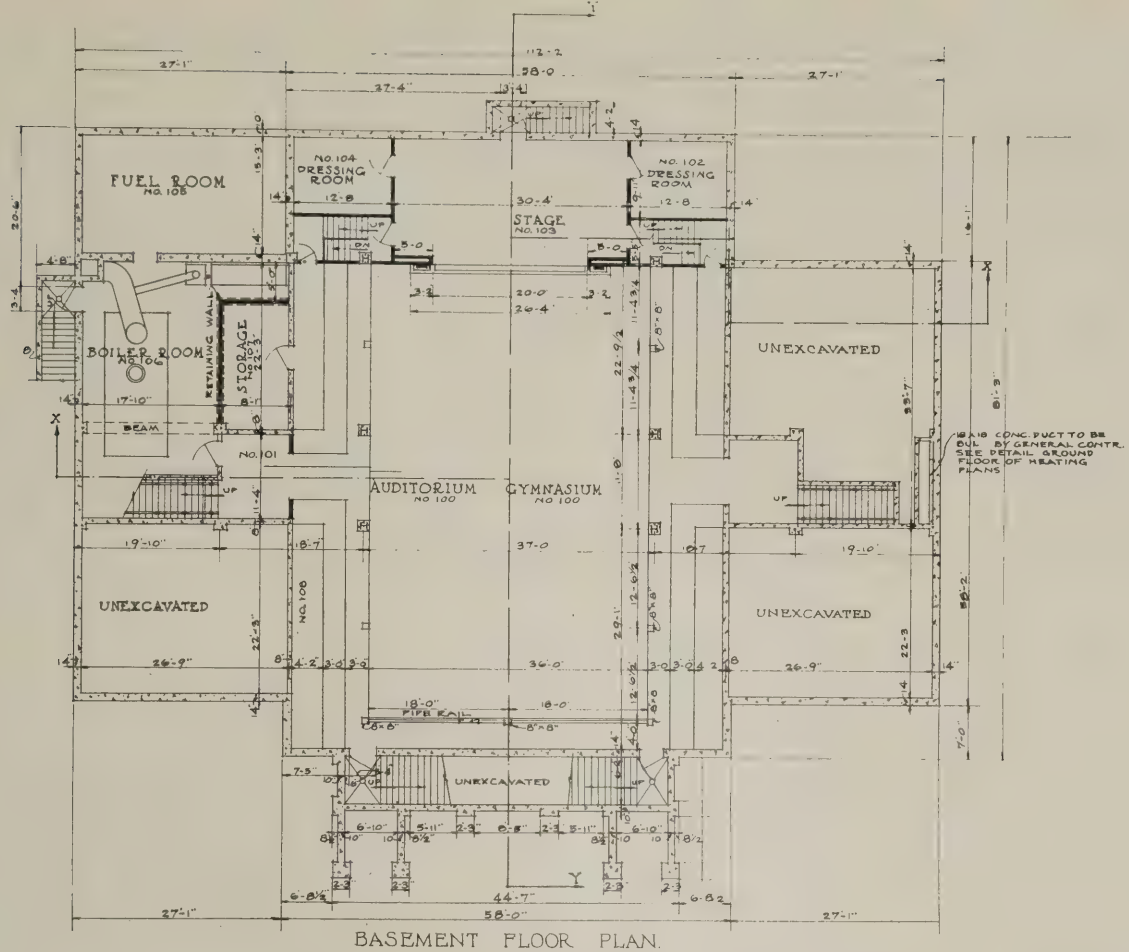
Winter construction. Note the orderliness of material layout



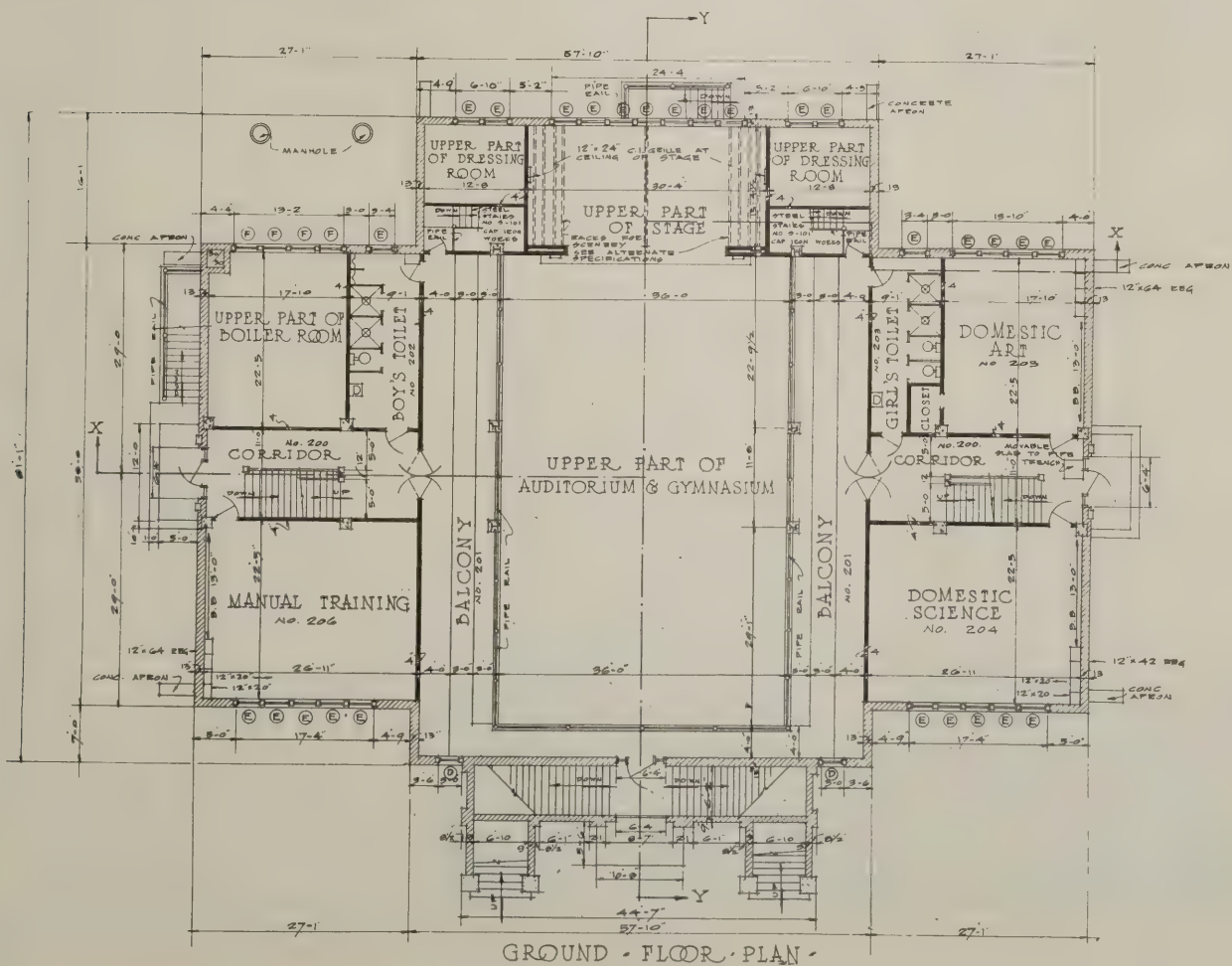
FIRST FLOOR PLAN.



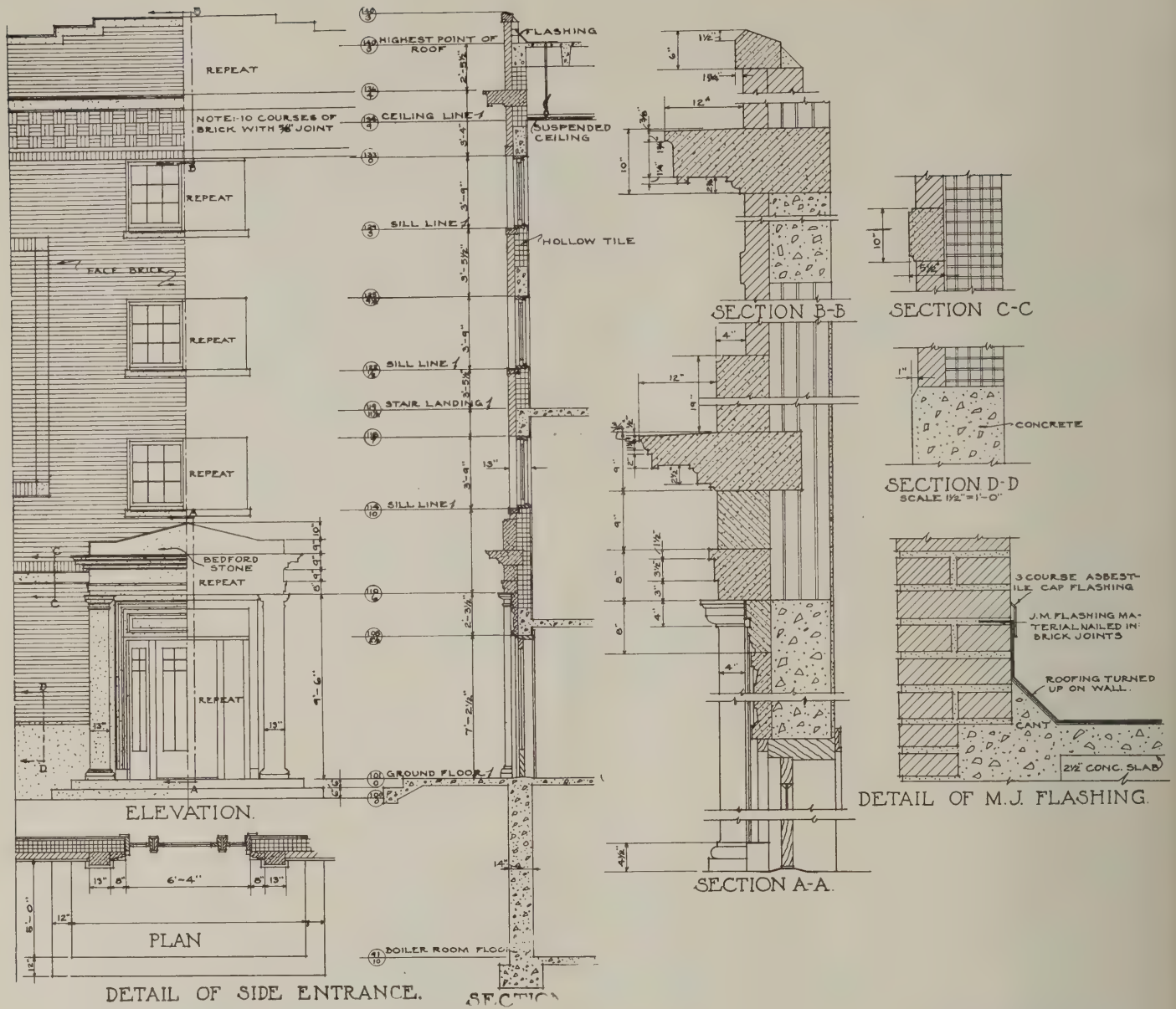
SECOND FLOOR PLAN



BASEMENT FLOOR PLAN.



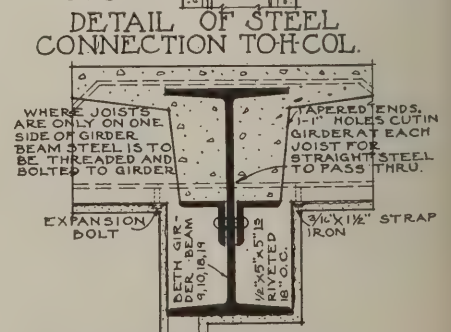
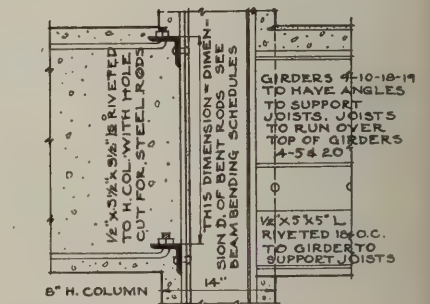
GROUND - FLOOR - PLAN -



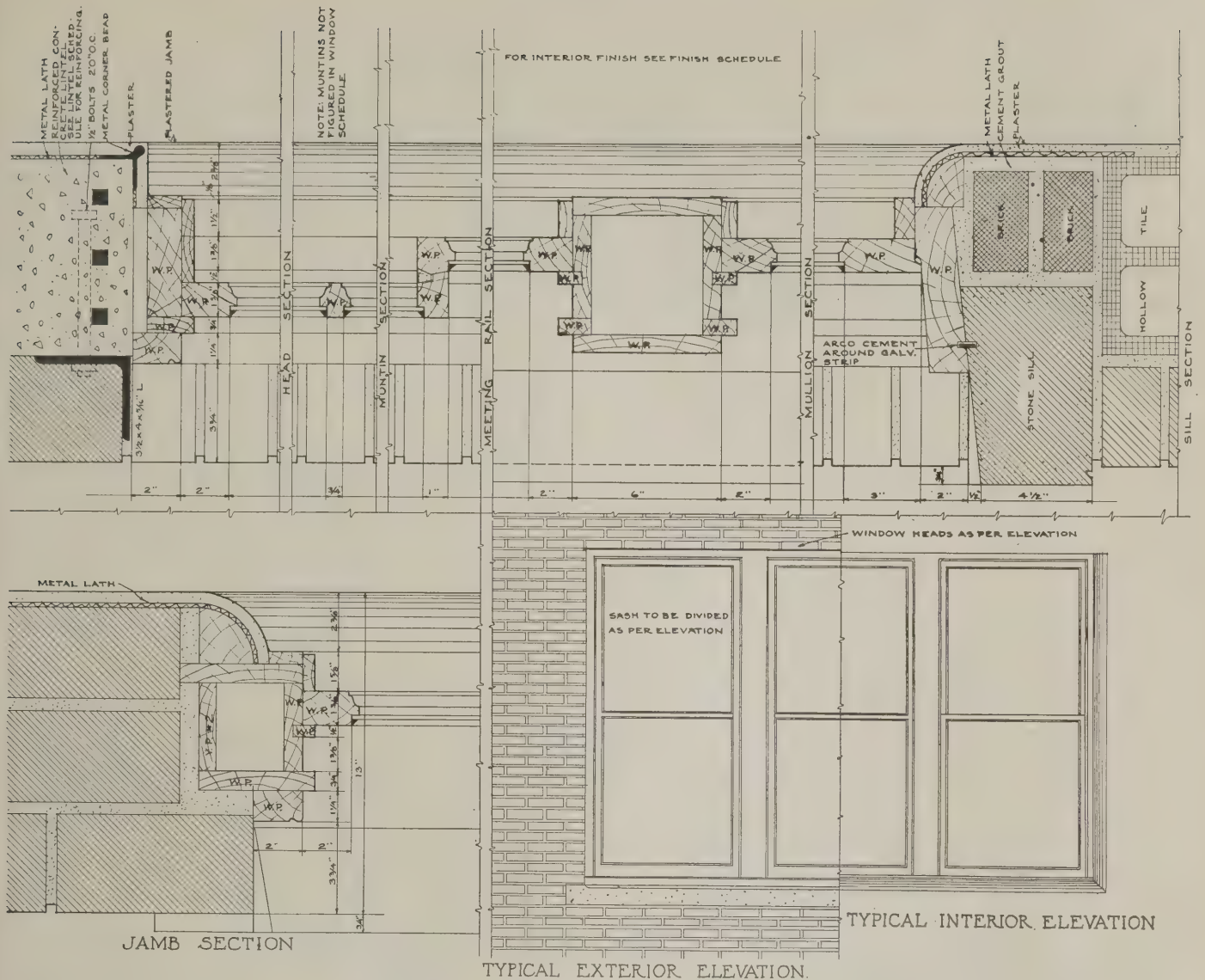
Construction details of Brookfield school building



Winter construction. Face brick protected from frosty weather by tarpaulins



DETAIL OF JOIST CONNECTION TO GIRDER



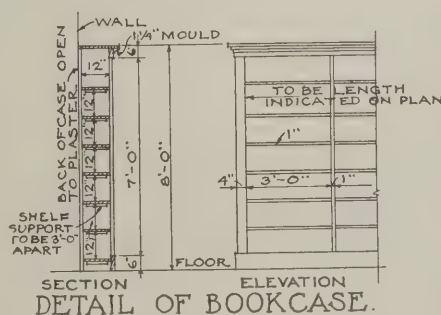
Window details of the Brookfield, Mo., school building

built into the masonry, and are anchored at every third joint in the height of the wall.

The heat and vent stacks are built of 2-in. solid Prybar as shown in one of the details. The portion of all stacks visible from rooms is plastered over. There is no trim in the stacks except woven wire screens. The stacks were built in and plastered at the same time the other plaster work was done.

The plaster used on all walls was a two-coat plaster composed of a base coat of 1 part gypsum plaster and 3 parts by weight of sand, and a finish coat of $\frac{1}{4}$ in., composed of a mixture of Keene's cement and hydrated lime in the proportion of 400 lb. of Keene's cement to 100 lb. of hydrated lime. The lime was first soaked in water for 24 hours and the Keene's cement added.

Where beams, girders, stair slabs and other concrete surfaces were given a finish coat direct, the mixture used was 3 parts of Keene's cement to 1 part of hydrated lime. The concrete surfaces were first washed and scrubbed with a steel brush, and



were dampened immediately before the plaster was applied.

Wainscot Details

The plaster wainscot shown on the plans is 4 ft. high to the top of the cap. The plaster used for this work was mixed in the same proportion as the finish-coat plaster in the two-coat work described above. Where the plaster wainscot was applied to hollow-tile walls, a two-coat application was used, but where it was applied direct to concrete only the finish coat was used.

The finish coat of the wainscot plastering was laid off in 6-in. squares in an imitation of tile, as one of the details shows.

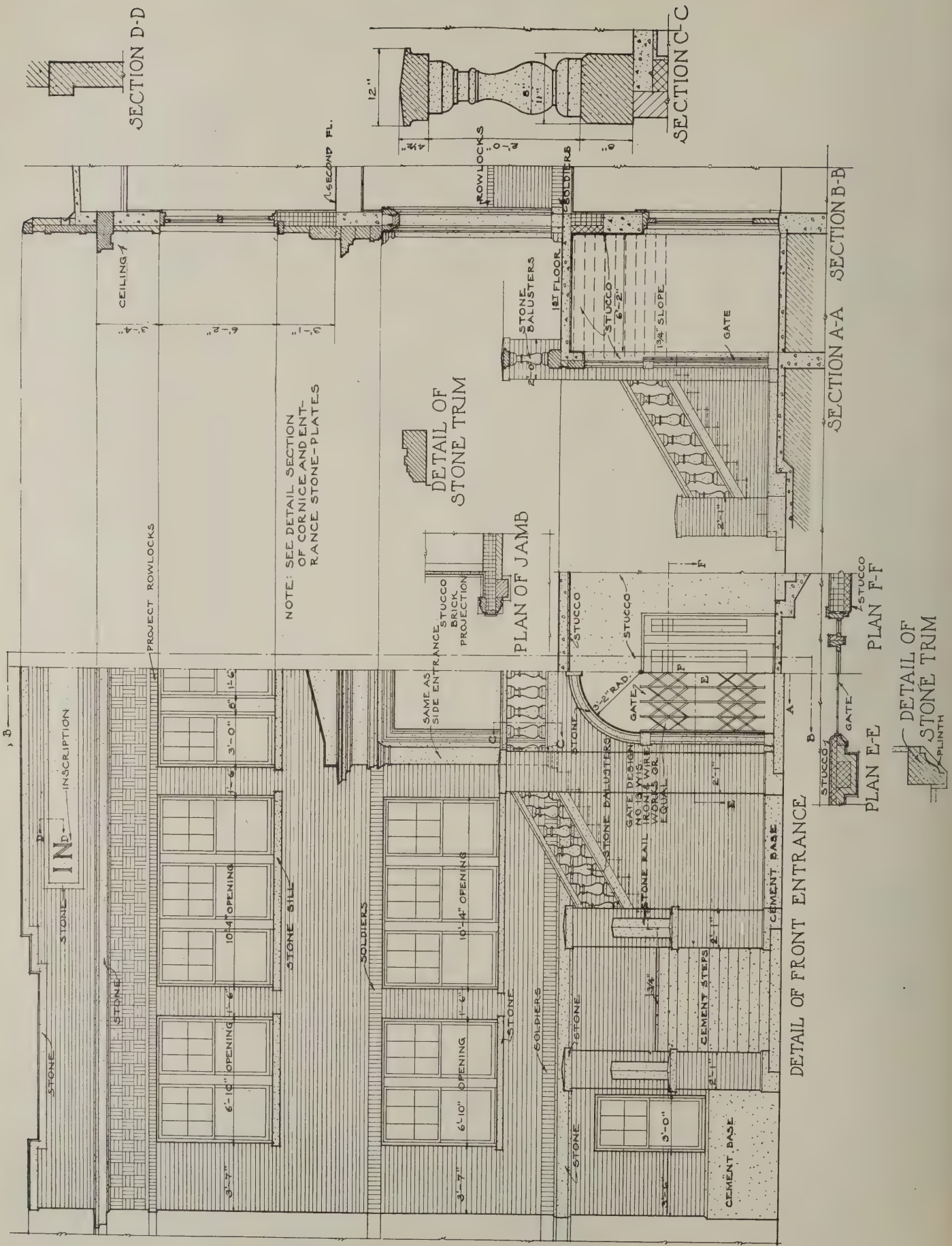
The interior woodwork is finished with a dark stain and varnished.

Special Equipment and Features

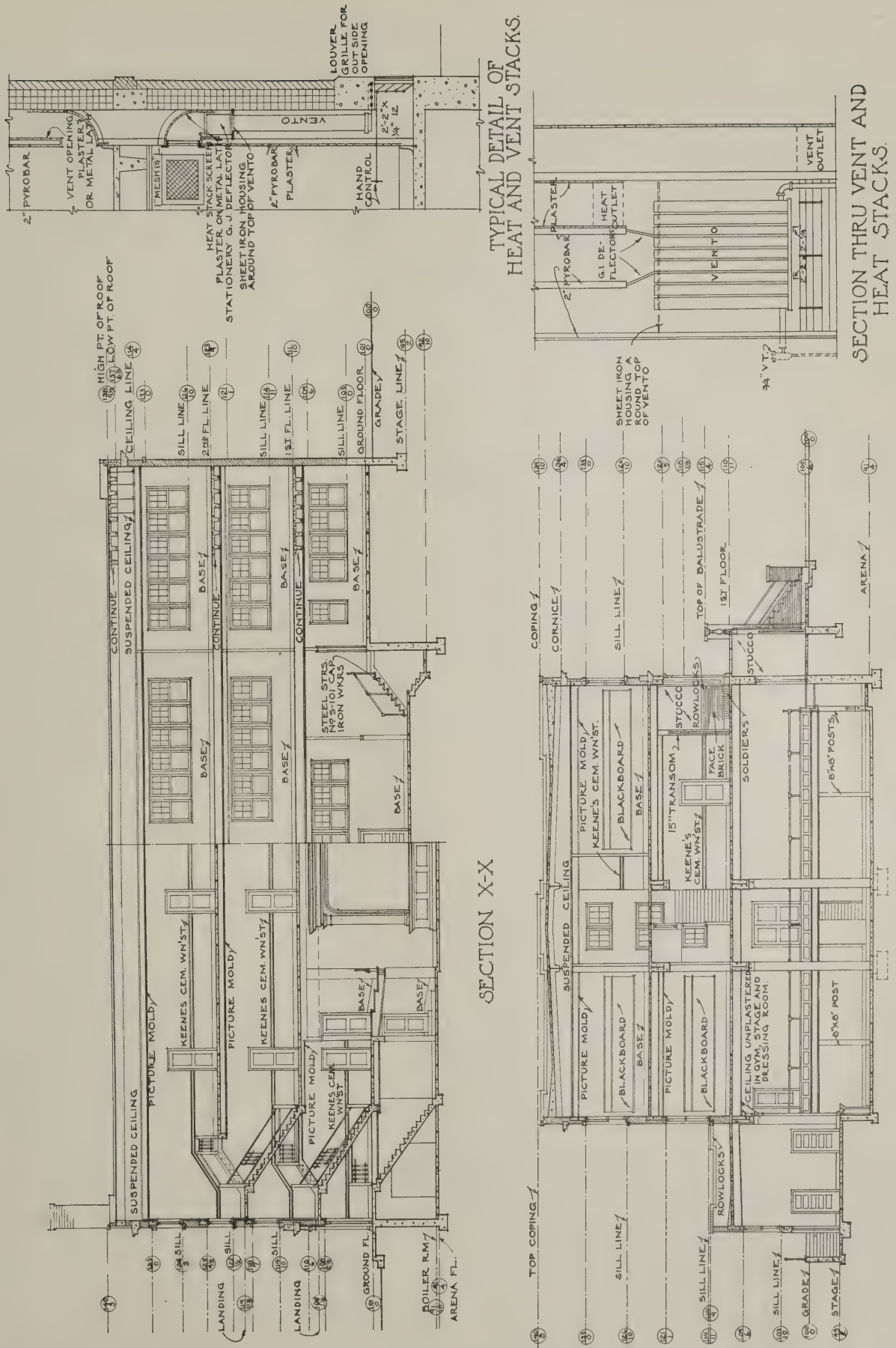
The mechanical equipment of the building, in addition to the usual features such as blackboards, toilets, etc., include a complete stage equipment for the auditorium: drop curtain, drapes, drops, scene sets, etc., as well as a moving picture machine and curtain.

Other features in the basement besides the auditorium-gymnasium, as the plans show, are rooms for manual training and domestic science teaching. Besides toilets, two shower baths are provided on each side for girls and boys.

This building is a type of many now being built or contemplated in the Central West and Far West. It is shown here, through the courtesy of Hulse & Co., in more detail than any similar building has been illustrated in any previous publication.



Construction details of the Brookfield, Mo., school building



Construction details of the Brookfield, Mo., school building



Getting the House Buyer's Point of View

Successful Building and Selling of Houses Means Being Forearmed
Against Points Raised by the Prospective Buyer—What Questions
Will He Ask and How Will You Answer Them?

UNFORTUNATELY the term "builder" has come to be indiscriminately applied to the man who pays a contractor to build a home, as well as to the contractor himself. The one may be an amateur "builder" while the other is a professional; but it would be better if the house purchaser were known as a "purchaser" and not as a "builder."

In the sense that "National Builder" uses the term "builder" it means the man whose profession or business is building—the technically trained man, whether his training was had in school, shop or office. A Builder then is expected to know more about building and about the structure of houses than his client, or prospective client, or purchaser.

To maintain his place in the community as a Builder, a man must keep better posted on building than his clients; and in this day of "Home Builders' Clinics" in the daily

newspapers, women's magazines, etc., the widespread popular advertising of building material manufacturers, and propaganda of one kind and another, keeping better posted than the so-called "home builder"—the house purchaser—is no easy thing.

Selling houses, or selling building service, requires the use of selling arguments; and the best selling arguments are naturally those that answer the queries raised in the mind of the buyer, whether he gives expression to them or not. What are some of these queries?

This question is quite satisfactorily answered in the service bulletin of the Architects' Small House Service Bureau of the United States—"The Small Home"—for September, in response to the letter from John M. Gries, chief of the Division of Building and Housing of the United States Department of Commerce, which with the answer is here reproduced by permission:

Twenty Things to Look for in Buying or Building a Home

THERE are a number of points that should be considered by either the buyer of a finished house, or the man who has a new house built for him, which can safely be undertaken by the individual himself.

It is always well, however, for him to reinforce his judgment by consultation with some disinterested professional man, either an architect, or a good builder. He should be willing to pay a small charge for this service, as it will be of inestimable value to him for his own guidance.

In the points that he may feel reasonably safe in deciding for himself we suggest considering them under two heads, "Design" and "Construction."

Design

Exterior

1. The house should be simple and attractive. Ask yourself this question, "Do I want to live in a house that looks like this 365 days of a year for many years?"
2. What about the neighborhood? Are the houses in the immediate vicinity and the people you will have for neighbors the kind that you want to live among and see 365 days of a year for many years?
3. Is the setting of the house convenient

to the street and are the grounds well planted and well kept? Are there shade trees?

4. How does the house face with respect the sun? Will you have sunlight in your living rooms and sleeping rooms, and is provision made for cross ventilation in these principal rooms?

Interior

5. Are your rooms conveniently located so that the housework can be easily carried on and so that you can have some privacy for yourself and family? With the kitchen arranged as it is will the kitchen work take too much effort? Can you get to the bath room without going through other rooms?

6. Is there plenty of closet and storage space, a closet in each of the bedrooms, a cloak closet convenient to the front door?

7. Try the stairways. Are they easy to climb, and is there plenty of head room? Will there be a draft down stairs into the living room?

8. If there is a cellar or basement with heating plant or laundry in it are these easily get-atable both from the inside of the house and the outside?

9. Has each room ample light and a

comfortable feeling and, most important, is there a place for your beds, bureaus, piano and other special furniture?

10. Are the electric and gas outlets conveniently arranged for your comfort and use?

Construction

Under the heading of construction we have two different points of view, one for the house that is to be built, and one for the house that is already built.

For the house that is to be built, your best insurance of having it right, is to build from plans that are complete enough to insure good construction throughout. The ordinary free plan service cannot insure you this. * * *

For Houses Already Built

If houses are already built give careful consideration to the following points:

1. Look about the house carefully to see if there are any signs of settlement about the walls and foundations of the building. Examine the foundation walls for cracks or leakage. The basement must be dry. Examine the center posts to see if they are sound at top and bottom and if the girders supporting the floor above are level and do not show signs of sagging. Look for

DEPARTMENT OF COMMERCE
OFFICE OF THE SECRETARY
WASHINGTON

August 14, 1922.

Mr. Edwin H. Brown,
C/o Small House Service Bureau,
1200 Second Avenue, South,
Minneapolis, Minn.

My dear Mr. Brown:

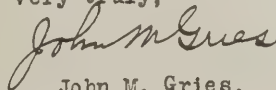
In our correspondence we frequently find that prospective buyers of houses want to know the things they should look for, first, under design; and second, under construction. Will you kindly offer some suggestions for them?

Of course some of the things are so concealed in the house that it is impossible to pass offhand judgment, but in other respects laymen are competent to judge in case they are provided with safe standards.

Would you kindly list from 6 to 10 points which the layman could consider in the design of a house and about the same number of points which he could consider in determining the quality of construction?

I feel that your opinion will be most valuable in this connection.

Yours very truly,



JMG.NLK. Chief, Division of Building and Housing.

cracks in outside walls if they are of brick, tile or stucco.

2. The very condition of the plastering is a very good indication as to whether or not the house was well braced when it was built. Look for long cracks with wide openings, especially diagonal cracks. Look particularly for cracks over large doors and windows. If you find them, the supports over these openings are not strong enough. There will always be trouble at these places. Is the plastering pitted, cracked, fallen off, chipped? Look for stains which indicate water leaks from the roof. Examine the plaster around windows and outside doors for streaks which means leakage of air.

3. Look at the doors, windows, floors, and millwork generally. Do the floors squeak? Are there wide openings between the board units? Are the floors level? Are the casings warped or pulled away from the plastering? Do the doors swing freely? If a door does not close perhaps the whole frame of the house has sagged. Look for this. Do the drawers and cupboards work freely?

4. What kind of plumbing fixtures are used? Are they in good condition? Is the enamel ware stained or chipped? Are the

fixtures of a modern model? In the drain pipes in the basement do you find cleanouts at the base of vertical risers so that these can be cleaned? Are the faucets in good order? Does the water run through them freely without hissing?

5. Is the heating plant in good condition? Look at the grates. Is the insulation in place and in proper quantity? Find out if you can whether the house is easy to heat? How much coal was used in previous winters?

6. Look over all the woodwork of the house inside and out. Will you immediately have a job of repainting? Is the paint blistered, peeled off, or discolored? Is the varnish off the floors? What do you think of the colors used?

7. Roofing deteriorates rapidly. Do you find the shingles curled or broken? If so some replacement will have to be made. A shingle roof in good repair shows the shingle units lying flat. Look over the down spouts and eaves troughs. How many of these are rusted out? Leaks in roofs are indicated by stains in plaster.

8. Ask previous owners whether the house was comfortable, whether it was easily heated, whether or not the drainage

lines had to be frequently cleaned out. Find out when the house was built and by whom. Find out whether insulation was used on the outside walls and the second story ceiling.

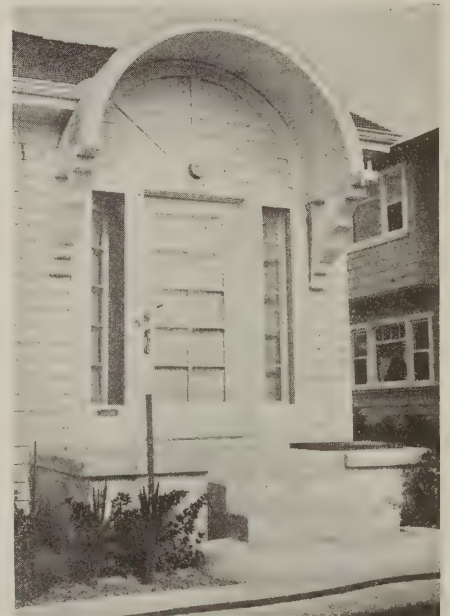
9. Do not let enamel paint, special hardwood floors, tiled bathrooms, sun porches or other luxuries make you forget the far more important points already mentioned.

10. Such other points as the validity of the title to the land, whether there are gas, electricity, water, and sewage connections, or if not in the city, whether there are proper sanitary conditions and water supply, are matters about which you must investigate.

Obviously, if these are vital points with the purchaser, they are equally vital to you—the architect, contractor or builder. The answers to them are *your selling arguments*.

A Modernized Colonial Doorway

IN colonial days the windows on either side of the front door were fixed and served for ornament and for lighting the dim hall within. The modernized colonial doorway illustrated shows the side lights transformed into slender casements, really



accessory glass doors, that open with ease and serve as the main ventilating channels for the living room within. When a stranger rings the bell, there is opportunity to ask his business without opening the door to him. The screens are hinged on top and extend down to the door sill, being secured inside and painted white so as to be of a piece with the door frame. Note the particularly fine canopy and brackets, the appropriate hardware, porch light and numbering, and the convenient slit for letters set low down in the left-hand screen frame.

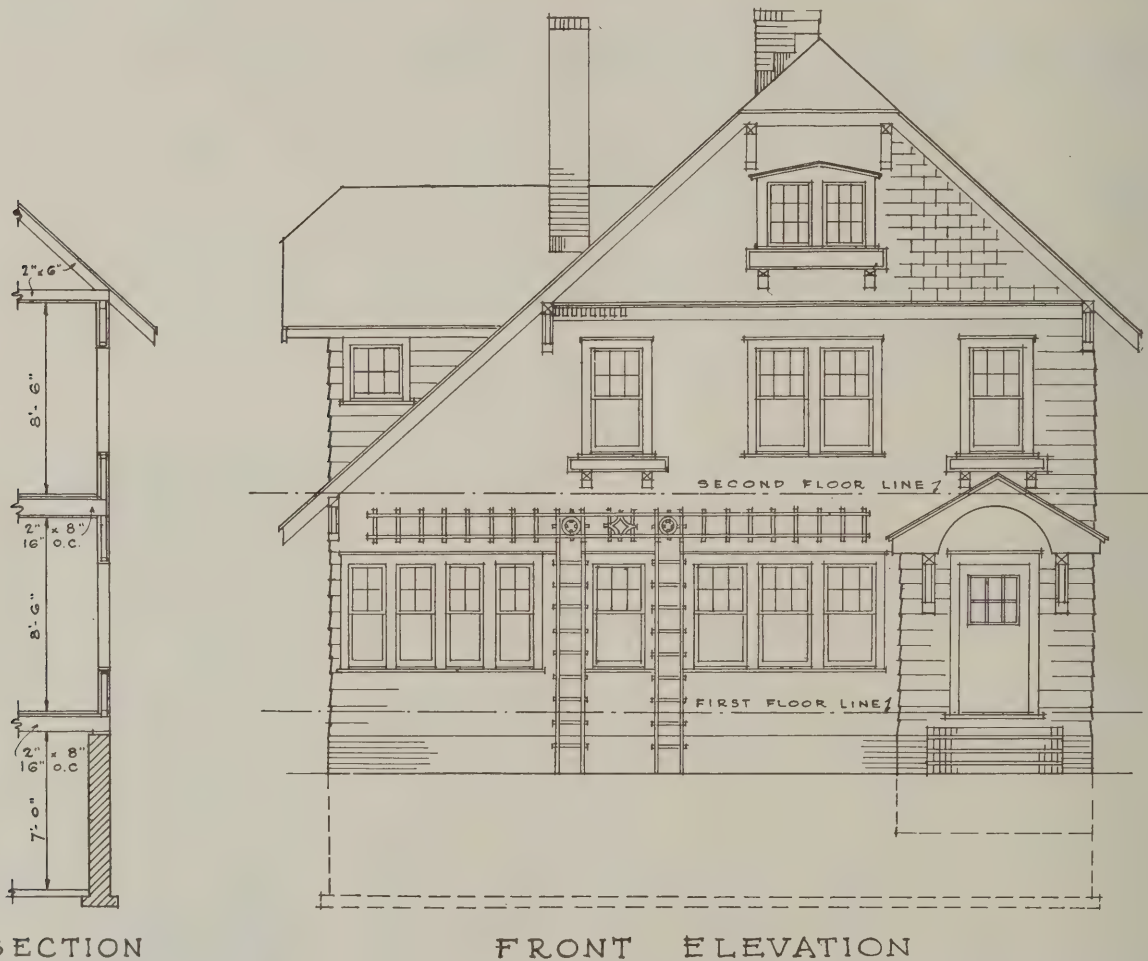
Modern Two-Family House

Must Have Individuality and Style—Example of a Space-Economizing Floor Plan for Bungalow, Two-Family House or Apartment

CLEVELAND and Buffalo are cities in which two-family houses are very popular. But the types of houses built in the two cities make a remarkable contrast. Buffalo builds the regulation "2-decker," with big front porches, two front entrances

looking homes may be built. The builder who has the courage to change the style is generally the one to achieve fame and fortune; and in any event the change is inevitable, and he might as well be first as last.

of study. Particular attention is called to the arrangement of the kitchen and breakfast nook. Another special feature is the side sun parlor or sun room, which of course could be placed on either side of the house, by turning the plan around. By a



SECTION

FRONT ELEVATION

Section and elevation of a modern two-family house designed by Henry W. Grieme, architect, Cleveland, Ohio

side by side, and all the other ear marks of the old standard 2-decker. Cleveland builds a type of two-family house that requires keen observation to identify as a two-family house; they often look so much like big high class residences. In Buffalo every house looks just like its neighbor, while in Cleveland there is great variety in appearance, as well as added attractiveness.

It may be, as Buffalo builders argue, that most owners want a kind of standardized structure; but the experience elsewhere, and notably in the neighboring city of Cleveland, is that people want such houses only because they don't know that much better

This article illustrates the design of a new Cleveland two-family house, of the regulation two-flat type, which is still popular, although the duplex type, with upstairs and downstairs quarters for each family, is also very popular in Cleveland. (Plans of one of this latter class will be shown in a subsequent issue.) The house here described and illustrated was designed by Henry W. Grieme, architect, whose work was shown in considerable detail in the September issue of NATIONAL BUILDER.

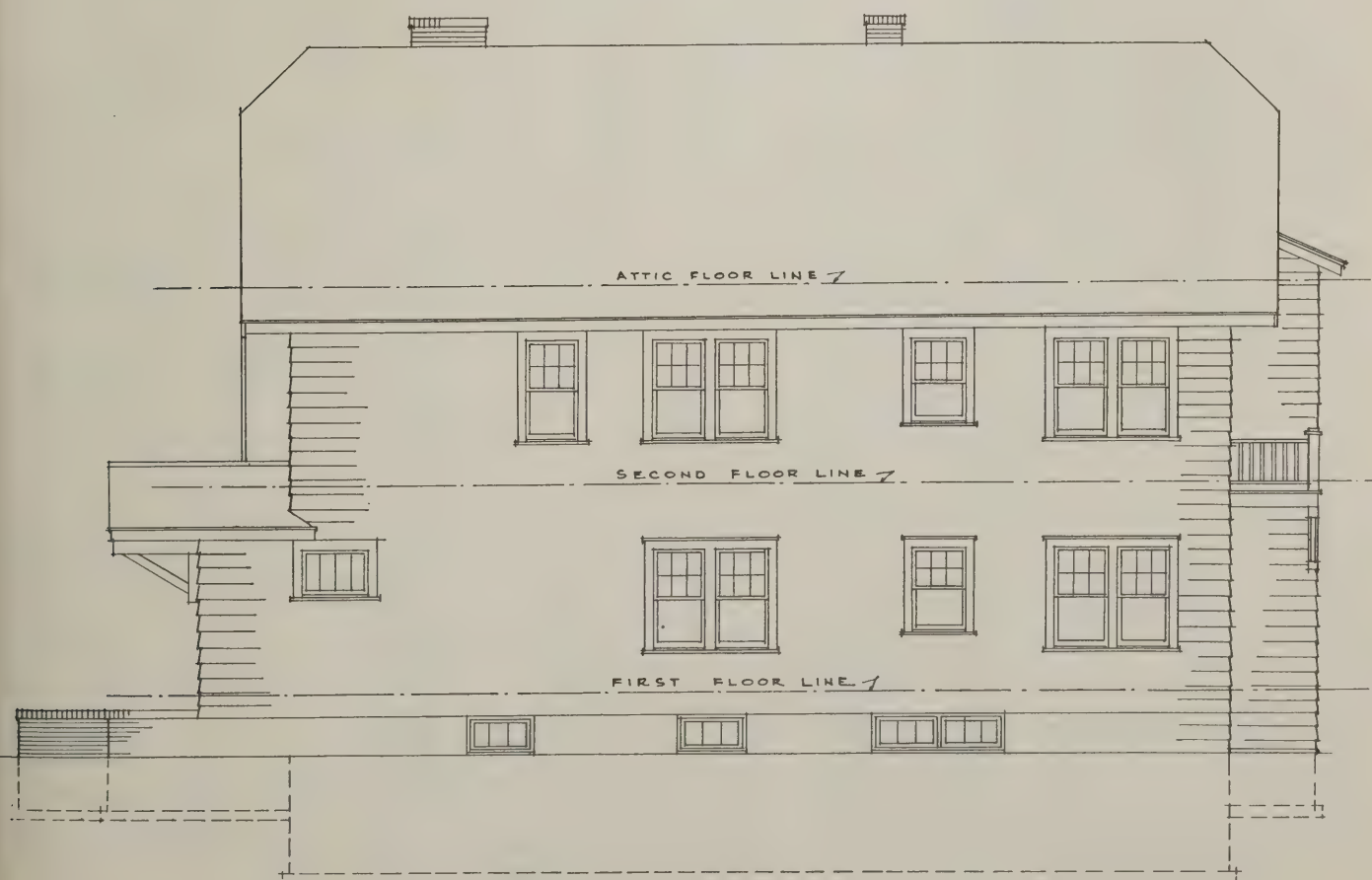
One of the most interesting features of this design is the floor plan, upon which Mr. Grieme has expended a large amount

slight change in this sun room a bed closet and in-a-door bed could be included and the additional feature of a sleeping porch added.

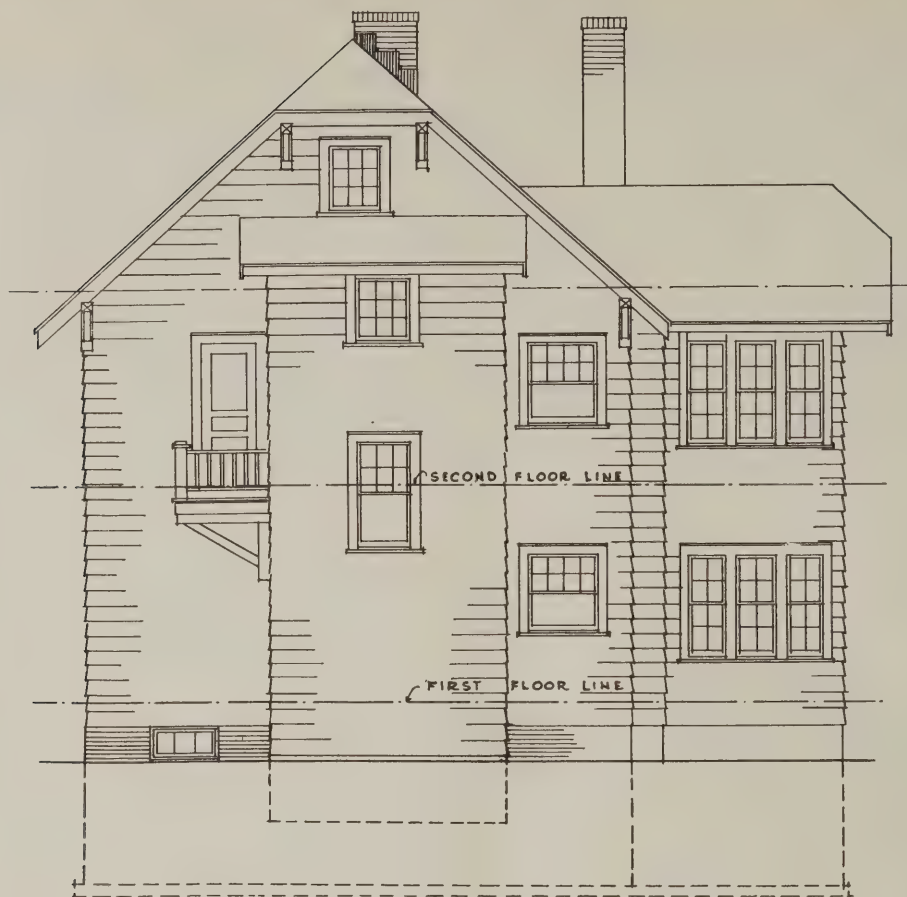
The dining room has built-in china closets and a window seat. The living room is spacious for an apartment of this kind. The bed rooms have ample closets and the bathroom is equipped with a full-size linen closet, and the entrance hall with a clothes chute. The layout of the bedrooms and bathroom is such that even in so small an apartment, by closing the kitchen door, the rear bedroom has all the privacy demanded in a guest room. Each apartment has a



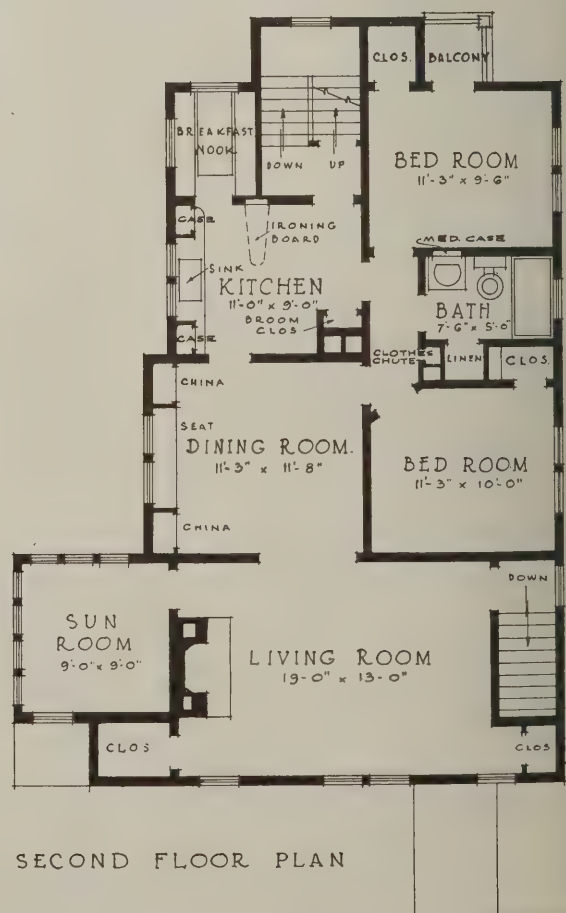
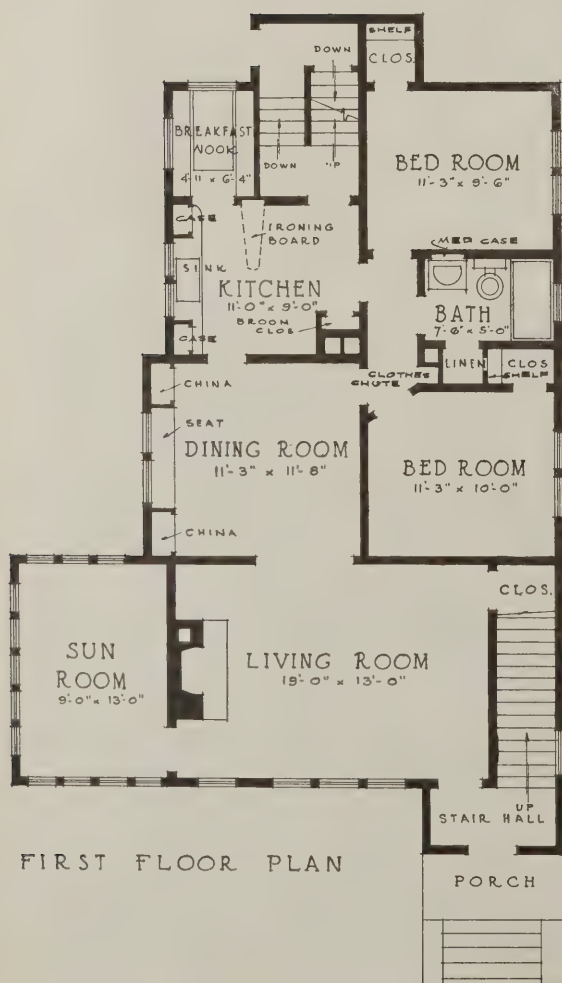
SIDE ELEVATION



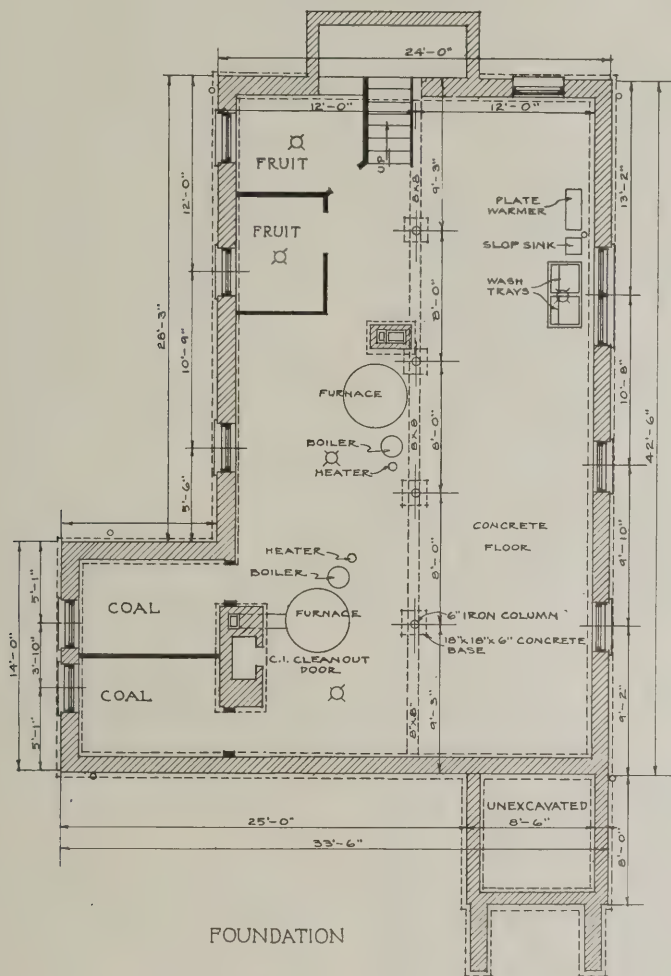
SIDE ELEVATION



REAR ELEVATION



While submitted as a good example of a modern two-flat, the floor plan of this house is obviously a good one for a bungalow, a three-family house, or with some changes, of an apartment house.



What Are Building Costs?

By A. P. Greensfelder, Fruin-Colnon Contracting Co., St. Louis, Mo.*

PEOPLE frequently discuss building costs as if bricks and bricklayers, materials and labor were the only items worthy of consideration. Broadly speaking, men and materials do comprise the total expense in construction work, just as they do in any other article produced for civilized man.

What we wish to emphasize, however, is that most people really think that the walls and floors of a building, the visible completed objects, are the only costs that enter into the expense of erection. They think differently, however, when they find it necessary to buy a stick of wood at the lumberyard or a pair of hinges at a hardware store, which may be needed for an extra partition after they have moved into the new building.

From their own books business men know just the sort of expense items they must add to the cost for fixed charges, operating expense and legitimate profits. They understand that their selling prices must include rent, taxes and insurance, contingency charges, interest and profits.

Builder Has "Overhead"

The builder is a merchant. He is also a manufacturer, differing from the usual producer in that the builders factory is portable and frequently without a roof, at least until nearly the end of the job. The builder has a fixed office, a warehouse and yards for storage of machinery and materials. The annual upkeep of these adjuncts must be sustained by field construction executed during the year.

The builder also has selling expense. He

must advertise and call upon architects, engineers and owners before he secures a customer. He must pay his estimator to make a quantity survey of the plans, because the owner does not tell him what he tells everybody else he buys from—the quantity of materials he wants to purchase. The builder's purchasing agent then locates the materials at market prices; and, after careful estimates are made, conferences held and a financier consulted, a contract is made with a future owner and the builder assumes the title and agency of a contract.

As agent, the contractor arranges to incur the following expenses: surety bonds, liability, fire and tornado insurance, building permits, water license, city inspection fee, temporary public utilities service, transportation of materials and drayage of equipment. Not a single item would be visible to a visitor to the building site, and yet they may constitute 10 per cent to 15 per cent of the cost. Then there is bank interest, because the owner does not advance money for payrolls and material bills. There is also ice and coal, oil, stationery, carfare, postage, rope, perishable tools, scaffolding, demurrage, war taxes and other miscellaneous items which are consumed.

Equipment Costs High

On a job of any size at all, the contractor must provide labor-saving equipment, such as concrete mixers, steam shovels, derricks, hoisting machines, power saws and similar machinery. While they are truly labor-saving and produce economy, they cost about 4 per cent of their value each month. Then there is the greatest of intangibles, brains, which, mingled with experience, knowledge, good judgment, aptitude and industry, produce that supervision which makes for good results. Brains insure satisfactory service. This is represented in the contractor's organization in many ways. The ablest superintendent, for instance, makes the fewest mistakes, has initiative, plans his work ahead, keeps his men working cheerfully together and gets a quality job done ahead of time within the estimated cost. Such men earn good wages and are worth it. Every merchant and manufacturer knows how scarce leaders are.

Then appear such contingency items as frost, rain, labor strikes, railroad delays and accidents, many of which are common to most industries, but all of which frequently confront the contractor. The law of averages applies the proper charge on such items to the work. Finally, to the actual outlay for materials and labor must be added a remuneration for the contractor sufficient to induce him to remain in business, subject to hardships and risks, and yet keep his financial credit good enough to start the next job.

Do you still think men and materials embrace all building costs?

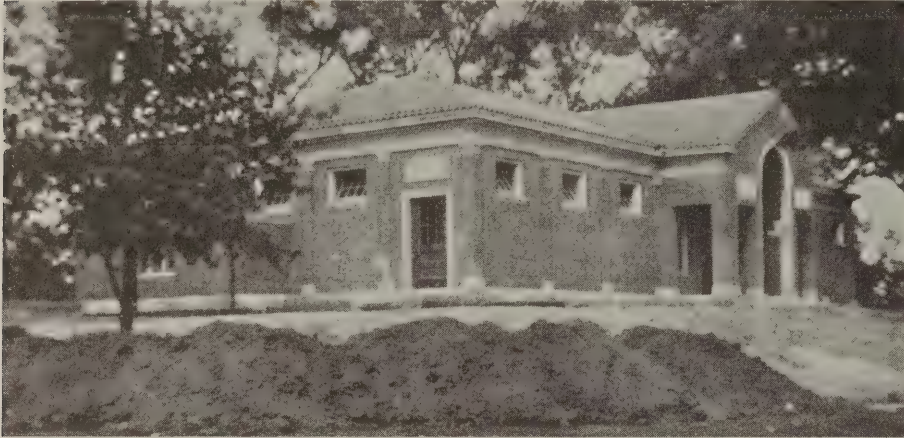
*From the October A. G. C. Monthly, "The Constructor."

A Field House

MOST mayors of the smaller towns are apt to be set on at various times by well meaning civic bodies to keep the young hoodlums off the downtown corners. And most mayors would reply that they are only too glad to have the "young hoodlums" in plain

small charge is asked and the youngsters are not spineless.

At the northeast corner of Lincoln Park, in Chicago, is a large field for football and baseball. There are four grounds for football, six diamonds and one indoor diamond.



Elevation of field house, Lincoln Park, Chicago

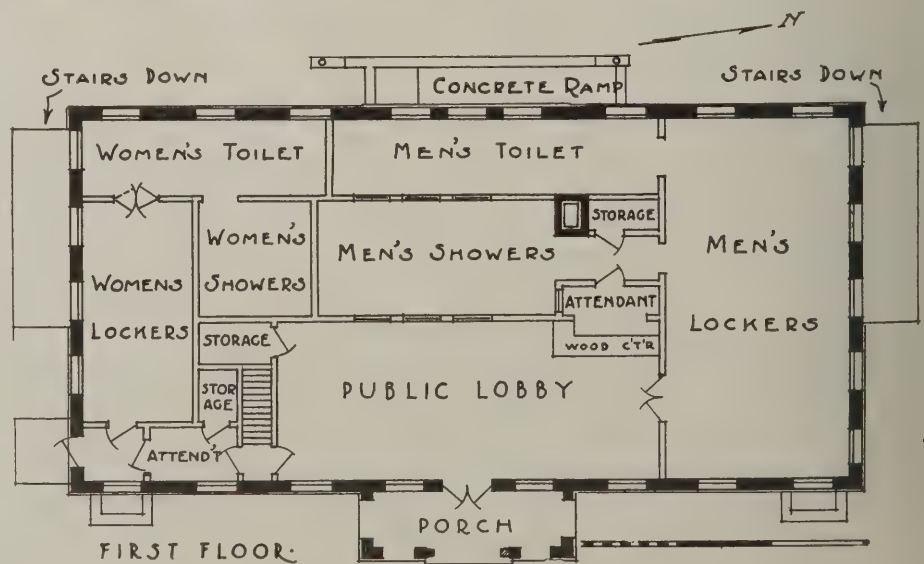
sight. They know that by nature most of the young are hoodlums, varying merely in degree. So the field house has become the remedy of the civic bodies and the mayors where the town is not financially able to support more elaborate equipment. And a field house, like the library, is a most democratic place.

If a community has a large field fit for baseball or football, with the possibilities of tennis and any other outdoor games, they can make no better investment. If the boys and young men, and the young women, too, have a place in which they can change to play-clothes, and take a shower after getting up a healthy perspiration, they will take to all sorts of exercise and keep out of mischief. The field house need not be very costly, but the building should be carefully planned, and the heating and plumbing munity. The running expense is nil if a

should be substantial. Its size of course may vary according to the size of the community. Afternoons, Saturdays and Sundays the place is filled with players and teams, some coming from quite a distance. This field house is notable for its appropriateness. Clark & Walcott are the architects. The building is brick on concrete foundation, steel truss roof with tile and hollow tile partitions. Doors, frames and trim are metal. From basement to first floor the distance is 10 ft. The height from first floor to ceiling is 12 ft. The windows are high up and ample, and with no obstruction for circulation of air. The shower rooms are airy and light and entirely free from low drafts. The toilets are long with excess of sunlight for the floor area. This is specially commendable. You will notice that the men's shower room, which is provided with window-lights and ventilators, is separated from the locker room by a passage between the storage closet and the attendant's booth, and that the attendant may pass the towels to the men from his booth before they leave the shower room. A man can then at least partly dry before passing to the locker room which is free from steam. Being altogether fireproof, no drafty doorways can offend. I am pointing out these things to emphasize the fact that a successful field house is more the product of good planning than expense.

The basement is equipped at either end with a comfort station, one for men and one for women. Between these is a space for the heating plant with enough left over for a very commodious lounge.

This type of a country club for the young people of any town is certainly worth while.



Plan of field house

National Builder Style Sheet



Plan 331 of elevation of "Unit" house, the Architects' Small House Service Bureau, Inc. See description and plan on page 41



Another view (first unit) of the Unit house, Plan 331, noted above



Elevation of Plan 422 of the Architects' Small House Service Bureau, Inc. See plans on page 41



Elevation of Plan 552 of the Architects' Small House Service Bureau, Inc. See plans on page 42



Elevation of Plan 651 of the Architects' Small House Service Bureau, Inc. See plans on page 42



Elevation of Plan 652 of the Architects' Small House Service Bureau, Inc. See plans on page 42



Elevation of Plan 658 of the Architects' Small House Service Bureau, Inc. See plans on page 43



Electric house, R. G. Bainbridge, architect. See description and plans on page 44



City house with veranda. See description and plans on pages 68 to 72



Elevation of Plan 821 by Bungalow Craft Company, Los Angeles, Calif. See plans on page 43



Elevation of Plan 823 by Bungalow Craft Company, Los Angeles, Calif. See plan on page 43



A two-story bungalow in Southern California



Tile and stucco bungalow in California showing Spanish influence



A California bungalow of the cottage type



Another tile and stucco bungalow of a Spanish cast



A composite bungalow in California

Floor Plans of Style Sheet Houses

A NOTABLE addition to the Style Sheet this month are the halftone reproductions of the houses built from the designs and plans of The Architects' Small House Bureau, Northwestern Division, Inc. The plans of these houses and the data regarding them are obtainable from that source. The floor plans herewith indicate the arrangement of the houses as built.

Plan No. 331, of which two elevations are shown, is a "unit" house, designed to

how one or two bedrooms can be added. The first bedroom then becomes a dining room, library or third bedroom.

House No. 422

This Colonial bungalow was built in Minneapolis. Both inside and outside have been kept simple and inexpensive, while the essentials have been preserved. It is built of frame with wide bevel siding on the exterior, shingle roof, brick base course and brick chimney. The plan being a rectangle with a simple roof, there are no expensive extras. The living quarters are on one side of the house, the sleeping quarters on the other. Entrance to the bedroom section is by a private hall, a superior arrangement. The latticed entrance porch is so well protected that a vestibule is unnecessary. This house is virtually a five-room house, the dining alcove with built-in seats and table is in effect a dining room.

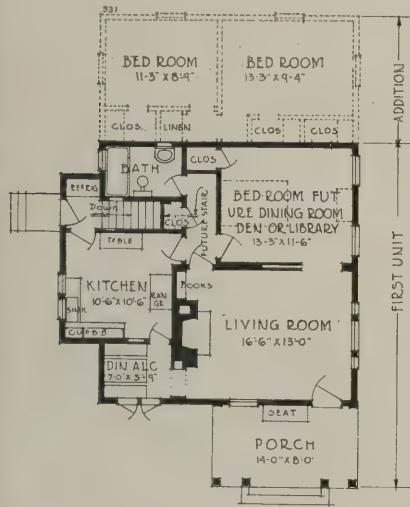
House No. 552

This is a "big small house" that can be built on a 40 ft. lot. It is of frame with stucco exterior in white with green marble dash, and insulated throughout. The foundation walls are cement to grade, then brick. Roof is stained cedar shingles. Exterior trim is white. Interior finish downstairs is fumed oak, and natural fir upstairs. The kitchen is a model in step and labor saving. The built-in buffet opens directly into both dining room and kitchen.

House No. 651

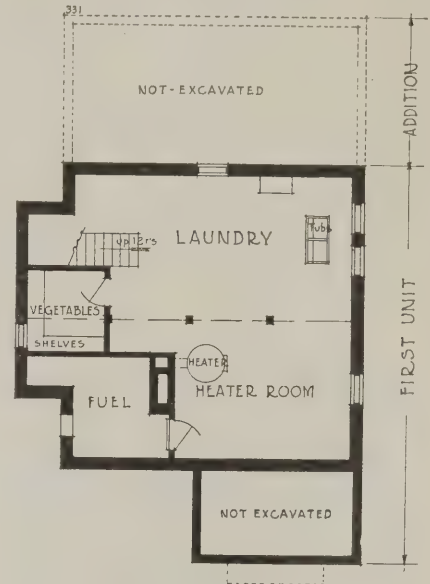
It is stated that a builder in one of the larger cities has just completed a house from this plan and sold it so quickly and at such a good profit that he is considering

building five more like it. The house shown in the Style Sheet was built in one of the best residential districts of a large city and showed more distinction and style than some of the far more costly houses surrounding it. The plan of the house makes it an economical house to build. The hooded Colonial entrance leads to a small



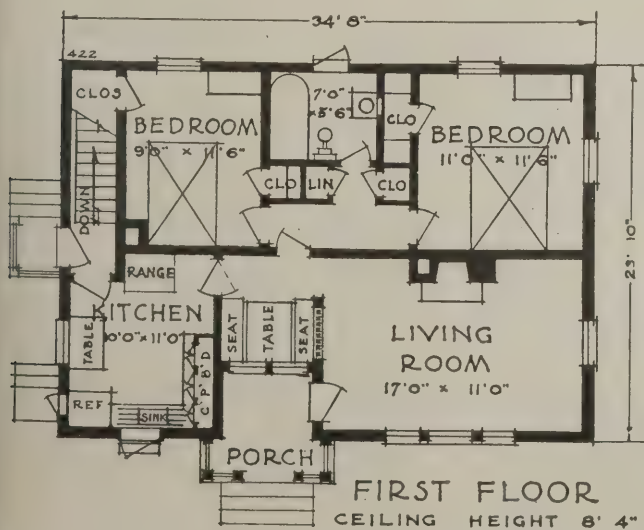
Plan 331, "unit" house. Showing how additions can be made without changing plumbing or heating

allow of an attractive small house being built with provisions for enlargement without changes in plumbing or heating. This is one of the latest developments in home planning. The photographs show the first unit of the completed house, and the dotted lines on the floor plans on this page show

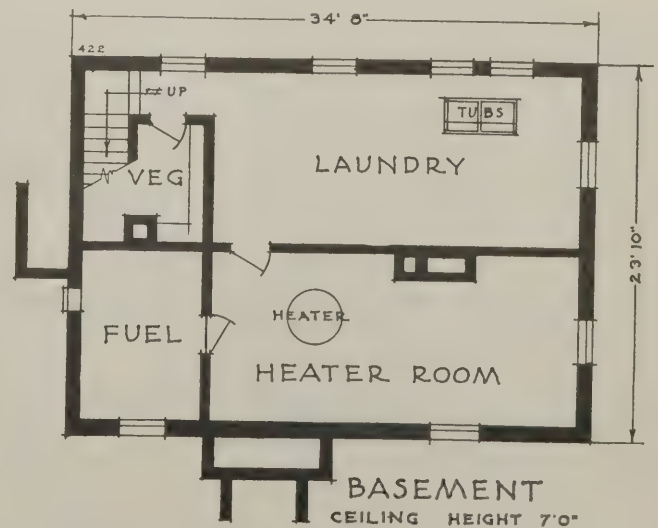


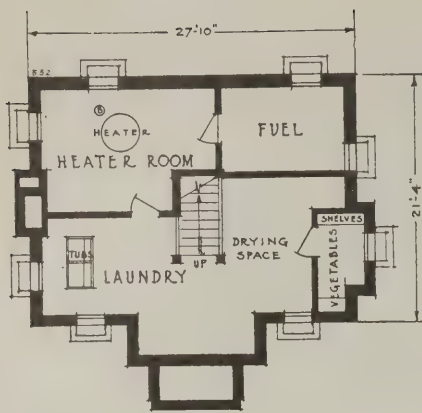
Basement plan of "unit" house, No. 331. The first unit is good enough, but if you want to sell the opportunity to enlarge is a selling point

vestibule with a coat closet on each side of the entrance door. Just beyond is the stair hall. The stairway is lighted by a window in the upper hall as well as from below. The large living room with fire-

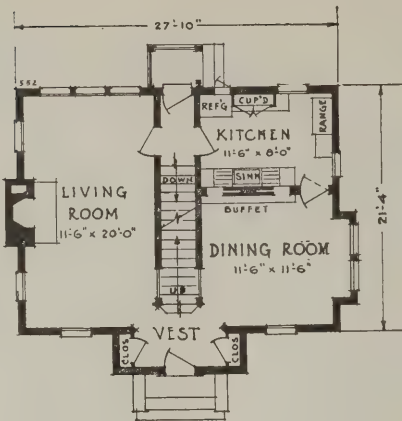


Plans of House No. 422 in which economy and convenience are effectively combined

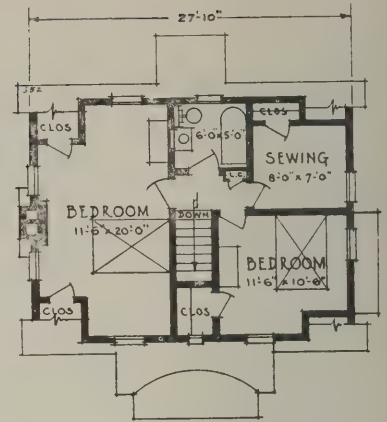




BASEMENT
CEILING HEIGHT 7'6"



FIRST FLOOR
CEILING HEIGHT 8'4"



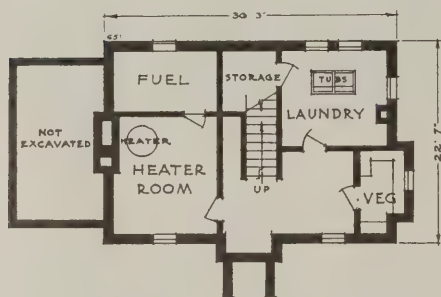
SECOND FLOOR
CEILING HEIGHT 8'0"

Plan of House No. 552, the "big small house" that saves the housewife miles of walking

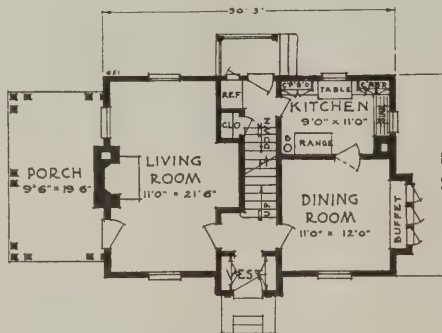
place and the large porch connected by French doors provides two living rooms in effect. An 8 ft. alcove opposite the fireplace provides a convenient place for the piano

leads to the basement cellar stairs. There are three corner bedrooms and bath on the second floor. Each bedroom has a closet and there is a linen closet in the hall.

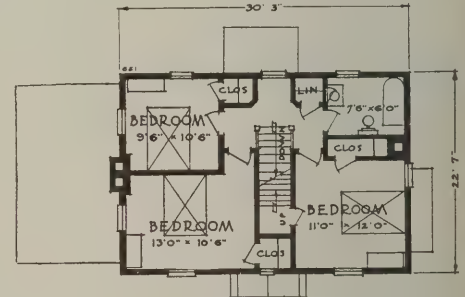
and step-saving kitchen. The house is compact and well-planned for convenience—a house to enjoy. The structure is frame, with foundation walls of cement block. The



BASEMENT
CEILING HEIGHT 7'6"



FIRST FLOOR
CEILING HEIGHT 8'4"



SECOND FLOOR
CEILING HEIGHT 8'0"

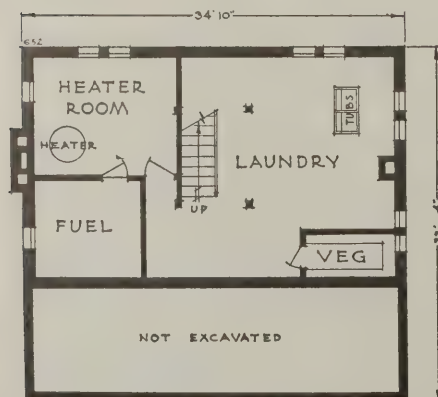
Plans of House No. 651, a house of distinction, economy and comfort

or davenport. A built-in buffet is in the dining room with casement windows above it. The kitchen has cross ventilation, and the rear entry, with a niche for the ice box,

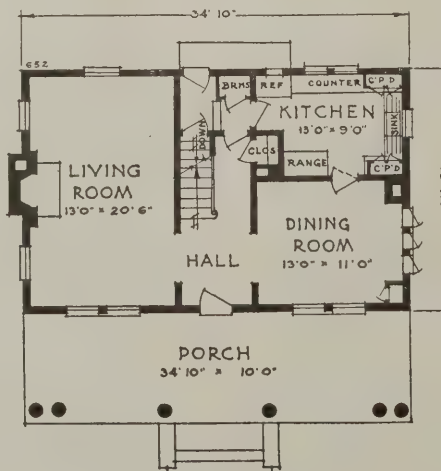
House No. 652

This Dutch Colonial house contains six good rooms, a sleeping porch, fireplace, spacious front porch, bath and a labor-saving

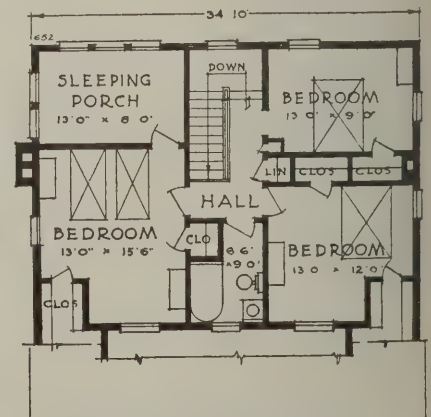
roof and exterior walls are laid with bleached red cedar shingles. The exterior trim, porch columns and windows are painted white, and the house is insulated



BASEMENT
CEILING HEIGHT 7'6"

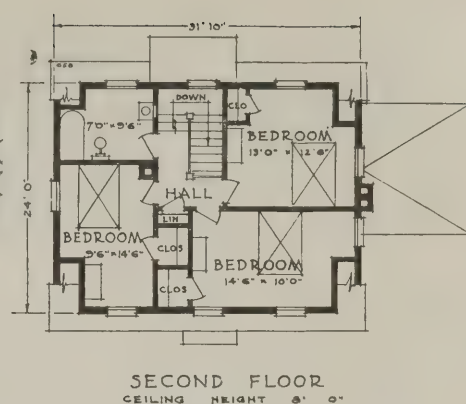
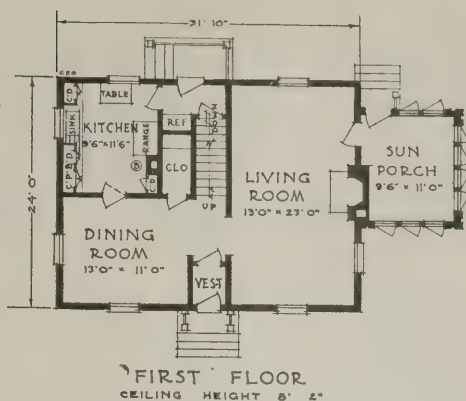
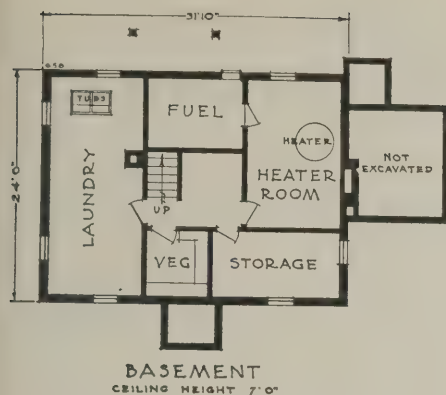


FIRST FLOOR
CEILING HEIGHT 8'6"



SECOND FLOOR
CEILING HEIGHT 8'0"

Plan of House No. 652, a Dutch Colonial house that can be modified to suit conditions. Compact and convenient



Plans of House No. 658, showing dignity, economy and comfort

House No. 658

In presenting this Dutch Colonial house it is well to speak of old-fashioned flowers, hollyhocks, shade trees, shrubbery and grass plots, as these form the setting the home requires, with a lot 50 ft. wide. Six roomy rooms are provided in this plan, a bath and sun porch besides numerous conveniences. There is a small vestibule at the entrance, as a barrier to drafts and for privacy. There is a large coat closet accessible from the dining room. The living room extends the full length of the house with a fireplace and windows on three sides. Two chimneys are called for in this design—one for the fireplace and one for the kitchen range. They carry out the balance of the design suited to this style. The house is frame construction, with brick chimneys, shingle

roof, sided walls. There are three bedrooms, each with a closet; bath with built-in cabinet, and a linen closet in the upstairs hall.

bathroom with a built-in tub and shower over. A stairway could be placed on the screen porch and a basement added if required.

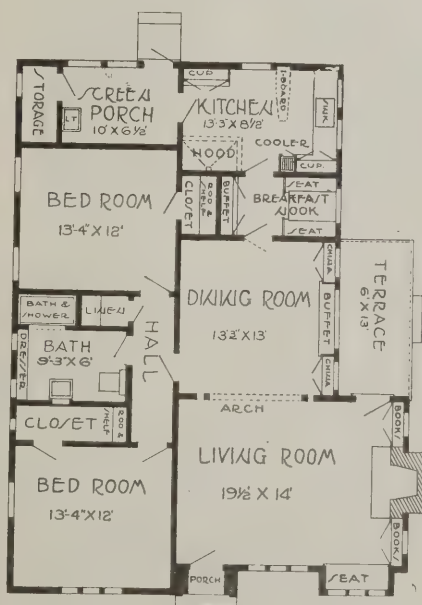
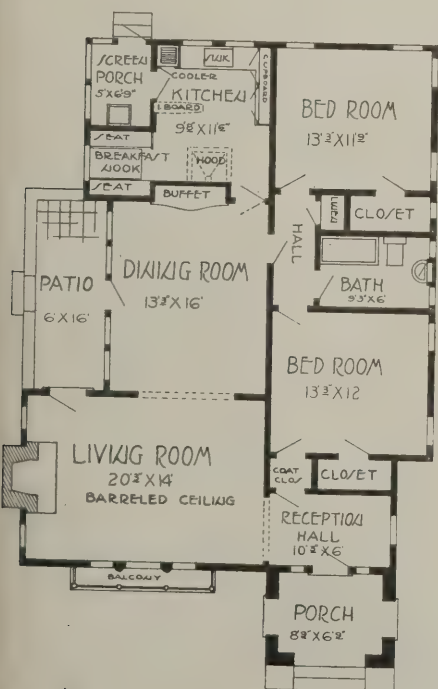
Bungalow Plan 821

This plan presents the features that make the Spanish ideas of comfort in a sunny climate attractive. The patio on the side is accessible from both the dining room and the living room, forming an enclosed terrace desirable to all who wish

New Books About Houses

The Practical Book of Furnishing the Small House and Apartment, by Edward Stratton Hollaway, published by J. B. Lippincott Co., Philadelphia, Pa., with nine illustrations in color, 198 in doubletone and seven diagrams. It shows and explains in detail how to furnish and decorate room by room the most inexpensively equipped cottage, bungalow or flat as well as the smart apartment or house of fair dimensions. It helps the householder decide upon the style of furnishing, and "for the first time there is shown in this volume, with every scheme of furnishing presented, actual furniture appropriate thereto that can be purchased in the open market today, and in many cases actual textiles in which they can be covered." There are three main divisions of the subject treated: Color and form; non-period furnishing, and liberal period furnishing; with supplementary discussions of apartments, the kitchen, floors, mantels and over-mantels, arrangements, window and other hangings, accessories of various kinds, pictures, screens, artificial lighting and fashion and style. Price \$6.50.

"Better Built Homes," Vols. XVII and XVIII, published by Curtis Service Bureau, Clinton, Iowa; 9x12, 40 pages and 24 pages, respectively. More volumes in the same series as Vol. XVI, noted in NATIONAL BUILDER for October. Vol. XVII is devoted exclusively to seven-room houses, and Vol. XVIII exclusively to eight-room houses, all of Colonial, English and Western types, all illustrated from photographs or in color plates. There are 40 different designs in Vol. XVIII, with some 13 basic floor plans, and 24 exterior expressions for seven basic interior arrangements for the houses in Vol. XVIII. All houses are of two story. Plans and designs are by Trowbridge & Ackerman, architects of New York City. Prices of books \$1 each, or free if requested through your lumber dealer.



privacy and fresh air and shade. The rooms are well arranged and contain all conceivable built-ins to lighten housekeeping. The front bedroom closet, contrary to the floor sketch shown, has a window for light and ventilation.

House No. 823

This modernized type of an old English style is done in brown stained half-timber and hard burnt red brick against stucco walls. Features of the plan are a breakfast nook with buffet, a large screened porch, a

Buffalo Model Electrical Home

House Designed and Built by R. G. Bainbridge Selected on its Merits to Demonstrate Equipment and Convenience of Modern Home

A GOOD builder simply can't hide his light under a bushel, even if he were to try. Last summer one of the editors of NATIONAL BUILDER, wandering the streets of Buffalo, N. Y., in search of "stylish" houses, after passing through block after block of very ordinary looking buildings, happened on a little white dutch colonial home that stood out from its neighbors, as a well designed house always will stand out under such circumstances.

Inquiry showed the house had been designed and recently completed by R. G. Bainbridge, architect and builder, who had come to Buffalo to engage in the building business only a few years before. Further inquiry developed the fact that the editor was not the only one, who had been attracted by the appearance of the house. Before it had been fully completed it had been seen by the officials of the local electric company and selected by them, on its merits, for a demonstration of modern electrical home appliances. During the week that the house was used for this purpose no fewer than 17,000 people inspected it—pretty good advertising for the builder, as well as the electrical company; and it came to him because of recognition of his ability

as a builder and not through wire-pulling.

A front elevation of this house is shown on page 36 of the Style Sheet of this issue. The rear elevation and floor plans are shown herewith. The house stands at a street intersection where the rear is fully

as conspicuous as the front.

It is a small house, the overall dimensions being 36 x 26 ft., but is very compact. Its present cost probably is in the neighborhood of \$10,000.

The downstairs floor plan contains several very attractive features. The cosy entrance hall with easy access to the kitchen is especially to be noted. Also note the large clothes closet in the entrance hall—a feature perhaps too often omitted in the modern small house. The built-in seat in the hall gives it an unusual and homey atmosphere.

The living room is very large for a small house, 13 x 25 ft., with a fireplace so placed that one and the same chimney serves the whole house. The built-in bookcase alongside the fireplace is in genuine colonial style.

The dining room, being arranged somewhat as an alcove out of the living room, adds to the impression of spaciousness, giving another long vista across the whole width of the house. The dining room, with its six large windows, is as it should be, the most cheerful room in the house.

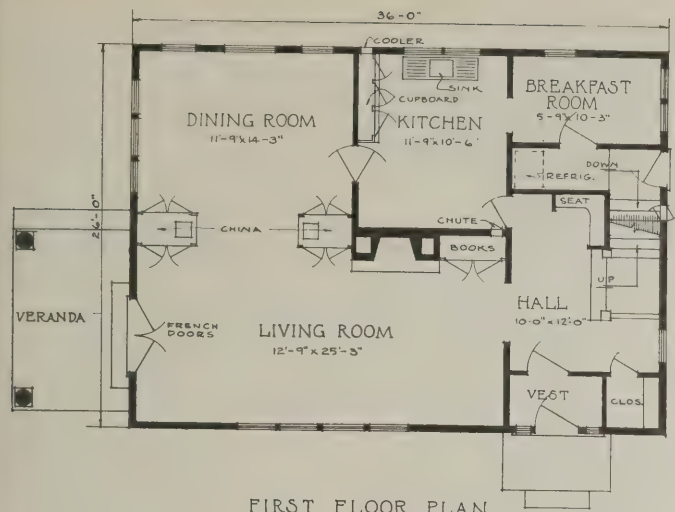
Between the living room and the dining room are built-in cabinets—bookcases on



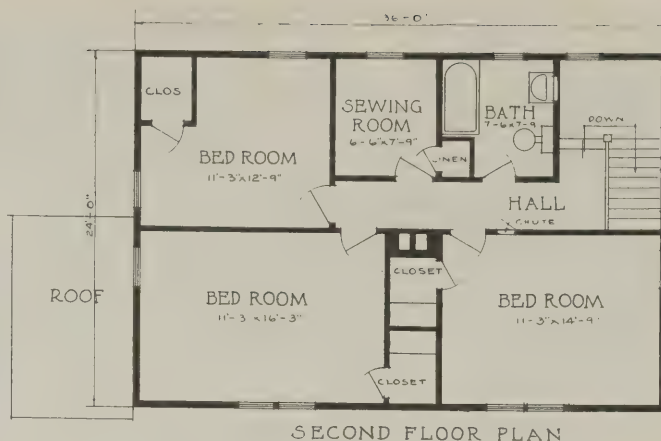
R. G. Bainbridge, architect and builder



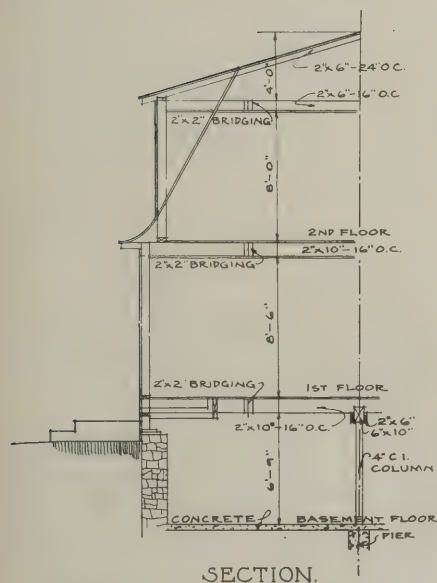
Model electrically equipped home, Buffalo, N. Y. See another elevation in Style Sheet, page 36



FIRST FLOOR PLAN



SECOND FLOOR PLAN



SECTION.



View looking in dining room from living room shows open construction around bookcases and mantels. China cabinets are provided on the dining room side back of bookcases. All trim is flat ivory and dark mahogany. The flooring is red oak hardwood, with black walnut border, laid over the rough flooring



One panel 1 3/4-in. door with antique brass Colonial door set and knocker. Jewettville rough red brick used for stoop

the living room side and china closets on the dining room side, thus economizing in both space and furniture.

The arrangement of the kitchen, breakfast room and back entry is rather unique. The principal feature is the unusual privacy of the kitchen. Back-door callers and grocery teamsters have no occasion to enter the kitchen. The back vestibule with its refrigerator is amply large for the delivery of provisions of all kinds.

The back-door caller or peddler does not have a look into the lady's kitchen, for the entrance is through the breakfast alcove. With the refrigerator accessible through the kitchen wall there is very little need of using the back entry except to take in provisions.

The upstairs layout is unusual, particularly in the arrangement of sewing room and bathroom. Ample closet room has been provided even at the expense of bedroom floor space.

As the interior views and their descriptions show, the house is decorated and equipped in keeping with its attractive design. Particularly interesting is the kitchen. Mr. Bainbridge believes this kitchen comes as near being an ideal size and arrangement for a city home as possible, and experience seems to justify his belief.

The door at the right on the main shelf of the kitchen cabinet opens to a cold closet, the outside ventilation of which is seen in the view of the rear elevation. Here is a feature often overlooked in city houses, and



Mantel is iron spot Roman brick with red quarry tile hearth. French doors, glazed with bevel plate glass, lead to veranda. Low radiation under double mullion front windows provides ample heat and adds considerably to general appearance. Mantel is finished in dark mahogany

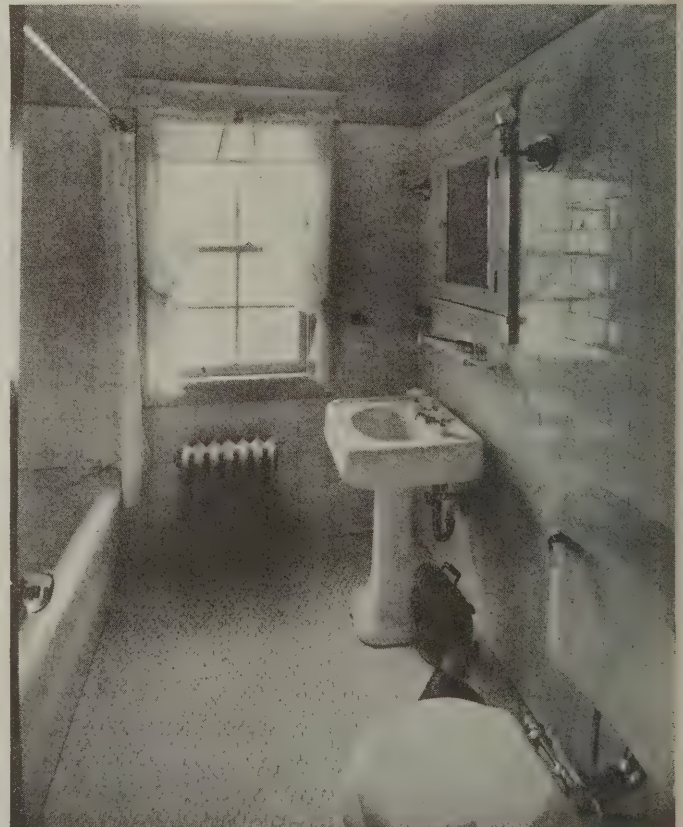
one that makes a splendid selling argument.

The electrical equipment of the breakfast room is such that an ordinary breakfast

may be cooked on the table. Plugs are provided for a coffee urn, a bread toaster and a broiler.



Breakfast set finished in a silver blue tone to harmonize with walls and ceiling, which are painted in a bluish tint, stippled



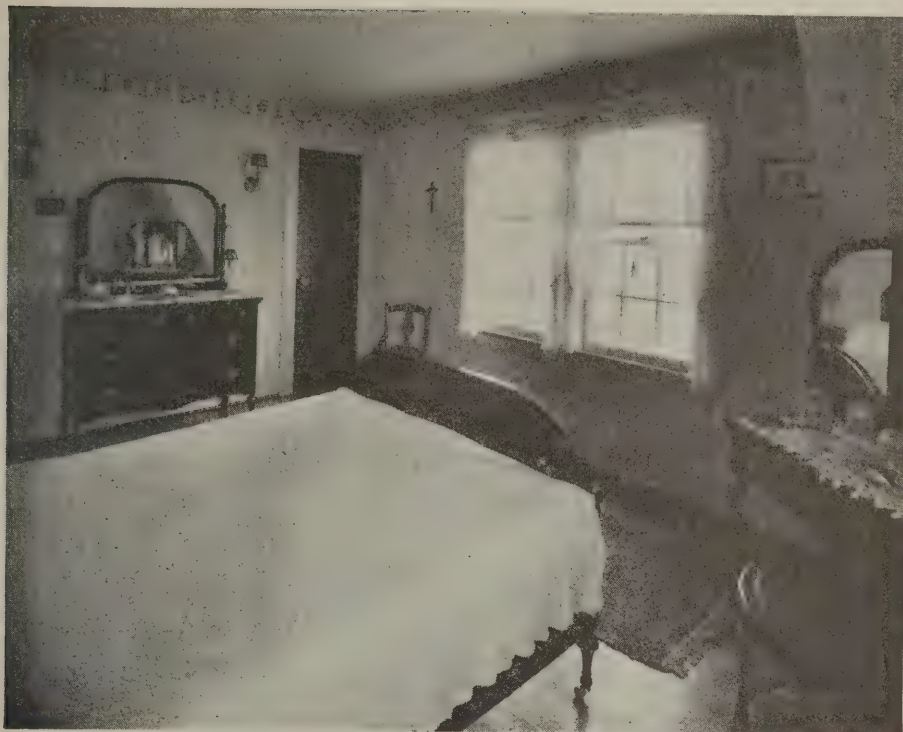
Bathroom is tiled to height of 6 ft. 6 in., with built-in tub and shower. Bathroom ware is all white enamel. Medicine cabinet is shown over lavatory. Woodwork is finished in white enamel

From the plans and description herewith, it will be seen that this house might be termed a modern home convenient, as well as a model home electric.

The Anonymous Architect

THERE has been a good deal of moaning among architects about the public indifference to architecture. But we believe this indifference is largely the fault of architects themselves. Why do they not sign their buildings, as painters do their pictures? A public which loves personalities would talk about buildings a good deal more if at the same time it could talk about their authors. Moreover, it is true, as C. McArthur Butler has suggested in a recent letter to the *London Press*, that "there never was a time when publicity could be so widely and freely secured by the architect as is the case today, and that without encroaching upon the written and unwritten laws against professional advertising. The public is becoming more interested in architecture and in architects, and the wise architect will see to it that the public is afforded every opportunity of criticising his work and of becoming acquainted with the name of its creator."

The condition thus described by the London, England, *Illustrated Carpenter and Builder*, is also true in America. If the credit for meritorious building designs is not



Bedroom is finished in flat ivory, with birch doors stained a dark mahogany. Door shown opens into clothes press, and controls light switch which turns on light in closet when opened. Photographer took his own picture incidentally through combination of mirror reflections



Trim is all finished in white enamel. Doors, 1¾-in. one-panel, are birch, finished in dark mahogany. Sink has double drainboard, all white porcelain. Cooler door can be seen on main shelf of cupboard, right-hand side. Clothes chute door over table on left-hand side

usually given it is due to the fact the identity of the architect or builder is so difficult to discover. In all the newspaper references, for instance, to the movement for the preservation of the Chicago World's

Columbian Administration Building the names of the architect and the builders failed to appear. The only publicity the architect or builder gets are the fugitive announcements in some few publications

and a sign or two on the building during construction, with the exception perhaps of the man who lays the sidewalk—he manages to get his name on his work in permanent form if he builds his sidewalk that way.

Shrinking and Swelling of Lumber in New Houses

IN DESIGNING the frame of a wooden dwelling, it is important to consider the influence of shrinkage and swelling in keeping the floor level. It is very uncommon for the frame lumber to be so dry when placed in a building that it will not ultimately shrink considerably. This shrinkage may cause considerable trouble, which could be partly eliminated, however, by proper design. For instance, if one end of a joist rests upon a concrete foundation, the other end should not be supported on top of a timber girder since the girder will shrink and lower that end of the joist. In small houses it is a better plan to place the girder flush with the top of the joists, which can be accomplished by supporting the joists on members spiked to the side of the girder.

If either interior or exterior trim is at too high a moisture content when used, the joints will open up due to the subsequent drying and shrinkage across the grain. If the material is too wet miter joints, for instance, will open at the inner corner as the wood shrinks and if too dry at the outer corner when it swells. (If the material is at the proper moisture content when put in position but if it is placed over wet plastering or allowed to become wet from other causes, the miter joints will first open at the outer corner and later when the material becomes dry they will open throughout their entire length).

The bad influence of shrinking and swelling will be much greater when flat grained material is used than when quarter-sawn stock is used, since flat-grain material shrinks and swells about 50 percent more than quarter-sawn stock with the same moisture changes. Quarter-sawn material is much less inclined to twist and warp than flat-sawn material and also has the advantage of offering a more uniform resistance to wear. From this it will be seen that quarter-sawn finish, flooring and the like are much superior to flat-sawn material even when what is usually the chief factor, its appearance, is disregarded.—*Preliminary Report of the Building Code Committee of the United States Department of Commerce.*

ELECTRICITY.—"It is destined to be the greatest conservator of natural resources, the greatest saver of human drudgery and animal toil, and the key to vast areas now unpeopled and unproductive."—A. S. Huey.

The Square Foot as a Pricing Unit

This is the Third of a Series of Articles on Short Cuts in Rapid Estimating and Methods Employed for Approximating the Cost of Buildings. The First Article Appeared in the July Number of National Builder, the Second Article in the September Number

By Theodore F. Laist

IN the two previous articles we discussed the development and merits of methods that could be employed by contractors and lumber dealers in ascertaining approximate costs of groups of small houses similar in construction and design but of varying size. Together with this some attention was given to the study of commonly used, short cut methods of estimating and the relative accuracy of such methods.

The Cubic and Square Foot

For the use of architects, contractors and others who are called upon to give quick estimates, the cubic foot or square foot method of figuring has always been considered the easiest and most adaptable, although in the matter of accuracy the value of these two methods is frequently questioned. While there are sometimes employed other common methods, none are more efficient than the modified cubic foot or square foot method, which is the subject of this article. The method is simple of application, sufficiently accurate for all practical purposes and time saving.

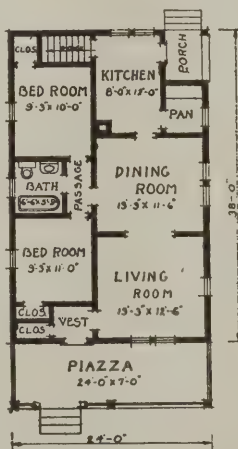
How a Lumber Yard Applies the Square Foot Method

Before proceeding we wish to cite the experiences and conclusions of a large lumber yard. In this yard the cubic foot and square foot units as ordinarily understood are employed; that is, a fixed price per square or cubic foot is applied regardless of the size of the building. Obviously, this method is inaccurate, although even with all its crudities the method seems to give results which may be used successfully in lumber yards or by contractors, but within narrow limits. The following report describing in detail the system adopted by this large retail lumber yard located in an Eastern city is given in substantiation. The value of such opinions cannot be underestimated, for while we recognize the value of purely academic discussions, the crucial test of any system lies in its practical application.

"The ——— Lumber Co. employs a very rapid but reasonably accurate method of figuring the tentative cost of homes. The square foot measure is used; that is, measuring the length of the floor plan and multiplying it by the width, which gives the



The "Miraflores" bungalow, with floor plan, used as an example of method of figuring costs. Courtesy of "American Lumberman"



area in square feet. This company has been established since 1870 and for many years has had a very efficient plan service. In making the plans the company has standardized on materials used, so that it is thoroughly familiar with the costs, which have been figured down to a square foot basis. The lumber company has issued a very attractive plan book, containing photographs, floor plans, specifications of materials used; in fact, it covers all the information a prospective builder should have. The accompanying illustration shows a model bungalow, which the company calls 'The Miraflores.' This bungalow has five rooms and a bath and the floor plan explains how every detail of comfort has been taken into consideration. Entering the ves-

tibule, the coat closet is immediately available on the left. To the right is the living room with a cozy fireplace; the dining room is visible through a cased opening, and it is only a step to the well arranged kitchen, with its convenient pantry, and the porch adjoining for the icebox. There are two roomy bedrooms with a closet in each opening off the passageway, with the bath between. This is a most satisfactory and economically built five-room bungalow. The photograph depicts a fireplace which is not shown in the floor plan.

"Taking this house as an example to demonstrate the method used to arrive at the cost, the company has figured the floor area at \$4 a square foot. The area in this house, 24x38, or 912 sq. ft. at \$4, would be \$3648; the porch is figured at \$2 a square foot, 24x7, 168 sq. ft., or \$336, making a total estimated cost of \$3984. This is for the completed job, including foundation for a 7-ft. cellar and everything for the house complete, reading to move into, good plumbing, with hot water tank and set tubs, usually one pipe heater, fair electric fixtures and papering and painting. If a fireplace is desired, this can easily be figured at from \$175 to \$250, depending on whether it is outside or inside. On 1½ story houses and bungalows with some rooms finished on the second floor, also two-story small houses, the cost averages about \$6 a square foot on the first floor and the porches about \$2. For the better class of houses over

28x28, where a little better quality of material might be used, such as a Dutch Colonial house, the cost is increased to about \$8 a square foot, first floor surface measure, a very few of them going as high as \$9 a square foot. This would cover a turn-key job, including foundation."

In discussing the accuracy of these figures, one of the officers of the lumber company says:

"If you were to put these plans and specifications out to four or five contractors, so all would be figuring on the same thing, on a house costing say \$5000 you would find there would be a variance in the figures on the completed cost of \$800 to \$1,000, or nearly 20 per cent on this size house, so at best you can get only a fair idea of what the house would cost.

"The prospective builder, as a general rule, figures on a leeway of \$800 to \$1000 on the estimated cost furnished by a contractor, so that the method described above is very satisfactory in arriving at the approximate cost.

foot or cubic foot price diminishes with the size of the building.

Conclusions

While there are so many crudities in this method, yet the results have been found to be sufficiently accurate for practical use. The explanation of this is that probably the price is applied only to buildings of no great range in size or cost.

The importance of the elimination of constants in all calculations is so obvious that it needs no defense. This process eliminates such items as plumbing, heating and other fixed amounts which would not vary with the size of houses of the same class.

Why is it that the application of a flat cubic foot or square foot price gives an inaccurate result? Obviously because the length of the enclosing walls, and consequently their cost does not increase in the same ratio as the area; that is, the proportion of the cost of the exterior wall to the total cost in a small house is much greater

TABLE SHOWING VARIATIONS IN RATIO TO AREA

Building dimensions	Length of outside walls ft.	Corresponding area of sq. ft.	Total cost flat cu. ft. price	Cost of outside walls included	Cost by modified method	Total cost outside wall included	Difference between methods
25'x25'x6.00	100	625	\$ 3750	\$ 937	\$ 2812	\$3750	
25'x37½'	125	937	5625	1406	4218	5155	\$ 470
25'x50'	150	1250	7500	1875	5624	6561	939
25'x62½'	175	1562	9375	2343	7030	7967	1408
25'x75'	200	1875	11250	2812	8436	9373	1877
25'x87½'	225	2187	13125	3281	9842	10779	2351
25'x100'	250	2500	15000	3750	11248	12175	2825

"The application of this method by any dealer can very easily be made if the dealer has a positive knowledge of his costs; that is, the price of materials and labor in his locality. By standardizing on the quality of material to be used for various plans in his possession and adding thereto the cost of labor, he can arrive at an average cost a square foot for floor area and at a certain figure for porch area, increasing the cost for one and one-half and two-story houses, and taking into consideration the better class of materials for the better class of houses. In this connection it might be well to emphasize the importance of every dealer having a thorough knowledge of costs at all times, whether figuring on the square foot surface measure or in detail, and in case of substitution of one kind of material for another they can readily figure on the additional cost.

"The lumber company states that it is very well satisfied with this method of figuring approximate cost; it has worked out profitably and is very acceptable to its customers."

Comment

There are two objections to the method employed, both of which have been mentioned but will bear repetition:

1. Plumbing, electric wiring, heating, etc., are not omitted.

2. A flat square foot price is used, although it has been shown that the square

than in a large building of the same type. This is clearly illustrated in the attached table showing variations in dwellings varying from 25x25 ft. to 25x100 ft. and has previously been shown by charts.

Explanation of Table

The first column shows the dimensions of the building; the second the length of the outside walls; the third, the corresponding area, to which the price would be applied; the fourth, the total cost obtained by the application of a flat cubic foot price; the fifth, the cost of the outside wall included in this figure; the sixth, the cost obtained by using the modified or more accurate method without outside walls; the seventh, the total with the outside wall included, by the more accurate method; and the eighth column showing the differences obtained by the two methods.

Thus we see there is a constantly increasing inaccuracy. The fact that this variation is not beyond all reason is sometimes due to compensating errors; that is, the error is offset by other errors which tend to reduce the price. In small bungalows the error is perhaps not material but there is the element of uncertainty attached to a rule of thumb of this kind that it is hardly to be recommended to a contractor who risks his money and reputation on his figures.

(Continued in next issue)

Built-in Writing Desk

ARCHITECTS and builders who are interested in saving space in rooms of small dimensions will find a suggestion in the inexpensive built-in writing desk shown herewith, which serves as a portion of the cut-away partition separating the living room and dining room. The corresponding portion of the partition on the opposite side of the passageway is a bookcase of the familiar built-in type. The photographs show that no costly cabinet work has been attempted in constructing this feature, and the same woods that are used in finishing the rest of the room are employed. It stands 58 in. high and is 32 in. wide.

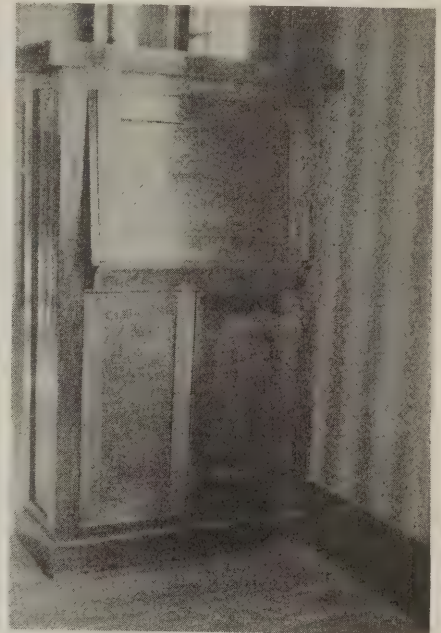


Fig. 1 — Cut-away partition between dining room and living room which has been converted into a writing desk

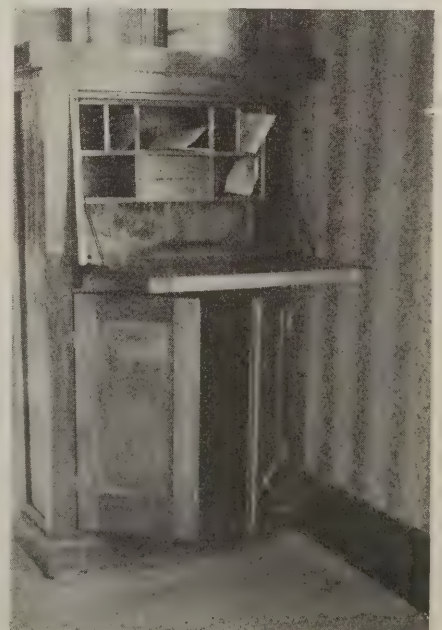


Fig. 2 — The cut-away partition opened to show the writing desk construction

Tile-Wall Dairy Barn With Gothic Roof

Example of an Up-to-Date Structure in One of the Greatest Dairy Sections of the World

IN the up-to-dateness and completeness of their construction and equipment the dairy barns of Minnesota and Wisconsin are

has been paid to adequate and sanitary housing for stock as has been expended in improving breeds of stock.

Prague, Minn., for Dr. E. E. Novak. It was designed by R. E. Ekholm of the Hudson Manufacturing Co., Minneapolis, Minn.,



Tile barn at New Prague, Minn.

probably second to none in any other section of the world. For through the leadership of powerful dairymen's leagues and the state agricultural departments as much attention

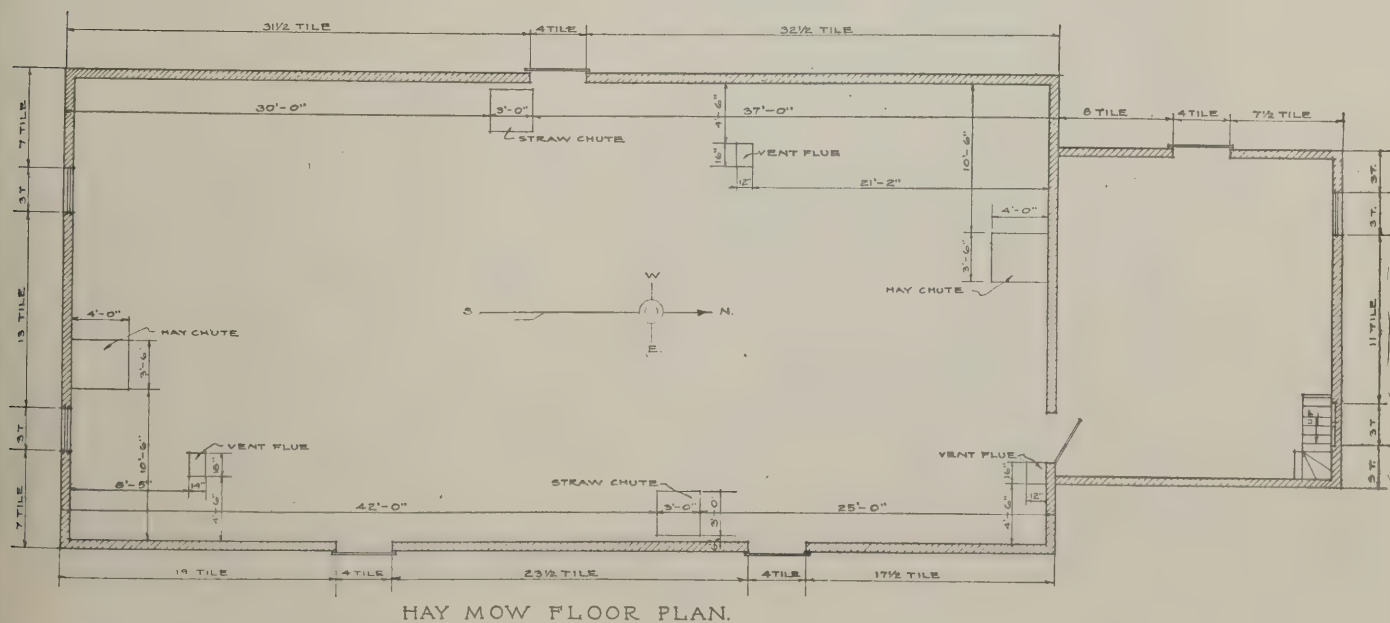
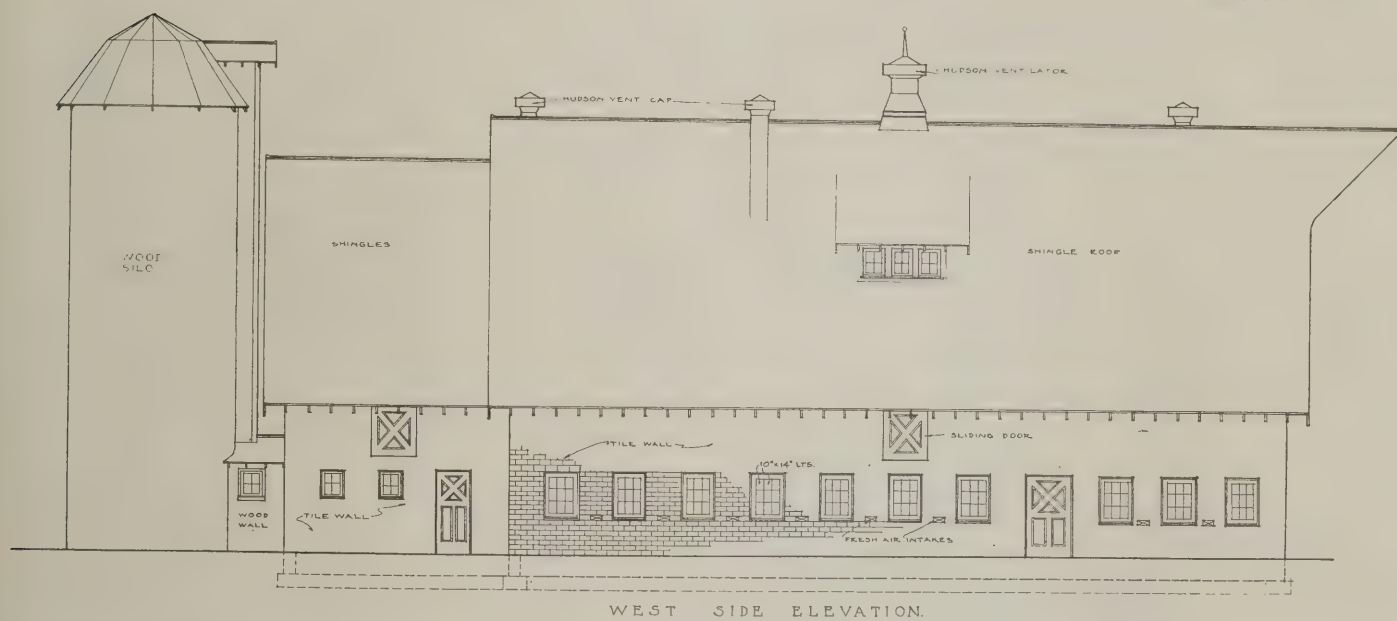
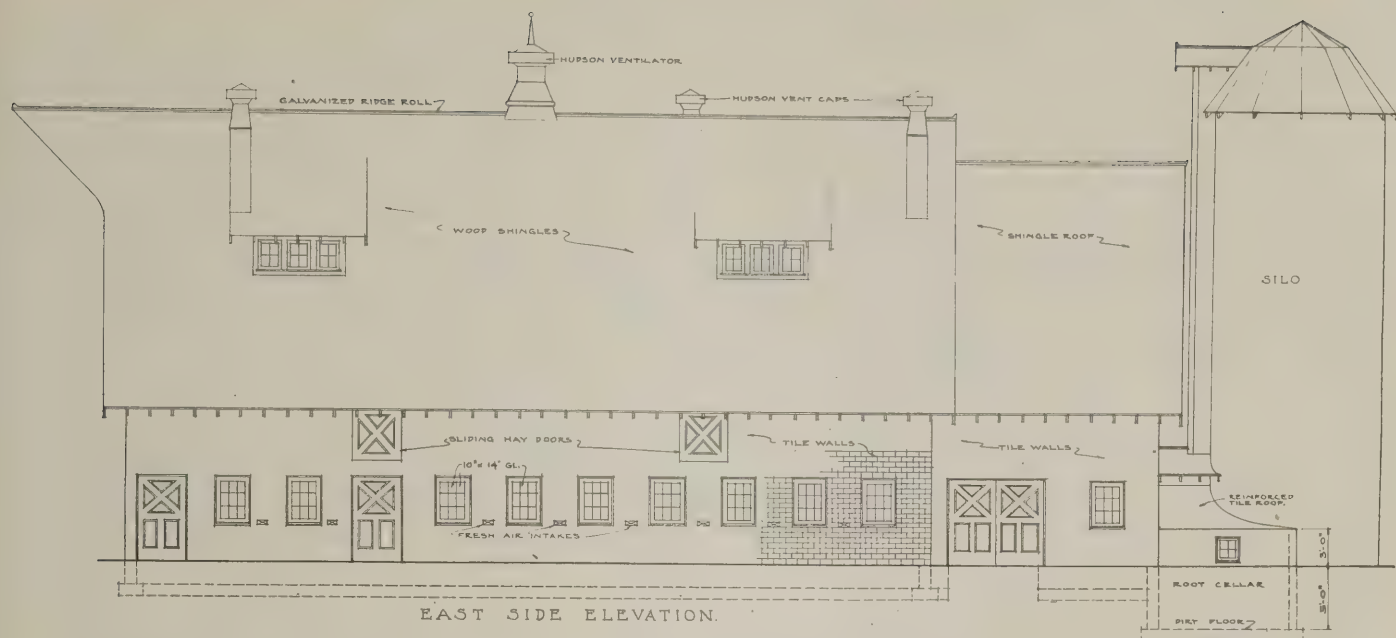
The building illustrated herewith is a good example of dairy-barn refinements possible in a prosperous dairy country. This barn was recently completed at New

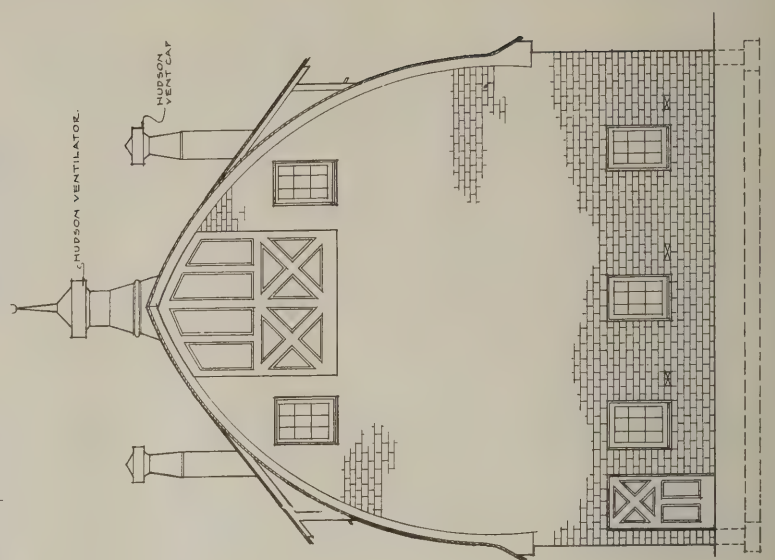
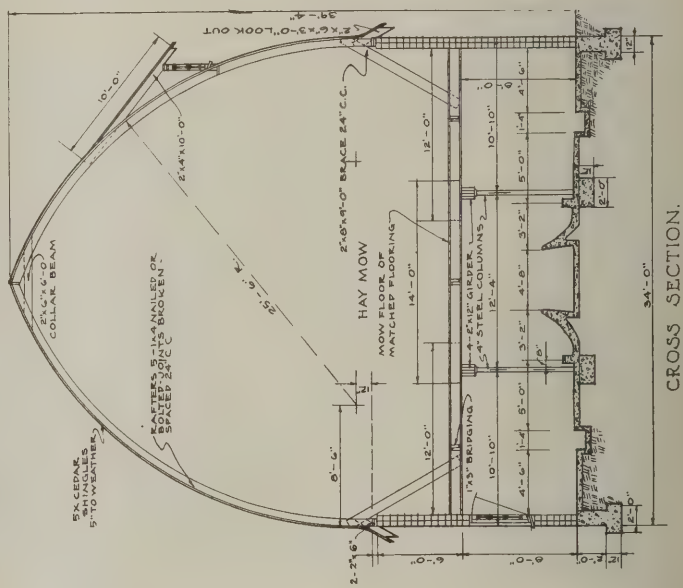
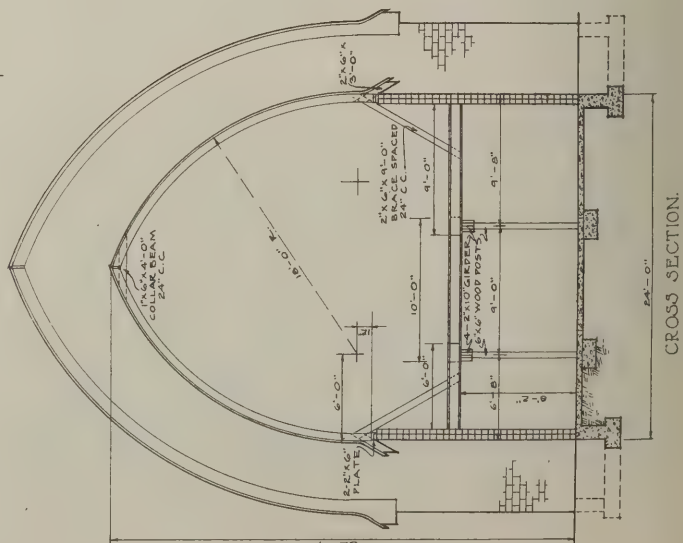
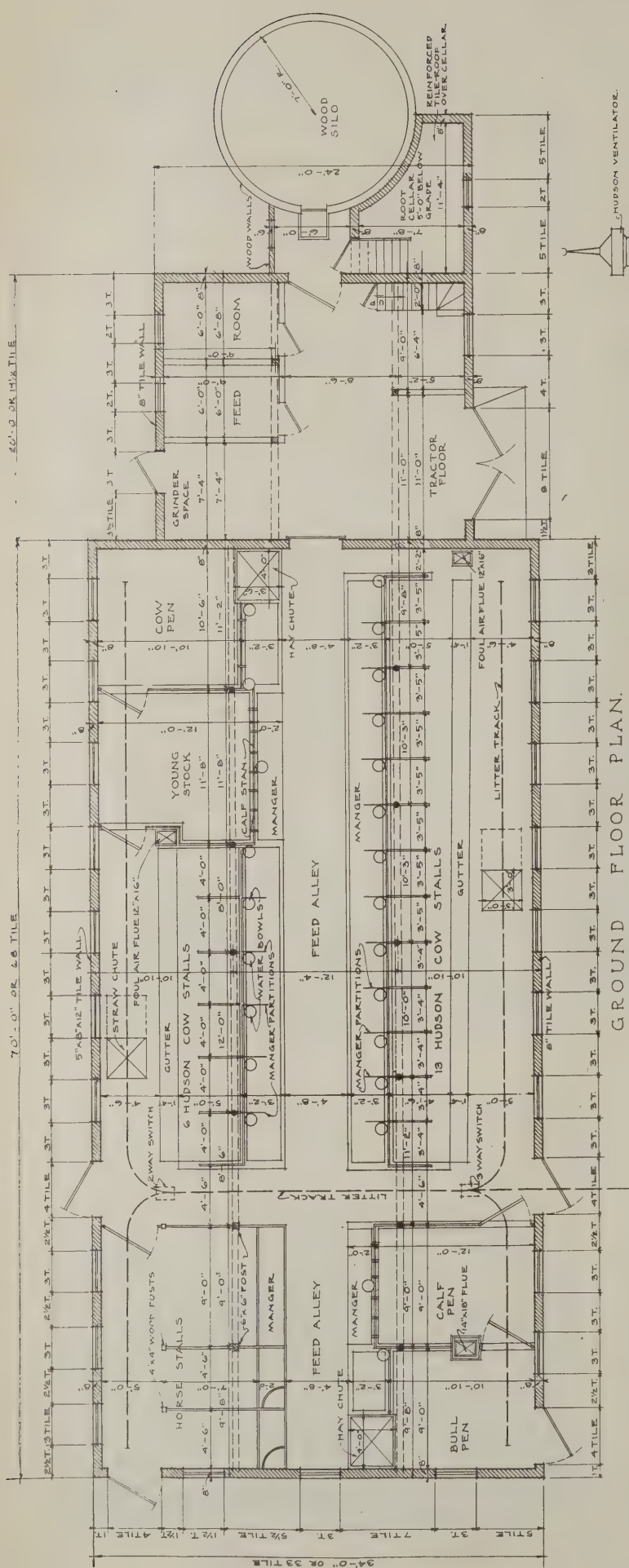
and cost in round figures approximately \$10,000.

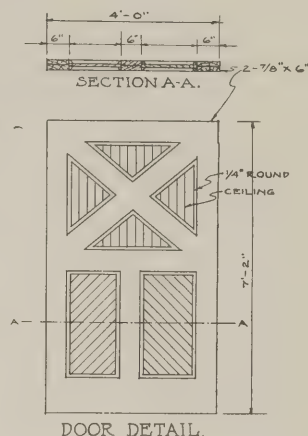
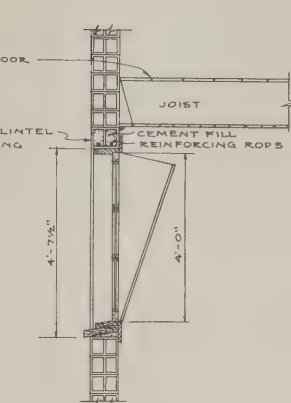
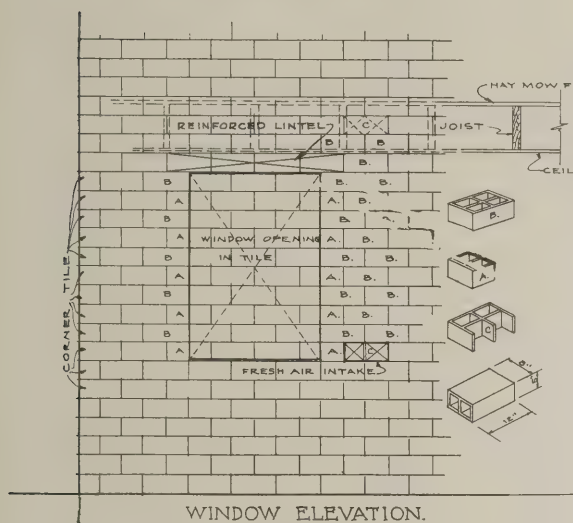
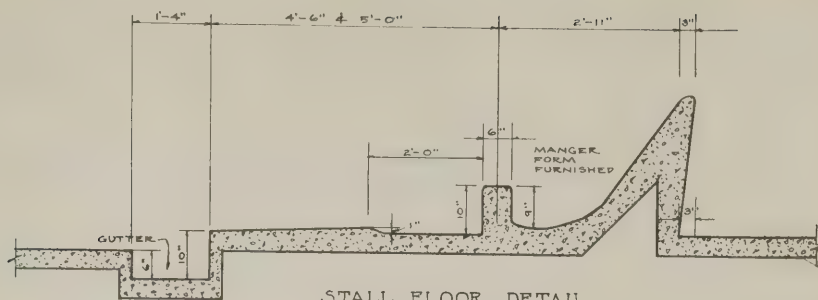
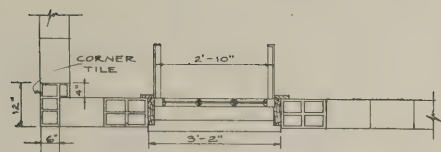
A bill of material accompanies this article.



Side elevations of tile-wall barn, at New Prague, Minn.







Floor Plan

The over-all dimensions of the floor plan are 70x34 ft. Note that all the dimensions are given in tile lengths, standard 5x8x12-in. four-way hollow clay tile being used. It was found that this method of laying out the plan was very helpful to the contractor and his masons.

Most of the details in the floor plan are clearly shown from the drawings. The cows face in with a central feed alley served by a carrier running from end to end of the barn, with the silo on the center line of the barn. One of the most interesting features in the floor plan is the room or compartment for the tractor, so arranged that when the tractor is thus housed it can be readily belted to the grinder and feed cutter machinery permanently placed in a room on the other side of the barn.

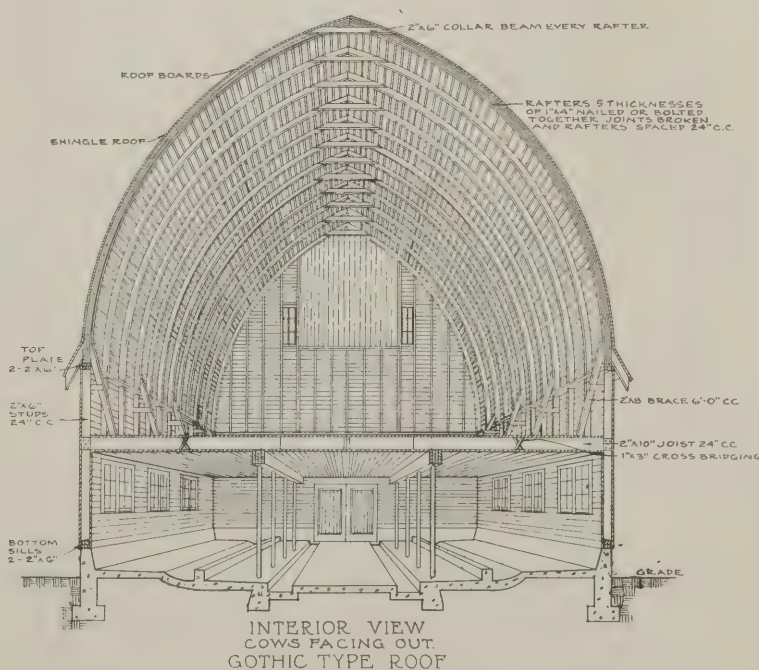
This part of the barn, adjoining the silo, is a section of an older structure, which accounts for the difference in sizes. This part, besides housing the tractor and fixed machinery, also contains a root cellar and feed rooms, all served by the central feed carrier.

Special Details

The typical cross-section showing a perspective of the interior is for a floor plan where the cows face out, and is intended merely to illustrate the structural features of the roof. The other two cross-sectional drawings show the interior details of this particular barn as built. It is a type of barn which gives the maximum amount of hay storage for its over-all dimensions.

The ventilation details are of particular interest. These are illustrated in the two side elevations and in the group of details showing how the window openings were

Two tiers above the tops of the window is another tile with the middle diaphragm and inside face knocked out, forming an opening from the inside of the wall of the



made in the tile walls. The fresh-air intakes are standard tile with the faces knocked off. The holes in the tile above being practically centered (the tiles are laid up on edge) a flue is formed for the air in the two outer compartments of the tile.

barn into the fresh-air flue, or duct.

Lintels over windows were made of tile-filled with concrete and reinforced with square bars, as shown in the drawing.

The reinforced concrete cow stalls are 4 ft. 6 in. deep at one end of the barn and

5 ft. deep at the other, so as to fit both large and small cows, and all sizes of cows in between.

Litter carriers are provided behind each gutter with a dumping track extending out the east side of the barn. In addition there is, of course, modern equipment of various kinds, such as individual water bowls, etc.

Bill of Material

3	6"x6"x8'	No. 1 Fir. S. 4 S. Posts
4	2"x10"x9'	No. 1 Fir. S. 1 S. 1 E. Girder
4	2"x10"x12'	No. 1 Fir. S. 1 S. 1 E. Girder
4	2"x10"x8'	No. 1 Fir. S. 1 S. 1 E. Girder
4	2"x10"x12'	No. 1 Fir. S. 1 S. 1 E. Girder
2	6"x6"x8'	No. 1 Fir. S. 4 S. Posts
3	4"x4"x8'	No. 1 Fir. S. 4 S. Posts
8	2"x12"x12'	No. 1 Fir. S. 1 S. 1 E. Girder
4	2"x12"x8'	No. 1 Fir. S. 1 S. 1 E. Girder
4	2"x12"x12'	No. 1 Fir. S. 1 S. 1 E. Girder
8	2"x12"x9'	No. 1 Fir. S. 1 S. 1 E. Girder
4	2"x12"x10'	No. 1 Fir. S. 1 S. 1 E. Girder
4	2"x12"x9'	No. 1 Fir. S. 1 S. 1 E. Girder
8	2"x12"x10'	No. 1 Fir. S. 1 S. 1 E. Girder
4	2"x12"x12'	No. 1 Fir. S. 1 S. 1 E. Girder
8	2"x12"x12'	No. 1 Fir. S. 1 S. 1 E. Girder
4	2"x12"x10'	No. 1 Fir. S. 1 S. 1 E. Girder
1	8"x10"x16'	Hay Fork Beam
11	2"x10"x9'	No. 1 Fir. S. 1 S. 1 E. Joist
12	2"x10"x10'	No. 1 Fir. S. 1 S. 1 E. Joist
11	2"x10"x6'	No. 1 Fir. S. 1 S. 1 E. Joist
72	2"x10"x12'	No. 1 Fir. S. 1 S. 1 E. Joist
36	2"x10"x14'	No. 1 Fir. S. 1 S. 1 E. Joist
600	Lin. Ft. 1"x4"	Bridging
620	Lin. Ft. 2"x6"	No. 1 Fir. Plates on Tile
1250	Lin. Ft. 1"x4"	No. 1 Fir. Rafters
16	2"x12"x12'	No. 1 Fir. Hood
2500	Lin. Ft. 1"x4"	No. 1 Fir. Rafters
10	2"x4"x10'	No. 1 Fir. Dormer Rafters
90	Lin. Ft. 2"x10"	Ridge Rafters
36	2"x6"x6'	No. 1 Fir. Collar Tie
11	1"x6"x4'	No. 1 Fir. Collar Tie
2	2"x6"x8'	No. 1 Fir. Dormer Hd.
72	2"x8"x9'	No. 1 Fir. Side Braces
22	2"x6"x9'	No. 1 Fir. Side Braces
— Gable Bracing not estimated		
98	2"x6"x3'	Selec. Com. Fir. S. 1 S. Tail Rafters
6850	No. 2 Com. Fir. Boards	Roof Sheeting
850	1"x6"x3'	S. G. Fir. or equal Cornice
— No paper on Roof		
63	M 5/2	Clear R. C. Shingles
3575	1"x6"	Fir. Flooring Mow Floor
3575	1"x6"	Beaded Ceiling
102	Lin. Ft. 2"x6"	No. 1 Fir. Partitions Studs for Feed Room
24	2"x6"x8'	No. 1 Fir. Partitions Studs for Feed Room
— Horse Stall Partitions not estimated		
307	Lin. Ft. 1"x10"	No. 1 Pine Frieze
20	2"x12"x10'	No. 1 Pine S. 4 S. Facia
6	2"x6"x8'	No. 1 Pine S. 4 S. Facia
500	1"x2"	No. 1 Pine S. 4 S. Mouldings
3	Trip Sash	Fir. 10x14 4 Lt. 7/8"
9	Single Sash	Fir. 10x14 4 Lt. 1 1/8" Dormer
4	Plank Sash	Fir. 10x14 9 Lt. per detail
4	Barn Sash	10x14 Fir. 9 Lt. per detail
23	Plank Sash	Fir. 10"x14" 9 Lt. per detail
23	Barn Sash	Fir. 10"x14" 9 Lt. per detail
23	Plank Sash	Fir. 9x10 4 Lt. per detail
1	Sash	Fir. 9x10 4 Lt. Stock
4	Sash	Fir. 9x10 4 Lt. 1 1/8"
12	2"x8"x8'	Rab. 7/8x2" for Door Frames
5	2"x8"x5'	Rab. 7/8x2" for Door Frames
10	2"x8"x10'	Rab. 7/8x2" for Door Frames
25	1"x6"x18'	Clear Fir. Window Trim
6	1"x6"x18'	Clear Fir. Door Trim
4	1"x6"x10'	Clear Fir. Door Trim
44	1"x6"x8'	No. 1 Pine S. 4 S. Doors
26	1"x6"x6'	No. 1 Pine S. 4 S. Doors
18	1"x12"x5'	No. 1 Pine S. 4 S. Doors
24	1"x6"x10'	No. 1 Pine S. 4 S. Doors
4	1"x6"x12'	No. 1 Pine S. 4 S. Doors
600	1"x4"	Ceiling Doors
1500	Lin. Ft. 1/4"	Round Doors
3	2"x6"x6'	No. 1 Fir. S. 1 S. E. Wall
8	2"x6"x8'	No. 1 Fir. S. 1 S. E. Wall

90	Ft. 1"x6"	Drop Siding
90	Ft. 1"x6"	No. 3 D. & M.
800	Ft. 1"x6"	No. 3 Clear D. & M.
36	2"x4"x12'	No. 1 Fir. Hay Chutes
2	2"x12"x14'	No. 1 Fir. Stairs
12	2"x10"x3'	No. 1 Fir. Stairs
13	1"x8"x3'	No. 1 Fir. Stairs
1	1"x10"x14'	No. 1 Pine Stairs
116	Bbls. Cement	for Floors, Footings and

Foundations	
11	M 5"x8"x12" Tile
95	Corner Tile, Detail A
95	Corner Tile, Detail B
228	Corner Tile, Detail B, Flues
114	Corner Tile, Detail A, Flues
38	Corner Tile, Detail C, Flues
480	Tile, Detail B for Doors and Windows
480	Tile, Detail A for Doors and Windows

What Silo Is Required?

DISCUSSING the requirements of a farmer contemplating going into the dairy business on a 24-acre farm, A. H. De Graff gives his views in a recent issue of the *Rural New Yorker*. These will be of value to those builders who study the real needs of their customers in consultation regarding proposed work of this character. After expressing doubt if dairying can be financially successful on a 24-acre farm, De Graff says:

Relative Sizes

"If one has only 10 head to feed, it is difficult to feed fast enough to keep the silage from spoiling in warm weather, and the silo must be very small in diameter to enable the dairyman to keep ahead of the mold. The smaller the tub is, the higher the cost per ton of capacity. This is because the capacity increases with the square of the diameter, while the amount of lumber or other building material increases only as the diameter. To make this clear I will give the capacity of a 10-ft. silo 28 ft. high, which is 40 tons, and that of a 20-ft. silo of the same height, which is 169 tons. If both tubs are made of 2-in. material we have the following results:

	10-ft.	20-ft.
	tub	tub
Board feet of material.....	1,900	2,800
Capacity, tons	40	169
Board feet per ton capacity....	47.5	22.5

"If the lumber is worth \$100 per 1,000 ft., it will cost you \$4.75 per ton capacity in the one case and \$2.25 in the other. There will be the same proportion in the hoops, and the chute will have to be about as large in the one case as the other. * * * *

"Now as to the type to build and the size. If you feed your cattle till May 15 and then start in again July 15, which you should do to keep up the flow of milk, you will feed about 300 days. At 40 lbs. per cow, and allowing the three head of young stock as equivalent to two mature cows, you would need 60 tons of silage. If you have a small breed of cows, they would not eat 40 lbs., and if your silage is very well eared they will not, anyway. Your tub must be small with a small number of cattle, not over 12 ft. diameter, and 10 ft. is better. If you intend to feed some green feed, such as corn fodder, you can cut the size some; 10x36 ft. would give you right capacity, 57 tons, but a tub of this height is likely to blow down if so small in diameter. Two 10x24-ft. tubs would be better, but a lot more expen-

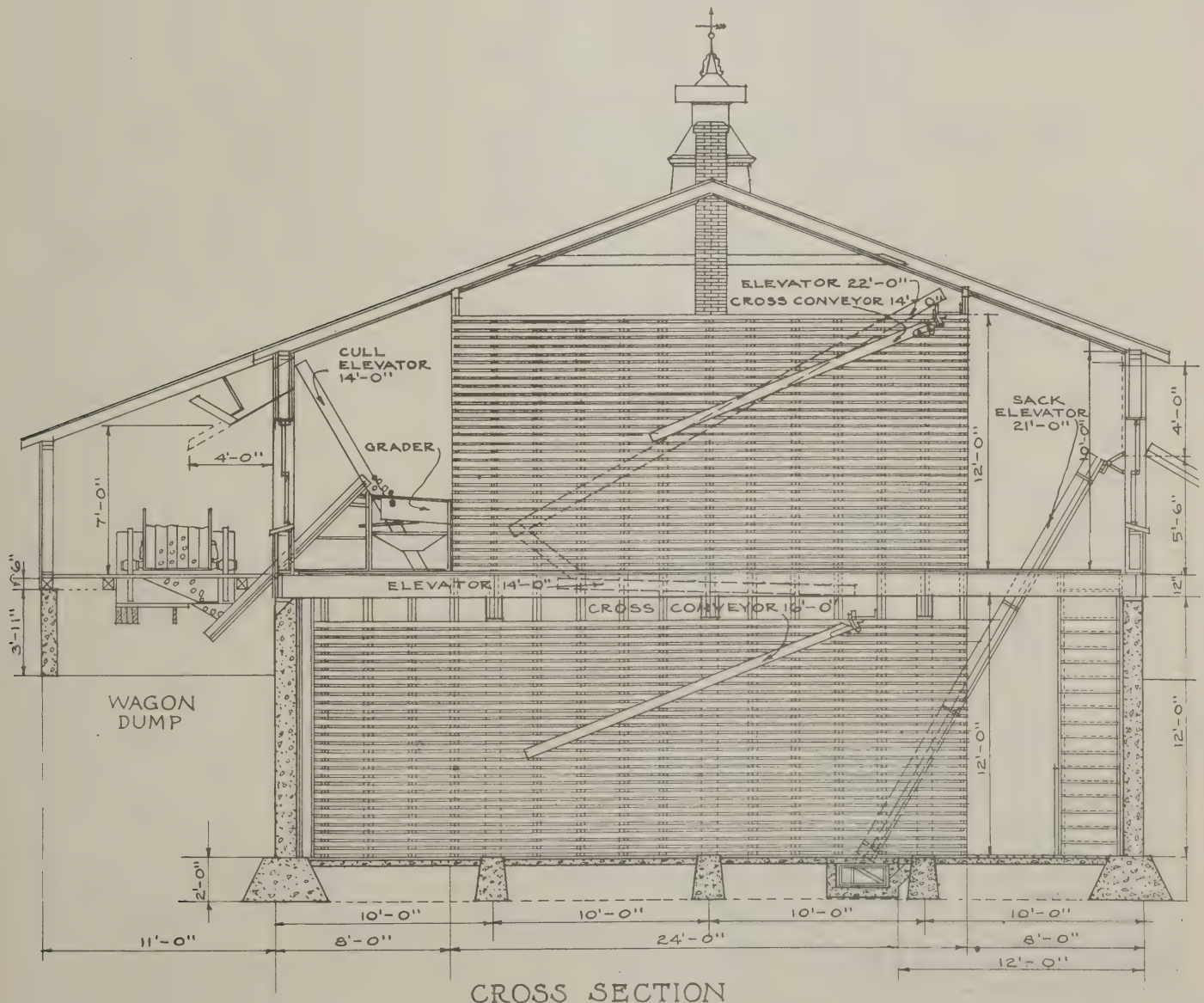
sive. I think I should take a chance and make the silo 11 or 12 ft.; 12x28 would hold 61 tons refilled to the top; 12x30 would hold enough without refilling.

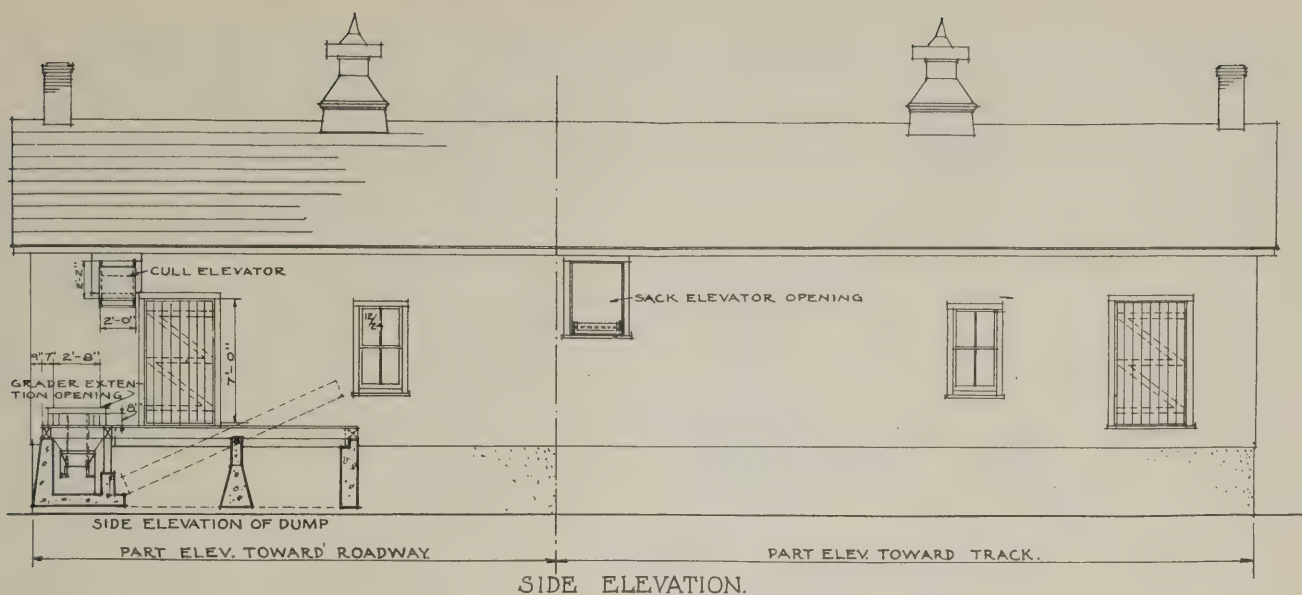
Types of Silos

"In my opinion the monolithic concrete silos are the best for the money. There are a lot of them in this county (Jefferson county, New York), and they seem to give good satisfaction. They would be pretty expensive, however, for the small size, as the men who build them charge a fixed price to set up, and then so much per hour for the building. That makes the small tub pretty high-priced. The charge used to be \$100 to set up. Tile silos are good, but expensive. I have built two home-made stave ones, and both have given satisfaction. The first one was built from hemlock gotten out of our own woods. It was not matched. The staves, which are 2x6, were dressed four sides, and simply toe-nailed together every 3 ft. with 12-penny nails. Then the hoops were put on and the whole tightened. Silage keeps fully as well in this tub as in a matched one. Perhaps a better way of building such a tub is given in United States Farmers' Bulletin 589. Holes are bored half way through the staves and the staves spiked together with 30 or 40-penny spikes, driven into the holes with a drift pin. The only disadvantage to these silos is that a staging is needed to put them up. The second one I built is built of matched spruce. I had it matched at the planing mill, and had two men who understood the game set it up. When matched no staging is needed. Cypress is the best lumber for silos, and if it is to be had at anything like a fair price, I should prefer it. Pine is also good; spruce not quite so good. Hemlock is all right if you can get good stuff. Fir and redwood are also said to be good, though I cannot say from personal experience."

Inspector of Construction

THE United States Civil Service Commission announces an open competitive examination for inspector of construction at Pearl Harbor, Hawaii, at \$7.20 per diem. Applicants should apply for Form 1312 to the United States Civil Service Commission, Washington, D. C., or to the secretary of the commission in their vicinity. Receipt of applications closes on November 21.





arranged with proper control doors and dampers so that air circulations can be controlled as well as the relative humidity. An ample supply of fresh air is essential.

Equipment of Warehouse

The first special equipment of a potato warehouse is the wagon dump. The wagon is driven upon a scale, weighed and automatically dumped through a trap into a hopper. From the hopper the potatoes are removed by a belt elevator to a potato grader, where the sizes are automatically sorted out. From the grader an inclined belt conveyor, or elevator, takes the potatoes to a belt conveyor over the bins, where they are stored, or direct to a belt at either end of the warehouse for loading cars in bulk. Cross conveyors permit the bins to be filled from the main belt conveyor and other conveyors and elevators provide for emptying the bins, either to the bulk loaders or to the sacking hoppers, at the ends of the building.

As in nearly all other industries the operations of a modern potato warehouse are practically automatic. There are potato graders, deflectors, picking tables, sack stackers, wagon dumps, car loaders, weighing scales, etc. The arrangement and placing of these for economical power consumption as well as the general layout of the building is the work of specialists, whose services are available to contractors, builders and architects, who may be asked to erect such buildings.

In view of the very large potato crop in the northwest this year and the present low prices for the product, there bids fair to be unusual activity in the construction of potato warehouses.

The December National Builder.—New features of service will distinguish the December number, indicative of the extensive program of progress mapped out for 1923. Arrange not to miss the publication as we cannot guarantee to supply back issues.

Garage Doors

THREE- and four-door swinging and sliding combinations are now very popular for both single and double garages. Another popular style is a two-door sliding combina-

tion, with parallel tracks, making it possible to open either half of the doorway in a two-car garage by moving one door toward the opposite side.

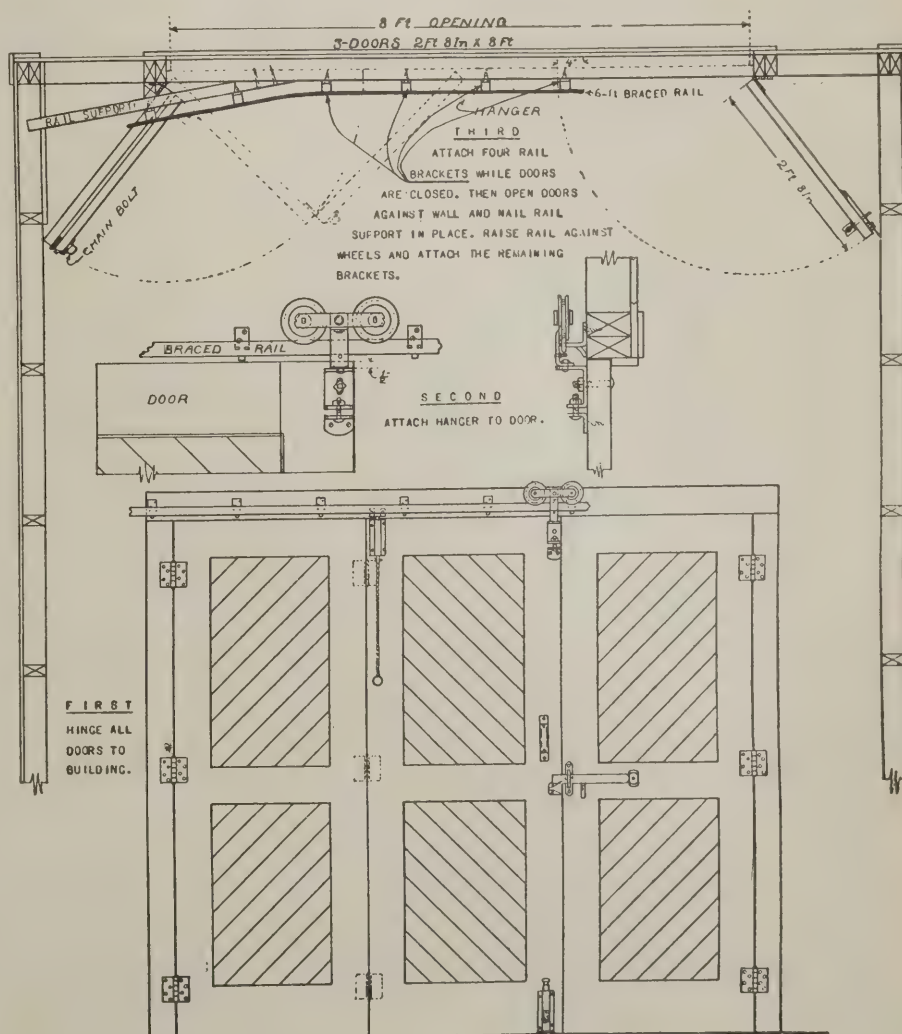


Fig. 1

In garages of simple construction where only one entrance is desired, saving in both cost and equipment, the three- or four-door swinging and sliding combination is a good one to use. Typical examples of these and the methods of hanging them are shown in Figs. 1, 2, 3 and 4.

Fig. 1 illustrates a combination for which

Fig. 2 shows a very similar type of door except that no special construction is required to carry the rail at the side. Also this construction provides for adjusting the rail or track laterally, thus keeping it in alignment, even though the frame carrying it is not.

The use of the three-door entrance is not

jamb. The two complete three-door units meet in the center when closed. For the multiple type of garage with separate stalls, the entrance for each stall is hung as any three-door sliding-folding entrance. This type of installation can be used on public garages where openings do not exceed a width of 9 ft.

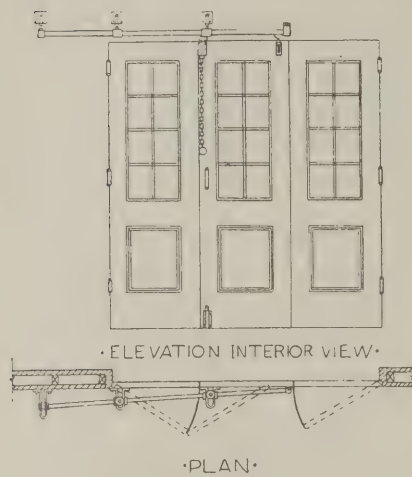


Fig. 2

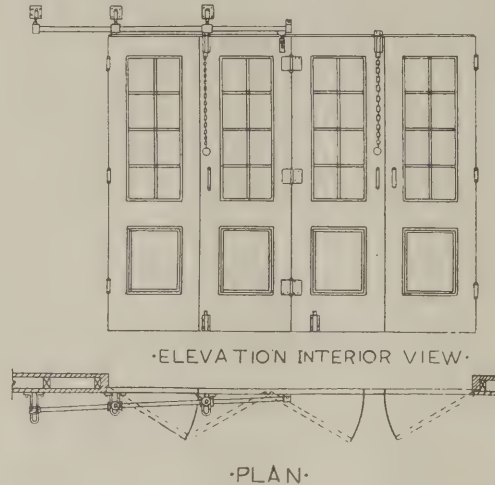


Fig. 3

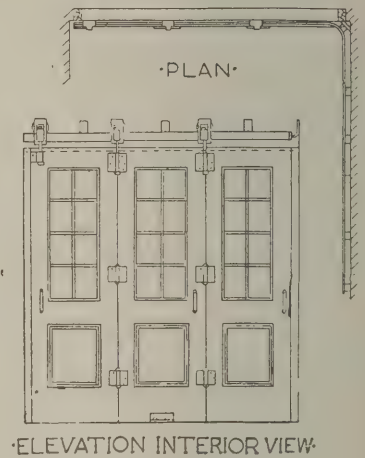


Fig. 4

Figs. 1, 2, 3 and 4—Three and four-door combinations for a single entrance

the following claims are made: It is easy working; a simple push and the doors are open; a slight pull and they are closed. These doors swing into jamb against stops, helping to make the doors weather-tight.

confined to single-car garages. In private garages for two or more cars, the use of a separate entrance for each car by placing posts of material the same as the garage exterior at the proper intervals in the door-

Fig. 3 shows a four-door combination of similar type. This door of course will provide a wider opening for the same clearance in front of the car than a three-door combination. The maximum clearance necessary between the car and the doorway for 9 to 12-ft. in-swinging doors is about 3 ft.

Fig. 4 shows a swinging, sliding door combination that can be used in a shallow garage, where a full 3 ft. in front of the car can not be spared. In this case the track bends around the corner, and the doors, are hung on swivels, so as to travel around the curve.

Another type of door is shown in Figs. 5, 6 and 7. This is a combination sliding and folding door manufactured by a firm that has specialized for years in elevator doors. Fig. 5 illustrates the method of opening this type of door, Fig. 6 the plan and elevation of a four-door single-track opening, and Fig. 7 the plan and elevation of a four-door, two-track opening. Fig. 7 also shows the two ways in which the doors can hang when opened.

The door widths do not exceed 3 ft., so that the clearance required in front of the car is approximately the same as in the doors shown, Figs. 1, 2 and 3. On four-door, two-track openings like Fig. 7 the center of the hanger is $2\frac{3}{4}$ to $3\frac{1}{2}$ in. from the edges of the two middle doors. On all other doors of this type the hanger apron is placed $\frac{1}{2}$ in. from the forward edge of the second door from the jamb.

One piece of track is required for each fold of the doors. In case of the four-door, two-track opening, shown in Fig. 7, the end of each track is centered over the



Fig. 5

One door is hung so that it will open without disturbing the other two. The hangers are adjustable in case of swelling or raising of the concrete floor, and to prevent sagging doors. The doors require a minimum of space in opening, for they are hung on the inside and fold and slide against the inner wall.

way is suggested. Each entrance can be closed with a separate three-door installation. In the two-car garage, where the doorway is not wide enough to permit the use of a center post, the entrance can be closed with a double installation, six doors in all, three hinged together from one side, and three hinged together to the opposite

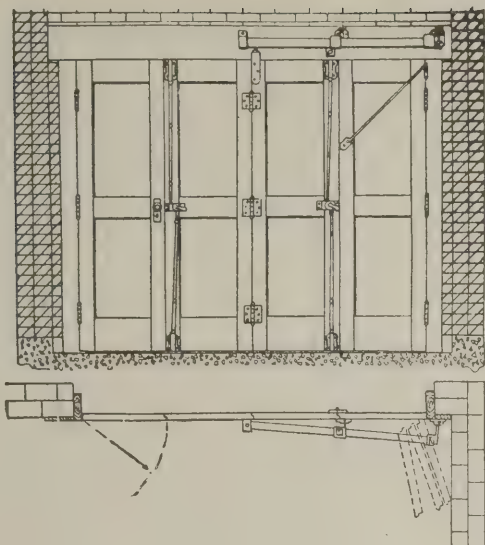


Fig. 6

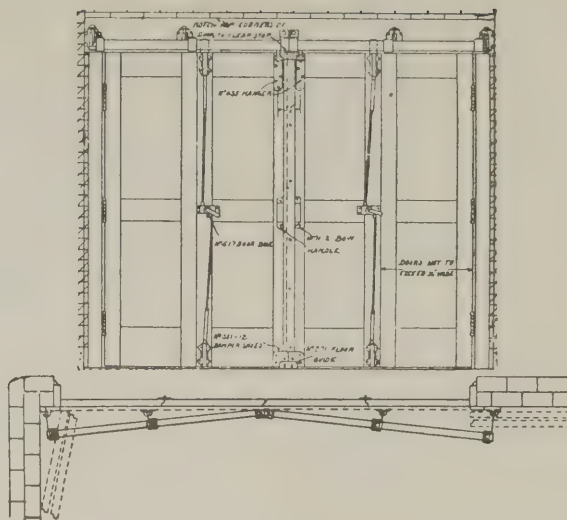


Fig. 7

Figs. 5, 6 and 7—Combination sliding and folding doors for garages and elevators

center of the opening. For the four-door single-track, or three-, five- or six-door openings the end of the track is $2\frac{1}{2}$ in.

ahead of the forward edge of the second door from the jamb, that is the door to which the hanger is attached.

he would sell him one that would work. His boiler would send steam into the radiators, something impossible at present.

The writer was sent to investigate the complaint. He found that the owner had just cause for saying the job was unsatisfactory as with all drafts turned full on and with all radiators turned off it was absolutely impossible to get any pressure to register upon the steam gauge. No wonder Mr. Owner kicked. Coached by the antagonistic fitter, prompted by the rival salesman and without any knowledge of the essentials of every heating system it was but natural for him to say "The Boiler's No Good."

A lazy, lifeless fire indicated at once that the boiler's fire was not getting enough air. Everything being O. K. in the boiler room a pilgrimage was made to the roof. The steamfitter insisted that this was useless as the draft was all right. Did not the other boiler man say that his boiler would work? Nevertheless the trip was made. Here a six-inch square opening was found. Through this all the flue gases had to pass—the boiler required a twelve-inch flue and they were trying to make one only one-fourth the size do the work. In spite of the obvious absurdity and with coal gas strong enough to be almost lit with a match pouring from the chimney the fitter held his handkerchief over the opening and because it blew straight up in the air insisted that it was a fine draft. He was not even convinced when told that if he had a lamp chimney that height as great a velocity would be produced and the handkerchief would act the same way.

However with the owner's consent the chimney was partially torn down and six feet below the roof a nine-inch square opening was located. This was carried up full size to the roof and because of the still insufficient area a twelve-inch round metal extension was added. This was made about fifteen feet high.

"The Boiler's No Good"

An Unjust Excuse for a Poor Heating System

By H. N. Dix, Jr., M. E.

NO matter what the actual trouble with a heating system may be, the boiler always gets the blame. The owner, the builder, the architect or the steamfitter always is ready to spring the alibi "The Boiler's No Good."

Forget it!

Ninety-nine times out of every hundred when the boiler is being blamed for a poorly working job THE BOILER IS NOT AT FAULT. It is just the handiest thing to lay the trouble to. As the thing that burns the coal, that boils the water, that sends up the steam it is but natural to assume that it is the cause of the trouble. But it seldom is.

If the boiler is not at fault, what is?

The causes may be many but anyone who has had experience locating heating troubles will invariably hazard a guess that it is poor draft. In any mystery the Frenchman says "Cherchez la femme." In a heating mystery we say "How's the draft?"

Poor Draft the Cause of Most Heating Ills

A poor chimney draft will cause more ills in a heating plant than all other usual causes put together. Without perfect combustion coal is wasted, the boiler will be slow to steam, not enough pressure is generated to drive the steam to the far ends of the main, the boiler rapidly fills with soot, clinkers are formed and if the draft

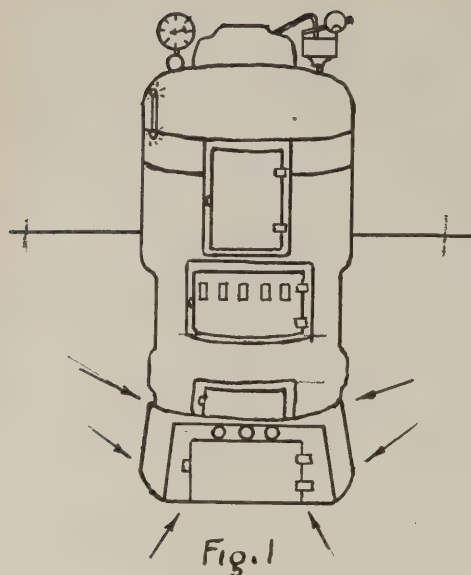
is not controlled it will be next to impossible to carry a fire.

What then constitutes a chimney that will produce good and sufficient draft?

There are three essentials to every good flue. It must be high enough to create sufficient draft tension, or pull, to draw the air needed for combustion through the firebed. It must be large enough in cross section area to allow the flue gases to escape without undue effort or friction. And the flue must be absolutely air tight, being free from all openings into it from such as fireplaces, stoves, instantaneous gas heaters, etc. Perhaps the best way to illustrate what a good flue is and why it is necessary is to tell of a few "The Boiler's No Good" complaints that have come to the attention of the writer and which, in every case investigation proved the boiler innocent and the draft guilty.

Lots of Coal, But No Heat

Against the will of the steamfitter a certain boiler was installed in a remodeled building. After steam was turned on in the fall the owner at once started to complain "The Boiler's No Good." He stated that he was now sorry that he had not taken the steamfitter's advice and installed the other make boiler. To make matters worse for the boiler's manufacturer the salesman for the other concern kept insisting to the owner that if he would take out the boiler



No more complaints from that job that "The Boiler's No Good."

The Fire Went Out Every Night

"The Boiler's No Good, it goes out every night." Such was the complaint of the purchaser of a new house. After making certain that he knew how to fix the drafts and bank the fire so that it would last over night an investigator was sent to locate the trouble. He closed the draft door in the ashpit, opened the check and found that the fire burned along just as though all the drafts were still turned on. Taking a lighted taper he passed it slowly along the floor where the base set. The flame was drawn under the boiler. Similarly the flame was sucked in at the joint between the firepot and the base. The first he fixed with cement and the latter with boiler putty. Thereafter the owners had no further trouble at night with the fire going out. They now say that in mild weather it is easy for them to carry a fire for thirty-six hours without any attention whatsoever.

Even An Architect Is Fooled

Some two or three years ago a friend of the writer's, an architect by profession, called him on the phone to say that, although he had used many boilers of a certain make and had found them uniformly satisfactory, he had now found one which was absolutely no good. Asked why, he explained that in one of his client's homes the boiler would not or could not heat the water about 140 degrees. He said that he had taken the matter up with the steam-fitter and had been informed that the trouble did not lie in the boiler but that the draft was "N. G." Rather than take his word for it he insisted upon the writer going with himself to investigate.

A four hours' train ride and an hours' spin in a machine brought us to the home in question. It was an old farm house that had been moved four hundred feet to a better location and then remodeled into a beautiful home. The boiler was set in the

center of the cellar and connected into the base of a chimney breast that contained a nest of six flues.

Suspecting that the trouble lay in the old chimney a fire of old rags and burlap was started. This made a most glorious smoke that issued from the chimney top like from a volcano. When it was at its height a plug of paper and burlap was thrust into the top of the chimney. At once the smoke

Be Wary of a Flue in An Old Building

The foregoing is but one example of thousands which occur every year. There is hardly a flue in an old building that is tight. Some times they are not only porous but they also connect into old fireplaces. This is quite often very difficult to detect at the first glance as the fireplaces may be closed up or they may have their opening covered by a cast iron cover plate. The

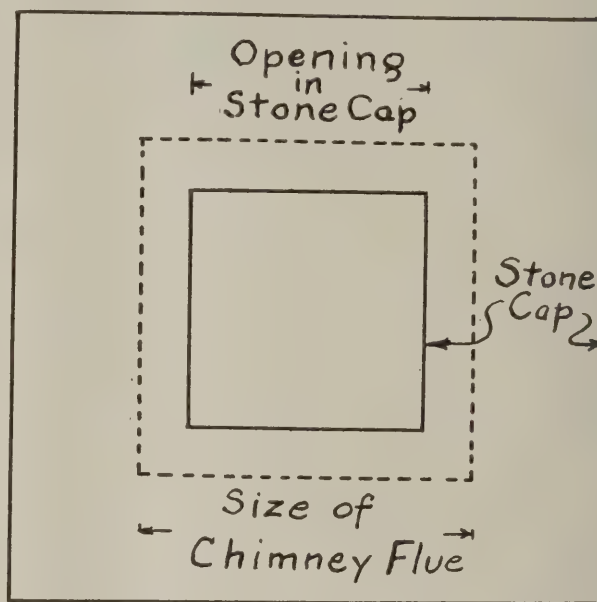


Fig. 2

came out of three different adjoining flues. The chimney was nothing more than a sieve, each hole acting as a small check draft, absolutely ruining the draft.

It was hopeless to try and fix such a chimney and so the owner had to pay for

smoke test used above will detect leaks from this cause. However often the only other solution is to build a new chimney.

It may be possible, if the flue is reasonably straight, to make it air tight by letting down some sort of a heavy weight wrapped

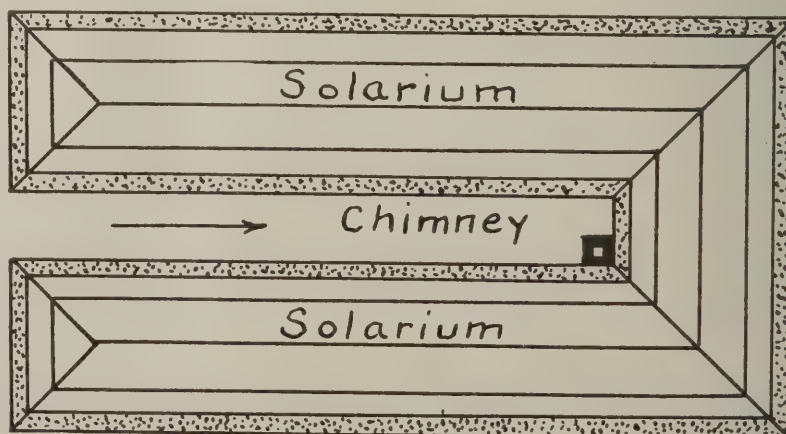


Fig. 3

the building of a new one on one side of the house. After this was done the boiler did its work and no further trouble was encountered.

The architect still uses the same make of boiler.

in burlap sufficiently tight to fit the flue area. After pouring several shovels full of cement down upon this plug the cement may be forced into the small holes and cracks by slowly pulling the weight upward. After doing this several times the

leaks are usually stopped up and the chimney again made useable.

Another trouble with old flues is that at times it was more or less common practice to restrict the area at each floor by setting the floor beams into the chimney bricks. This was not only very dangerous because of the fire hazard created but the lessening of the area also materially affected the capacity of the chimney. Just as a chain is no stronger than its weakest link, so a chimney is no larger than its smallest area.

Stone Chimney Caps Often Cause Trouble

After every one had seemed to give up finding the trouble with a job where it was reported that the "Boiler's No Good" the writer went to locate the trouble. Investigation indicated a lack of draft. With all drafts turned on, the needle would not leave the pin of the gauge.

Looking up at the chimney top from the yard one could see a very pretty stone cap reposing thereon. Being rather inaccessible, no one had seemingly taken the trouble to go up and see if the opening through the cap was as large as the chimney flue. However after much gymnastics and after nearly breaking his neck the writer reached the top. Calling to everyone to go into the cellar and watch the boiler he very nicely put his shoulder under the cap and tipped it over into the yard below.

By the time that he got down into the cellar he found the men there marveling over how the boiler had seemed to take a new lease upon life and even now the needle was up to two pounds.

It was rather a crude act to spoil this perfectly nice chimney cap but with the boiler being blamed and in danger of being taken out there really was no other course open. However the owner was a good sport and did not object after he realized that the cap with the small opening was causing him all of the trouble. To this day that cap reposes in the shop of the steam-fitter as an object lesson of what damage a stone cap can do.

Boilers a Success One Year, a Failure the Next

In a Southern city a beautiful sanitarium was erected and in it a very modern and expensive heating system installed. The first year every thing was eminently satisfactory. The next it was impossible to get any heat. True to form the authorities forgot all about the good year, and saw only the present failure. After a few ineffectual attempts at locating the trouble, they wired the manufacturer that the "Boilers Were No Good" and that unless something was done at once they would be removed and others installed.

The next train found a boiler expert on his way. Here is what he found:

The building was in the shape of the letter "U" as illustrated in Fig. 3. When

first built the top of the chimney was about four feet above the roof. However during the following summer a solarium had been erected, the roof of which was about six feet above the chimney top. This meant that the flue was surrounded upon three sides by a wall. When the wind blew in the direction of the arrow the boilers seemed to work fairly well but when it came from any other quarter it circled over the top of the solarium and poured down the chimney, creating a back draft that absolutely prevented any gas from escaping. No wonder the boilers would not steam. After carrying the chimney up about ten feet and above the solarium roof no further complaints were or have been made.

Be careful of down drafts. Always have the top of the chimney above the highest part of the roof or adjoining building. There have been cases where a home built among very high trees has had the same trouble.

A Real Mystery

This sanitarium job brings to mind another one similar because it occurred in a public building. The boilers in a new school refused to steam and even the heating engineer, the salesman who sold them, the architect who had designed the school and who knew that the chimney was built ample in size, all gave the matter up as a complete mystery. Again a boiler expert from the boiler manufacturer was sent for. He checked over everything. He found the boiler flues clean and the water free from all scum and floating grease. There was nothing wrong with the design of the chimney or smoke breeching. Still the boilers very evidently did not get enough air. The chimney was at fault somewhere.

A careful smoke test was made but no leaks were in evidence. At last he had what he called a hunch. Stored against the base of the chimney was the winter's supply of coal. After many protests he succeeded in having this removed and, just as he suspected, they found that the workmen had failed to put the clean-out cover in place and a hole a foot or more square existed at the foot of the flue. This of course acted as a check draft and so the fires were always checked.

The cover in place no further trouble was encountered.

Give the Boiler Air

Now in the school just mentioned the boilers did not get air because it took the course of least resistance and entered the vertical flue through the open clean-out opening. In the case of a garage in an eastern city it was slightly different, only the result was the same.

Like most buildings of this nature the only cellar under the garage was a small boiler room. To reach this one had to enter through a steel door opening onto the sidewalk. There were no windows as is also the usual thing.

The proprietors testified that the only time that the boiler seemed to work was when they were down in the boiler room trying to see what the trouble was. The boiler seemed to take special delight in working fine at that time but just as soon as they came upstairs it laid down on the job again and refused to send heat up into the building.

This was easy. When they were downstairs the door was open to the outdoors and the boiler got lots of air. But when they were upstairs they closed the door and the boiler room was almost hermetically sealed. The chimney pulled all right but no air could get into the boiler room and so to the fire. A grating was put in the door so that the air could enter at all times and no further complaints were made.

The Boiler's All Right, Look Elsewhere for Trouble

Almost any boiler will give reasonably good service and satisfaction if you give it half a chance. But unless it can breathe properly it is going to fall down on the job and trouble will follow.

So when things go wrong with the heating plant do *not* say "The Boiler's No Good," but instead ask yourself "How's the Draft?"

Weather Bureau Data Aid in Chimney Construction

ENGINEERS, architects and contractors charged with the building and remodeling of scores of heating and coal-consuming power plants in Salt Lake City have called on the Weather Bureau of the United States Department of Agriculture for data to assist them in making plans for the new structures. Following a new city ordinance, aimed at the reduction of the smoke nuisance, the city engineering department has found it necessary, because of the diminished atmospheric pressure at the altitude of Salt Lake City, to specify for the chimneys and smokestacks now being built increases in heights or capacities, or both, amounting to from 10 to 20 per cent over that necessary at sea level.

Records of the Weather Bureau show that the barometric pressure for Salt Lake City, which is 4350 ft. above sea level, averages from 25.60 to 25.70 in. through the winter months. The average atmospheric pressure at approximately sea-level localities is about 29.90 in. Where the air is rare a greater volume must be furnished to supply the amount of oxygen required to make the coal burn completely. This increase can be obtained either by increasing the velocity of the air taken in or the size of the opening through which it is received. Convenient tables have been prepared for the use of chimney builders, showing the limits of stack height and area to the boiler capacity, in square feet of radiating surface.

Back Plastered Construction

Recent Developments Applied in California Practice—
Advantages of Portland Cement Stucco on Metal Lath

*By Joseph Losekann, Architect**

IN THE selection of the materials of construction most economical for dwellings, the majority of builders have used the available materials in a manner established by

a selection made in the hope of an economy ultimately destroyed by maintenance and repairs.

The conscientious architect has the fol-

cal features of a building and to a considerable extent fulfills some of these qualifications. We have, however, the question of resistance to fire, up-keep and



Residence in Stockton, Calif., showing application of metal lath direct to studs without sheathing boards. Hurtzig & Orcutt, general contractors; Perry Bros., plastering contractors

custom, without regard to a better and more fire resistive construction in which these same materials may be used to greater advantage.

The principal qualities every home owner desires in his home and which in a great measure determine the choice of building materials are in most cases overlooked and

lowing qualities in mind in building the home: beauty, durability, low up-keep, resistance to fire, low first cost, low heating cost. The materials or combination of materials fulfilling these qualifications should be considered regardless of following custom or obsolete practice and to the exclusion of all so-called economical materials.

There is no question that frame construction lends itself quite readily to the economi-

durability to consider which in a great part are overlooked in the selection of frame construction for the home.

We have available information as to the fire losses in dwelling construction over a period of five years which amounts to over one billion, five hundred million and the loss of life to approximately fifteen thousand. These enormous losses are due in great part to inadequate construction of the improper combination of available material.

*Member of the firm of Losekann & Cloudsley, architects, Stockton, Calif. Reprinted by permission from "The Architect and Engineer," San Francisco, Calif., for July, 1922.



Showing metal lath with first coat of plaster

It is true that the major structural material is wood and wood will burn, but we can take steps to properly protect it from the flames and not condemn its use.

There is one material which lends itself more readily to building construction and that is cement stucco, but it has been abused and its improper use has caused a tendency to lean towards less fire resistive types of construction. Cement mortar or stucco is a material which in itself combines all the necessary qualifications as far as the skin coat of the building is concerned, and it is only necessary to determine the proper base or wall on which to apply the stucco to have solved all these conditions for the completed structure.

The question has been asked so many times that if stucco presents all the necessary qualifications, why do we have so many cracked and blotched surfaces? It has been our experience that stucco itself is not at fault but the application and our not availing ourselves of the wealth of information presented by such bodies as the Underwriters' Association, Bureau of Standards, and eminent testing laboratories of research, which would keep us from continuing to

make the errors in construction for which stucco is blamed.

It has been the practice throughout California to use sheathing boards over the studs, then a waterproofed paper, wood furring strips, a re-dipped galvanized wire or metal lath and the stucco. Upon examining some thirty or forty buildings constructed during a period of from one to five years we found that the surface of the stucco was cracked and in all cases where paint was not used, the surface presented a blotched and badly stained appearance. Most of these cracks appeared over the wood furring strips, some along the stud line and a great many near the watertable and the ground.

From this investigation we came to the conclusion that the introduction of wood in the stucco surface in the form of sheathing and furring strips cut down the thickness of the stucco coat over these strips and the alternate shrinking and swelling of the sheathing and wood strips caused the cracks. The blotched and stained appearance was made by the entrance of water through these cracks and at the ground by the capillary attraction of the stucco taking

water from the surface of the ground.

To correct these faults, it is obvious that all wood should be eliminated from the stucco, that the stucco be suitably waterproofed and that the surface be separated from the ground surface by a distinct break, either a course of brick or concrete.

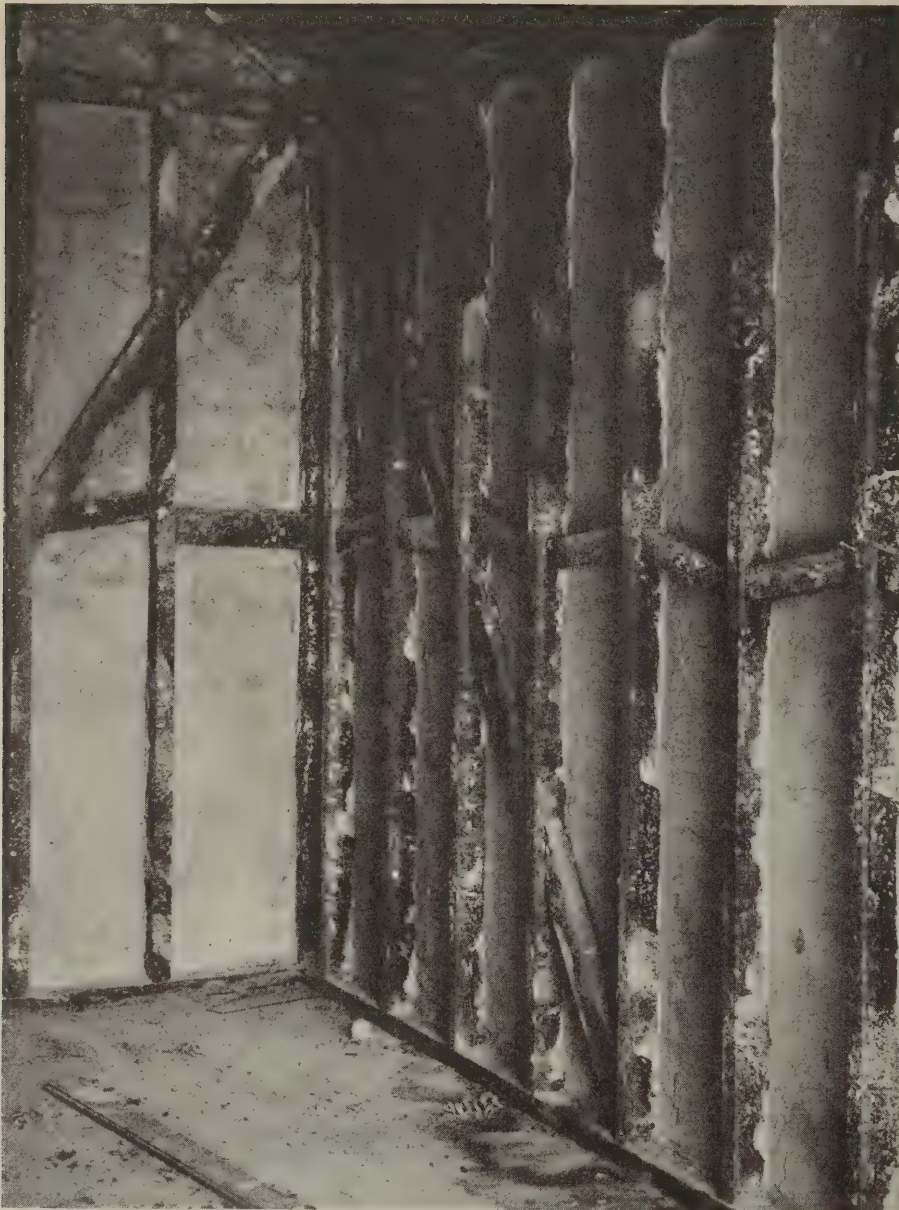
It was decided that although tile, solid concrete, stone, or some other material of like nature was of greater value as a base for stucco than wood, their cost would be prohibitive and that if wood could be properly used, from its economical value alone, we would have gained much for dwelling construction.

Some twenty-five years ago it was thought necessary to nail wood sheathing on wood studs before the application of the reinforcing material and stucco. This custom has persisted in many locations but the back plastered form of construction has been found in the laboratory of practical experience to be more satisfactory in every respect. The tendency toward back plastered construction appeared first in New England and such satisfactory results were obtained that it was decided by the United States Bureau of Standards at Washington to investigate all types of stucco construction on studs with a view of giving authoritative and unbiased information for the benefit of the public.

This series of tests was of a practical nature and followed a preliminary series begun in 1911. A two story building was erected, 200 ft. long 26 ft. wide and 25 ft. high. The exterior walls were divided into panels approximately 10 ft. 2 in. high, each panel containing a window. Fifty-



Back of metal lath between studs before back plastering



Showing back plaster between studs of exterior wall

six panels were thus provided with various bases for plaster and various types of mixtures and methods of application. Of all the fifty-six panels erected, panel No. 15 is the one which has received a rating "Excellent" in all inspections by the United States Bureau of Standards, taken through a period of ten years. The construction of panel No. 15 is metal lath, attached directly to the studs with lath back plastered between the studs, stucco mixture being one part cement, one-tenth hydrated lime, three of sand (parts by weight).

Quoting from the report on this panel, page 29, United States Bureau of Standards Technologic Paper No. 70:

"Superficial inspection: Color—uniform dark gray; no cracks; surface rough; general appearance excellent. Detailed inspection; no cracks; bond good; condition—excellent."

In other words, back plastered metal lath

without sheathing has the full 100 per cent rating, the same as monolithic concrete or brick.

The Underwriters' Laboratories, Inc., at Chicago, is the organization to which all insurance companies look for authoritative information on fire prevention matters. It is supported by the fire underwriting interests and is the recognized authority in that field. After a very exhaustive fire test on back plastered metal lath and Portland cement construction on wood studs, they have issued a report from which the following is quoted:

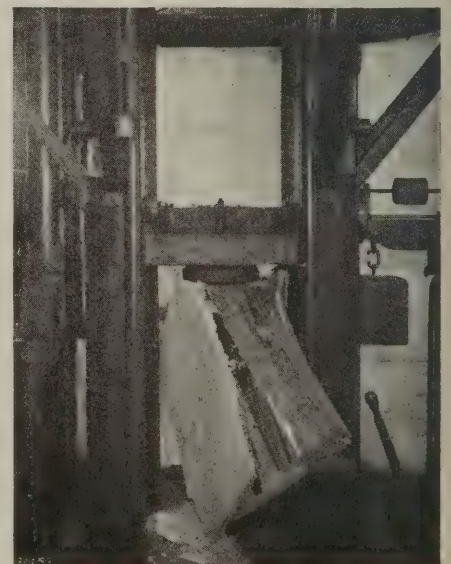
"This back plastered construction can be expected to provide sufficient heat insulation to prevent the ignition of the wooden supports to which it is attached for about one hour when exposed to fire of the degree of severity to which stucco finished buildings are likely to be subjected under average fire exposures."

The American Concrete Institute is composed of representatives of the United States Bureau of Standards, the Portland cement industry, concrete engineers, contractors, building officials, etc., who are anxious to standardize the use of Portland cement and find the best methods of construction with that material. Their committee on the "Treatment of Concrete Surfaces" is under the chairmanship of J. C. Pearson of the United States Bureau of Standards, is composed of manufacturers, contractors, an architect and an engineer insuring an unbiased and authoritative opinion. This committee has just recently rendered a report on a "Standard Recommended Practice for Portland Cement Stucco" in which they give the preference to the back plastered construction by virtue of its position in the report on "Back Plastered Construction on Frame Walls," and reference to the Underwriters' Laboratories' report and the United States Bureau of Standards' report above mentioned. They further state:

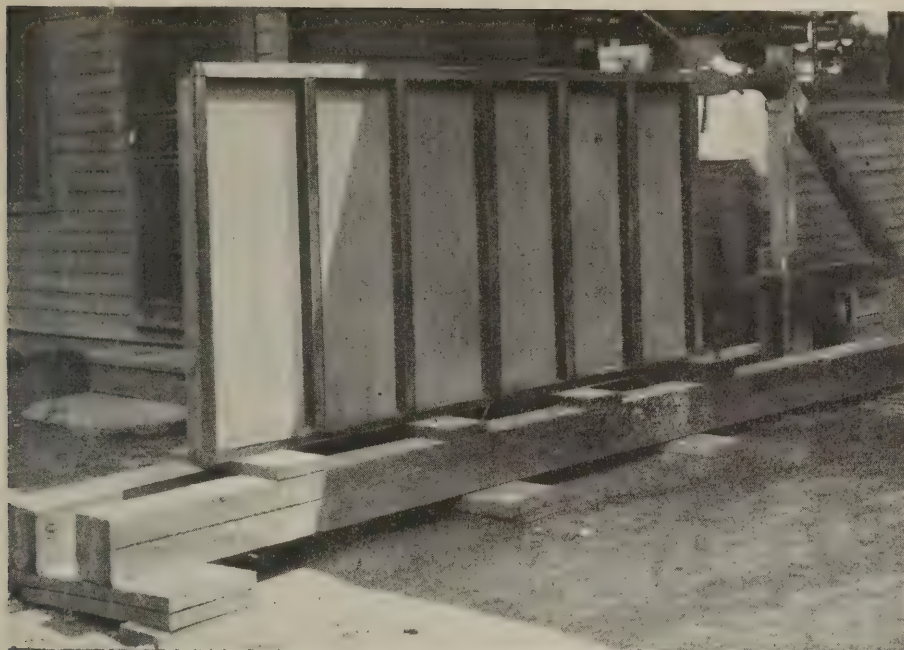
"The use of wood lath as a base for cement stucco finds many advocates and many opponents, but the Committee does not feel it can recommend wood lath for cement stucco."

Recent tests made by Pro. J. C. Peebles at the Armour Institute of Technology indicate that the back plastered stucco on metal lath for exterior walls is satisfactory from the standpoint of insulation and fuel saving. As noted above, the experience in the rugged New England climate shows that back plastered construction is entirely satisfactory.

In order to determine the strength of back plastered construction in resisting distortion, two distinct tests were but recently completed and serve to check fully, not only each other, but the findings of the United States Bureau of Standards, men-



Method of testing back plastered slab by Armour Institute, Chicago



Test conducted by Armour Institute, Chicago, Ill., showing rigging for distortion test of plastered metal lath

tioned above. At the Armour Institute of Technology, Professor Peebles tested these samples, as follows:

Sample No. 1—Six inch, standard hollow building tile, laid in portland cement, stuccoed with portland cement and plastered inside with gypsum plaster.

Sample 2—Portland cement stucco on 3.4-lb. diamond mesh metal lath furred out over $\frac{7}{8}$ -in. sheathing, nailed to 2x4 studs. Inside plaster on 2.5-lb. diamond mesh metal lath.

Sample 3—Back plastered construction using Portland cement for exterior stucco and gypsum plaster on metal lath for interior wall.

The samples were standard construction by ordinary mechanics, sizes 42x42 in., and were tested in an Olson machine with the direct pressure on opposite corners, simulating diagonal stresses due to wind, earthquake or settlement, and were under a steady pressure. The final crushing strength of the three samples was—hollow building tile, 9,600 lbs.; metal lath over wood sheathing, 10,000 lbs.; back plastered metal lath construction, 14,200 lbs.

A test very similar to the one conducted at Armour Institute was recently completed at Omaha before the Building Committee of that city. These investigations again proved the great resistance of back plastered construction to distortion. Where wood sheathing, lath and cement stucco showed cracks at 2,100 lbs. pressure, the back plastered metal lath sample showed no cracks at 3,500 lbs., the limit of the machine. Distortion at 2,100 lbs. for the back plastered construction was 3-16 in. whereas for the sheathed construction it was $1\frac{1}{8}$ in.

Metal lath as a base for cement stucco construction needs no introduction. Its

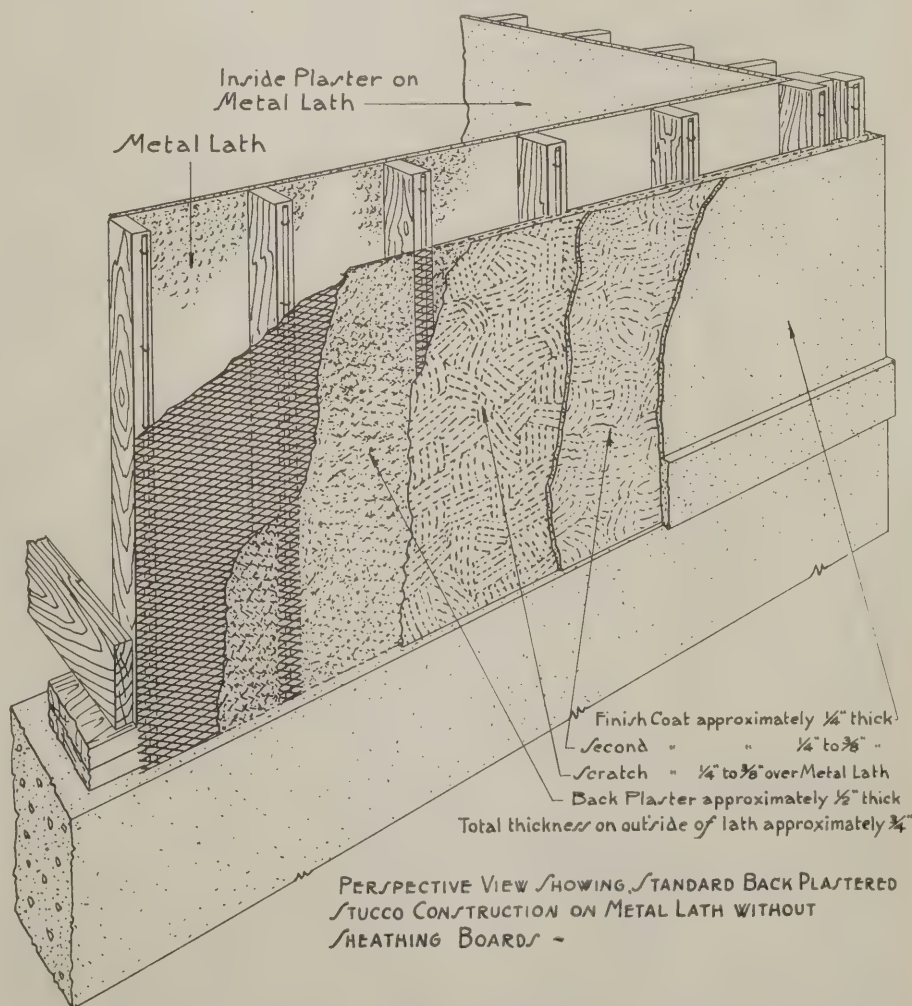
usefulness as a fire retardant and its success as a stucco base has been established through a period of long service. Un-

fortunately builders have looked upon it as costly and it has been placed in the class of fire resistive materials, desirable but too expensive for house construction.

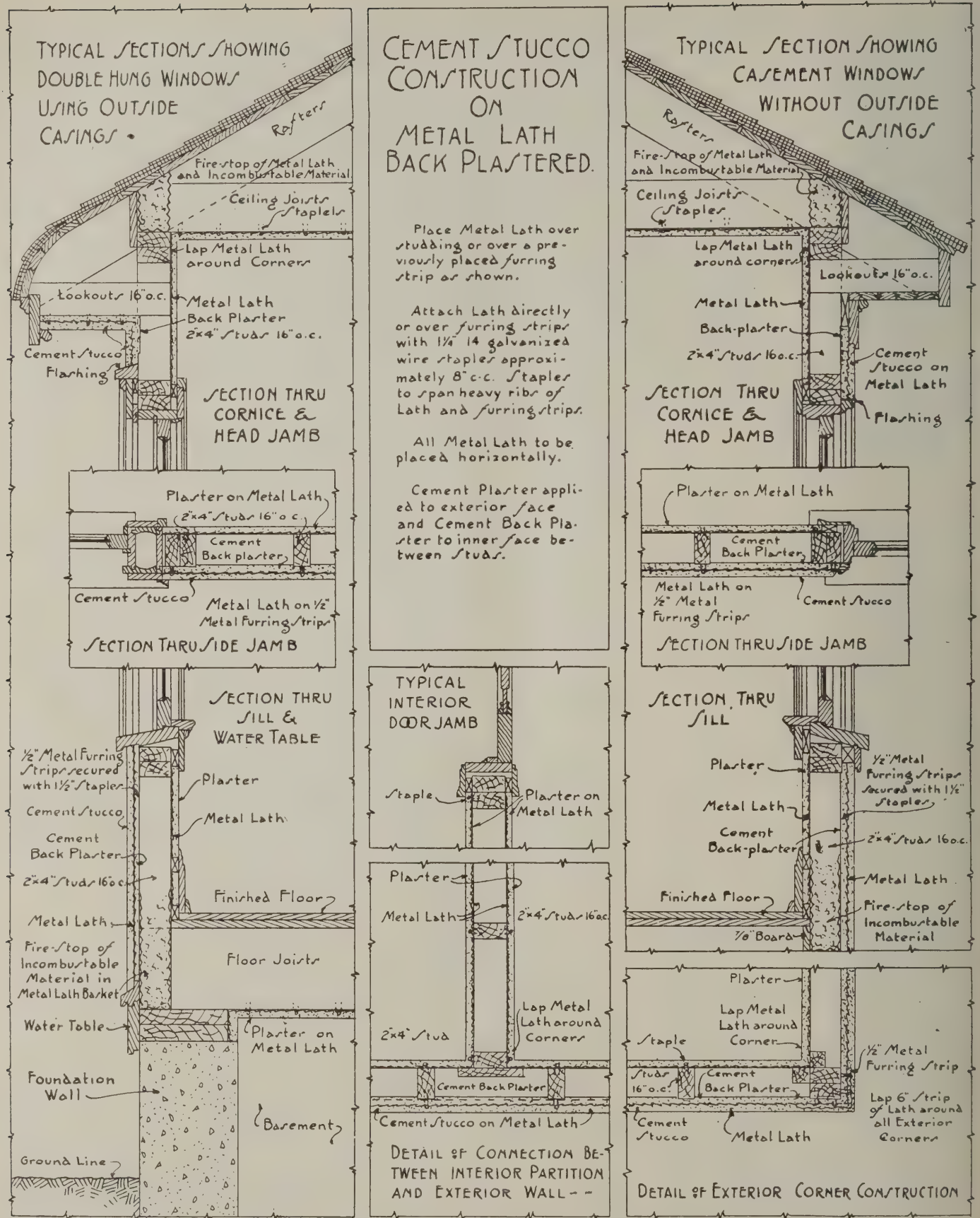
In back plastered construction it is possible to use metal lath to advantage and without adding to the expense and at the same time accomplish all the desirable qualities of a permanent structure at no economical loss.

In this type of construction a metal lath stiff enough to span the stud spacing is used and the mortar is applied after nailing the lath to the face of the studs. After the first or scratch coat is applied, the metal lath is then back plastered between the studs and the additional mortar coats applied to the exterior which forms a solid cement sheathing properly reinforced. The stud framing used for this type of construction is similar to that used for other types except that braces between the studs are set back one inch from the face of the stud.

The cost of back plastered construction is cheaper than most types of wood sheathed construction, besides the added advantage of strength and durability which the wood sheathed type does not possess. It has been our experience that close to 10 per cent can be saved over the exterior cost by use of



Perspective of metal lath back plastered wall



Details of construction for cement stucco on metal lath back plastered

this type of construction.

Back plastered construction has not been used to any extent in the West, although it is a prevailing type of stucco construction

in the East and has been such for over fifteen years. The lack of its use in the West can be attributed to the fact that stucco in the West does not undergo the

severe extremes of climate that prevail in the East and builders were not compelled to devise a construction to withstand climatic conditions. Although it is possible to build

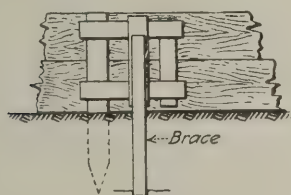
stucco with almost any kind of reinforcement to withstand this mild Western climate, it must not be overlooked that it is also necessary to provide a structural strength and fire protection which the present types do not possess in as great a degree as back plastered construction. Unfortunately, in the present type of stucco construction any economic saving is at the expense of the strength and durability of the construction, while in the back plastered type the strength and durability is permanent and the cost of construction less than the cheapest grade of wood sheathed construction.

NOTE—The Associated Metal Lath Association says: "Exterior walls should be designed for efficiency, like any other structural unit. Wood-studded stucco walls, even without extra insulation, are very efficient, but by the inexpensive device of creating a narrow, 1-in. air space, extra insulation is greatly increased.

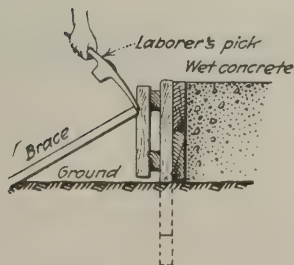
"This can be accomplished cheaply by either of two methods: (1) Placing incombustible building paper over the inside face of the studs; either nailing ordinary lath over the paper along the studs to act as furring for the interior lath, or (2) installing the paper loosely, allowing the paper to bag into the hollow space, placing the interior lath directly on the paper-covered studs."

Bracing a Concrete Side-walk Form

Rather an ingenious "stunt" was executed here recently on a concrete curb and sidewalk job. Forms sufficiently braced began to bulge. The form setter rigged up a brace as shown in the accompanying illustration.



Front Elevation



Side Elevation

tration and by means of an ordinary pick jacked the form and its contents back into place. I have often seen the same job done in a much more clumsy fashion, using a

sledge instead of the improvised pinch bar, and incidentally a great number of words not found in print.—D. H. Fleming, City Engineer, Owen Sound, Ont., Canada, in *Engineering News-Record*.

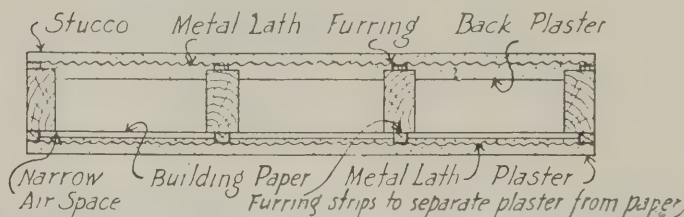
Zinc an Easy Metal to Solder if the Operator Knows How

SHEET zinc is one of the easiest metals to solder, but the operator must be familiar with his work, says the *Brass World*. Most failures in the attempt to secure joints of the desired strength and quality, where sheet zinc is concerned, are due to overheating the metal. Too long an application of the soldering iron is often

responsible for unsatisfactory results. Only a quick pass of the soldering iron over the metal is needed to produce a sound joint. If the contact is prolonged the zinc may melt or its internal structure become so changed by over-heating as to produce a weakening of the metal. Sheet zinc melts at a temperature of 786 degrees F. It is usual to heat the soldering iron until it becomes a dull red, and that is sufficient to perform the soldering of joints of sheet zinc. Solder a half-and-half grade is suitable; but preceding the actual operation, a "cut acid" fluxing solution, or a solution of zinc chloride acidulated with muriatic acid, should be applied to the metal being prepared for the work. Care must be exercised to insure the sheet zinc being first free from dirt and grease, particularly along the line to be soldered, and the seam surfaces must be in perfect contact.

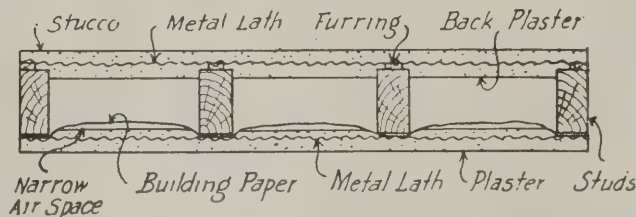
BACK PLASTERED EXTERIOR WALLS

Showing two methods of securing extra insulation at slight expense



Back Plastered Metal Lath - Interior Plaster on Metal Lath, Furred out 1/2 inch from Building Paper on inner Face of Studs

THESE WALLS ARE ABOUT 20% BETTER INSULATORS — THAN COMMON STUCCO CONSTRUCTION



Back Plastered Metal Lath - Interior Plaster On Metal Lath Attached to Studs, Covered by Building Paper Allowed to Bag in Between Studs Forming Narrow Air Space

City House With Veranda

Harmonizing a Big Veranda with a Modern Plain Rectangular House
—Why it Pays a Contractor to Work from a Real Plan

FRONT porches, or verandas, on city houses are not now good taste, at least if many architects have their way. They are considered disfiguring and out of harmony with the modern colonial, or near colonial, type of city house; and they pre-

be had without disfigurement of the house. However that may be, verandas with backyard vistas are not yet popular; and occasionally a client is met with who absolutely insists on having a front veranda. To give him what he wants and still give him a

decided on certain "minor changes;" such, for example, as changing the exterior from stucco to siding, adding a veranda, adding several windows, adding an open fireplace, rearranging the room layout, and, incidentally, changing the principal dimensions



A Chicago house designed by Allen E. Erickson, architect, to harmonize a large front porch with colonial features

vent carrying out the colonial features. Nevertheless many home owners want verandas, for they are undeniably a great source of comfort and satisfaction, and to many people's minds give a house a home-like atmosphere that the plain, rather severe, colonial type house does not always have.

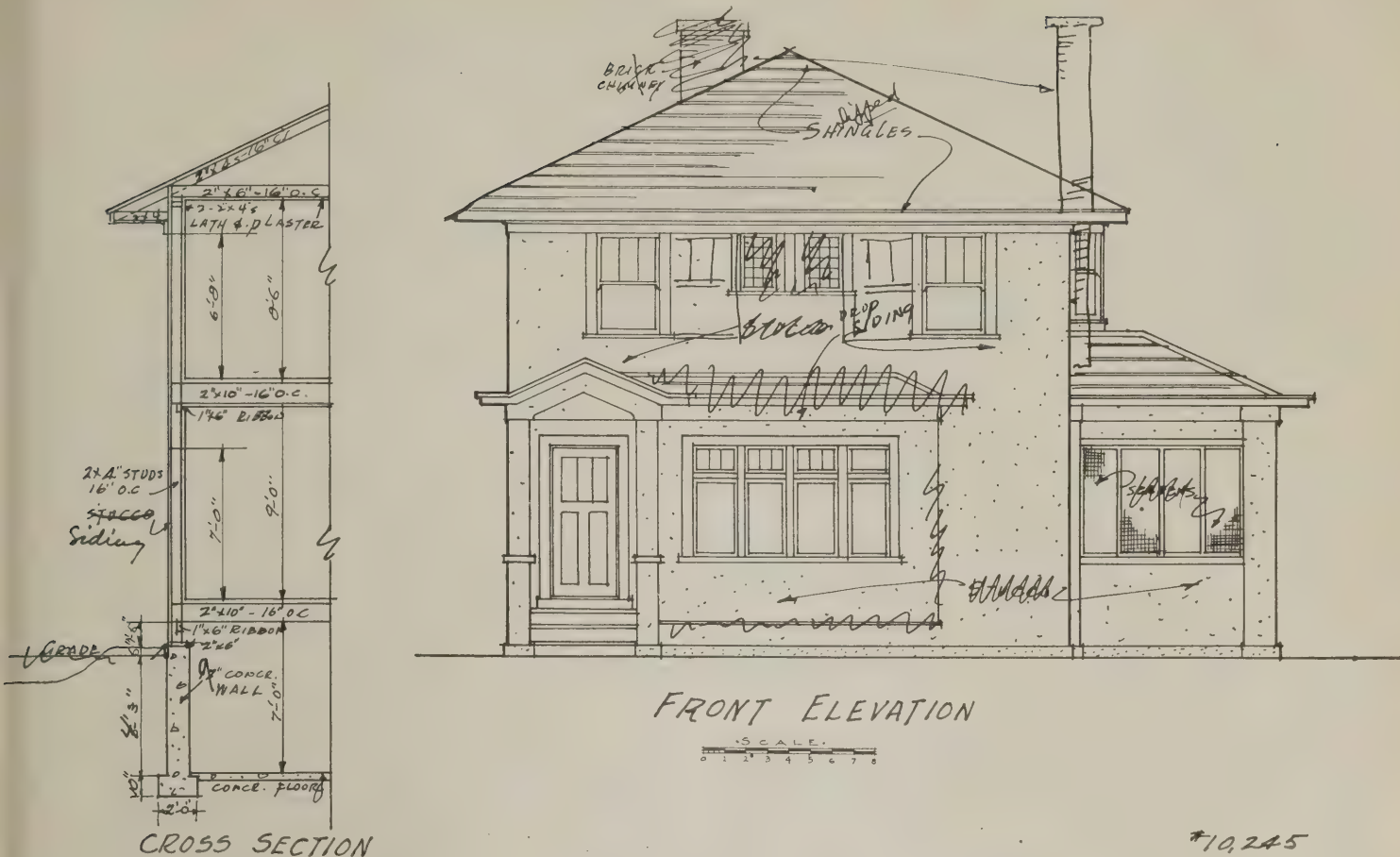
Architects now say that the place for a veranda is on the back, where comfort may

house that has some real *style* is the job of a skillful designer.

A case in point is illustrated herewith. This particular case, too, has an interesting history which clearly demonstrates the value to the contractor of an adequate design from which to work. It seems that a certain Mr. S. was "sold" on a "stock-plan" stucco house. But upon subsequent consideration, as almost invariably happens, he

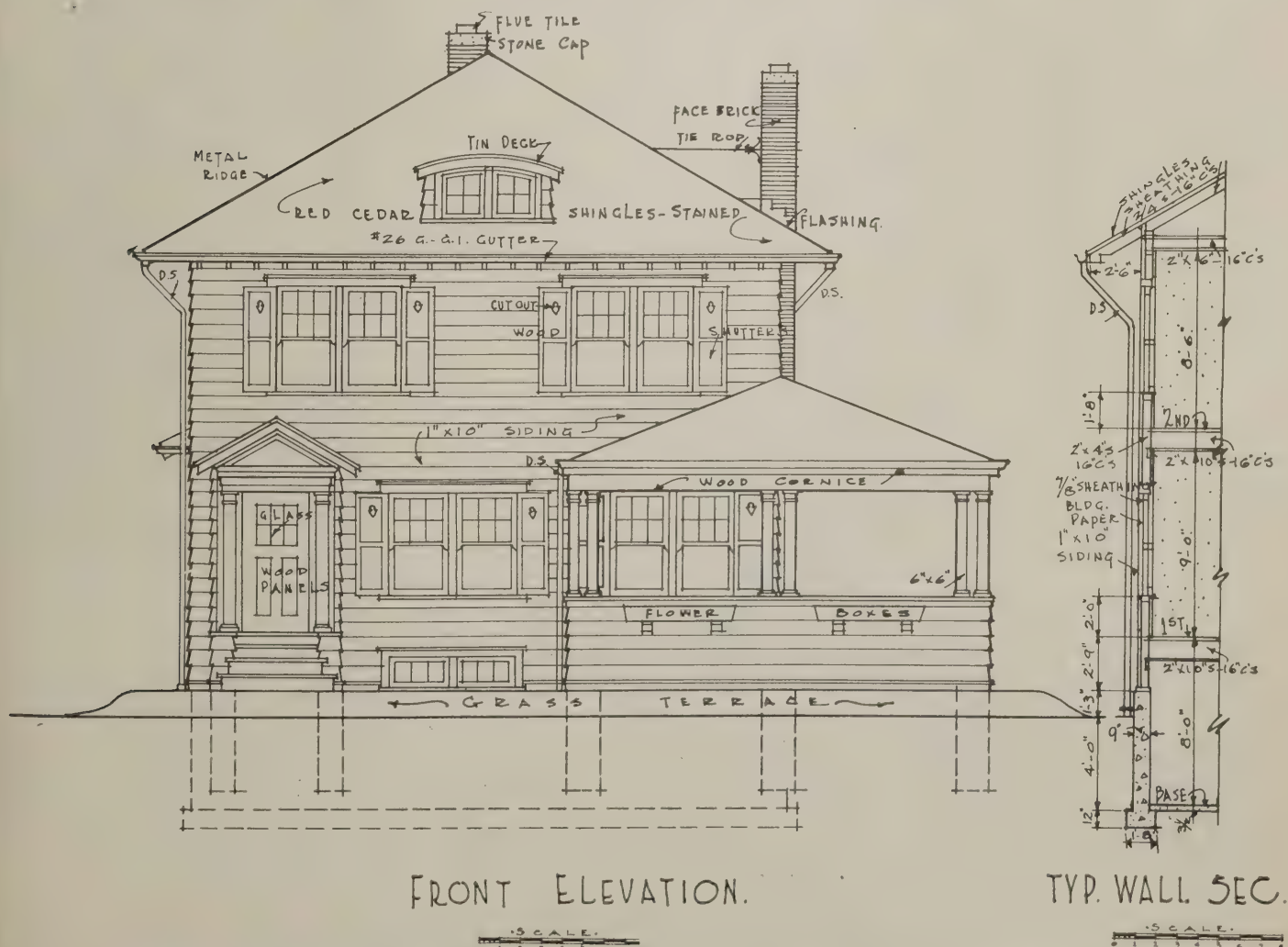
of the house to avoid certain trees on the lot.

Mr. S. designated these changes on his plans, to the best of his ability. Reproductions of the revised plans are shown herewith. They are no worse than many house plans that contractors are asked to figure on every day, and perhaps no worse than a builder's own plans after he gets ready to use them.

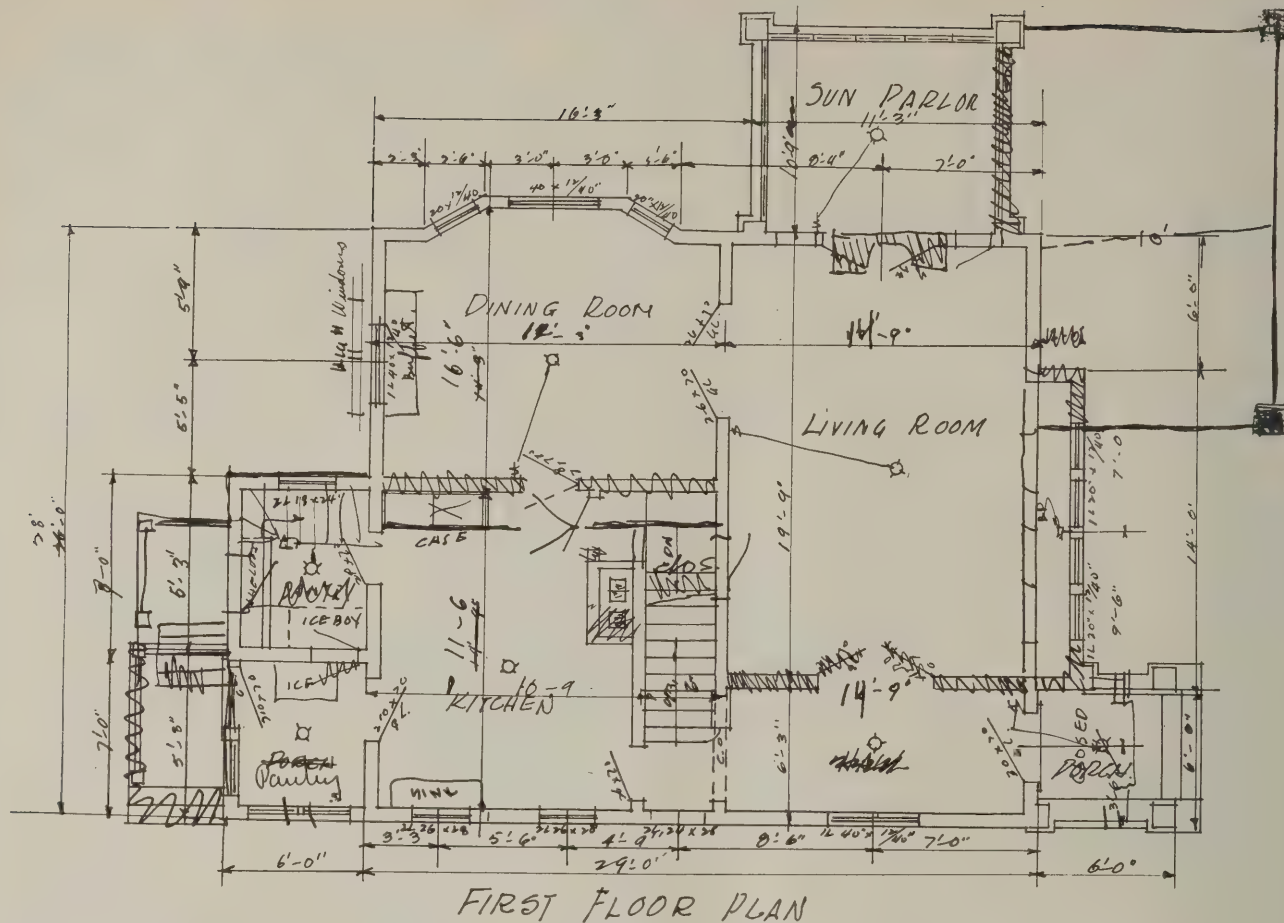


"Stock" plan "revised" by prospective client to suit his needs. Contractors figured on these details

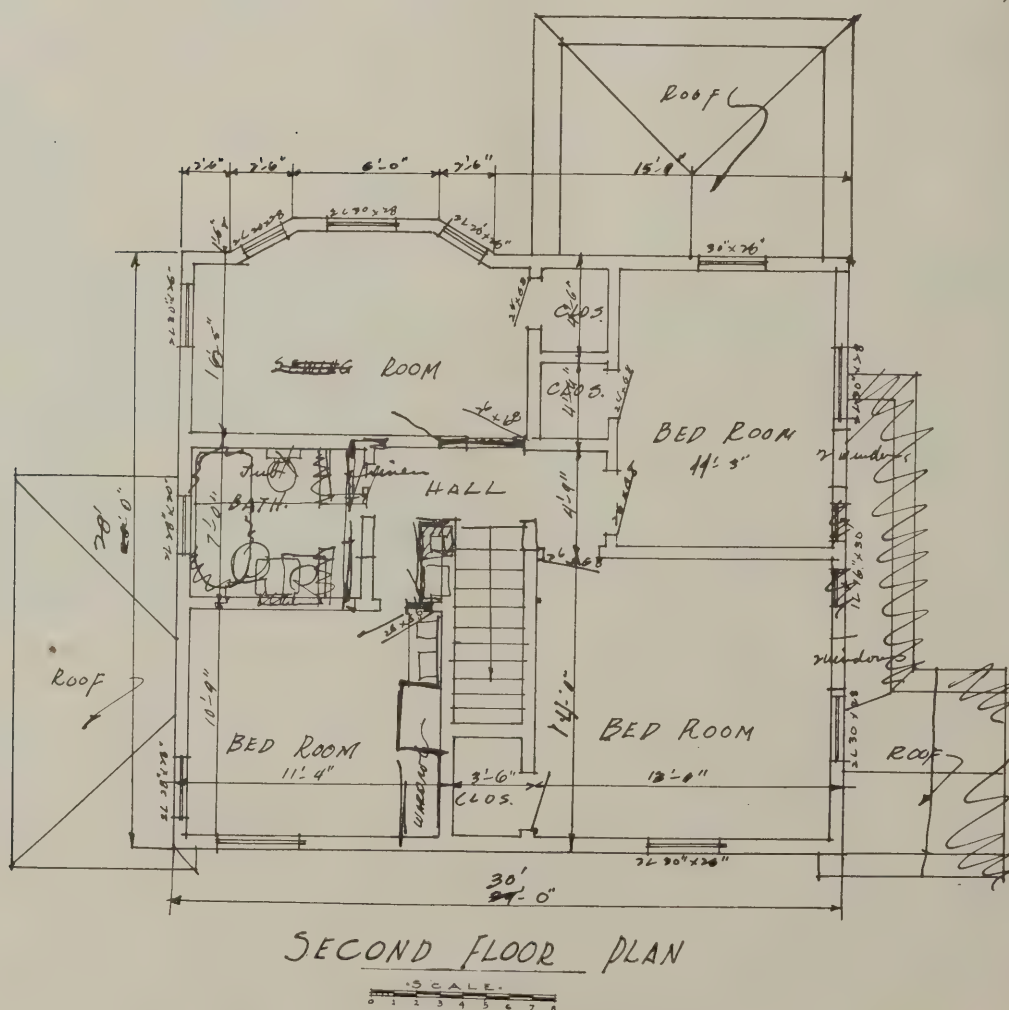
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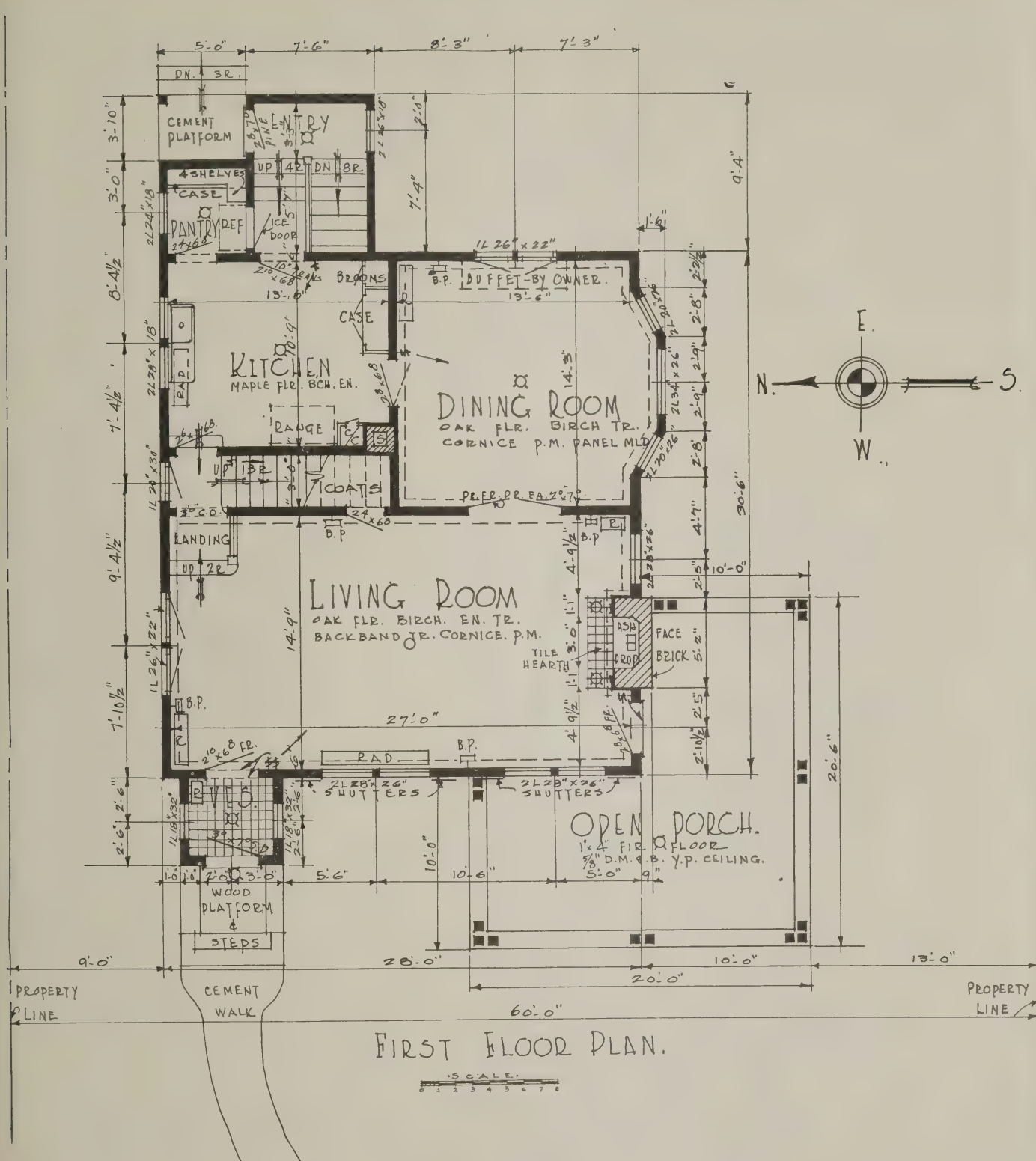
Elevation and section detail prepared by the architect after the "revised" "stock" plan had been discarded



#10,245



Floor plans of "stock" design "revised" by prospective owner



House as redesigned by Mr. Erickson with details as the owner really wanted them

On these revised "stock-plan" bids were received as follows: (A) \$9495, (B) \$10,500, (C) \$10,250. Fortunately Mr. S. was a man of considerable common sense and knew that discrepancy of \$1000, or 10 per cent of the total cost, could not be accounted for in any other way than a lack of understanding of what the bidders were bidding on. One of the bidders was so bold as to suggest to Mr. S. that he

have an architect draw some new plans and write some specifications, so that all might bid on the same thing. Mr. S. called in Allen E. Erickson, a Chicago architect, and plans were made which not only gave him a house with a porch, but a *stylish* house with a porch.

The same bidders estimated on Mr. Erickson's plans and specifications as follows: (A) \$9580, (B) \$9,500, (C) \$9775, the

maximum difference being \$275 and high bidder before being the low bidder now. The drafting of a set of plans at a very nominal extra cost therefore removed a gambling factor of just about \$1000, which might have been the contractor's profit, of course, but more likely would have been expended in wasted labor and wasted materials and in a house always unsatisfactory after it was completed.

Some of the things the new plans accomplished for Mr. S. were: A house of better proportions, simple in design, better arranged, a saving in footings and foundation walls, a suitable interior trim, windows properly sized and spaced to give a pleasing effect both from the exterior and interior, the pitches of the roof and of the porch arranged to give a proper perspective from street, radiators properly placed and suitable decoration, both interior and exterior. Some of the things the new plans did for the contractors were to remove an unknown gambling element and consequently to make a much more fair competition, the opportunity to make an estimate and not a

guess, the assurance that the owner had some comprehension of what the house was going to look like before it was three-quarters done, and therefore the assurance

that there would not be a thousand and one little extras which an owner never wants to pay for; and finally a satisfied client—a booster, instead of a knocker.

What Is Gypsum Plaster

GYPSUM plasters are prepared from calcined gypsum. They may be classed in a general way, according to Virgil G. Marani, engineer of the Gypsum Industrial Association as follows:

Ready Mixed Gypsum Plaster

This plaster, (sometimes called Prepared or Sanded Plaster) is a plastering material in which the predominating cementitious material is calcined gypsum, and which is

mixed by the manufacturer with sand and other necessary constituent parts in their proper proportion. It requires only the addition of water to make it ready for use. It is advantageous to use this material in cases where good clean sand is hard to procure. Where good sand is procurable and the freights rates amount to more than the cost of the sand, the use of ready mixed gypsum plaster is not economical.

Gypsum Wood Fiber Plaster

This is a plastering material in which not less than 80% by weight is calcined gypsum and not less than 1% consists of a non-staining wood fiber. The remainder is composed of hydrated lime, ground clay, asbestos, sand, retarder or cementitious material other than calcined gypsum, mixed in the required proportions by the manufacturer. This plaster is used with or without the admixture of sand, and is in demand where light weight, tough, insulating and highly fire-resistive surfaces are required.

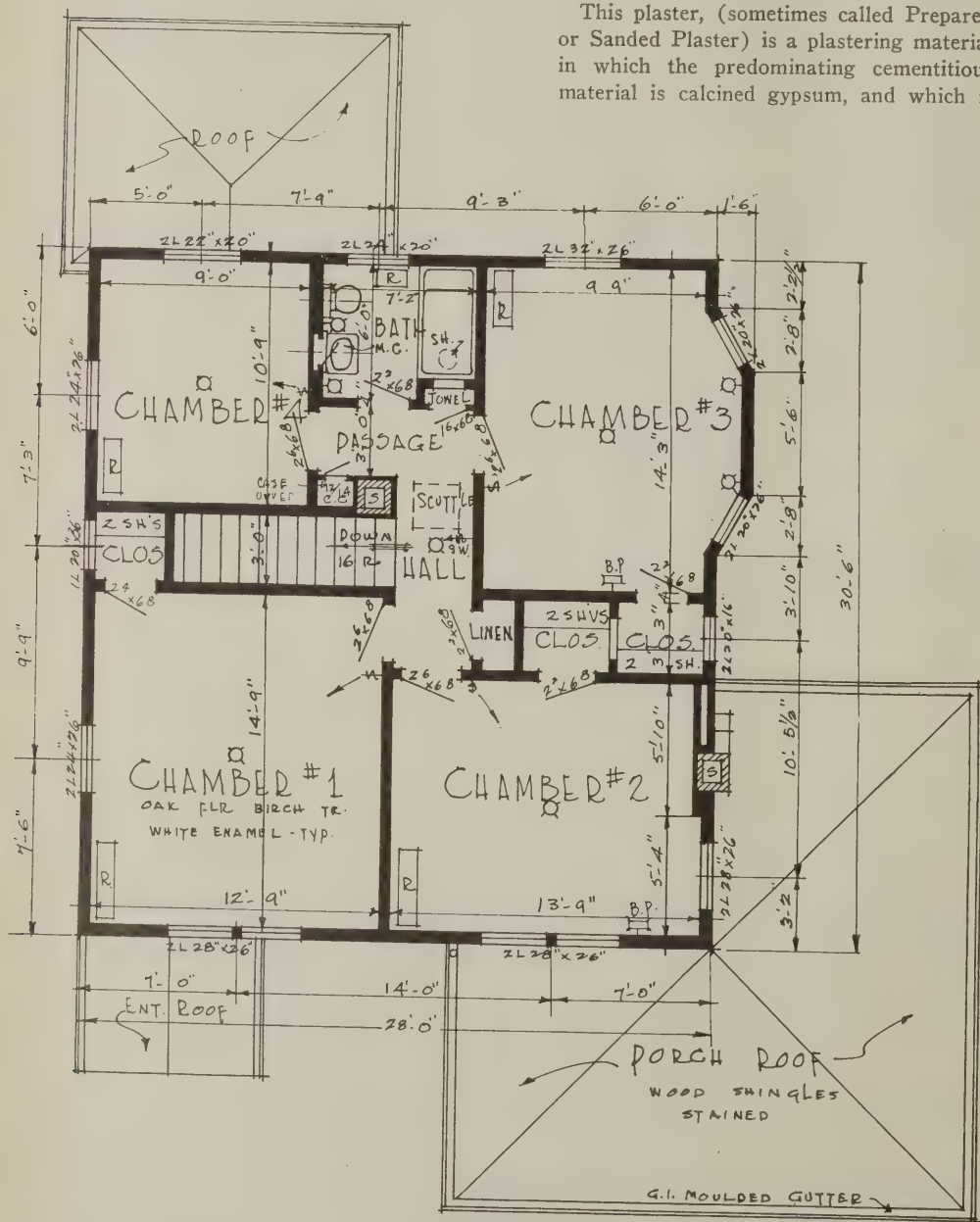
Neat Gypsum Plaster

Neat Gypsum Plaster (sometimes termed Gypsum Cement Plaster) is a plastering material in which not less than 85% by weight of the cementitious material is calcined gypsum. The remainder is composed of hydrated lime, ground clay, asbestos, retarder fiber, or cementitious material other than calcined gypsum, mixed in the required proportion by the manufacturer. This plaster is identical with "Ready Mixed Gypsum Plaster," but requires the addition of from two to three parts by weight of sand before mixing in water and applying.

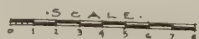
Other Gypsum Plasters

It is not necessary, within the scope of this article, to enter into the details of other gypsum plasters which are manufactured and sold in large quantities for specific purposes; such as "Gauging Plasters," "Keene's Cements," "Bond Plasters," "Molding Plasters," "Trowel Finishing Plasters," etc., except to state that in practically all building operations there is a demand for some or all of the plasters named.

BUILDING BUSINESS.—A good front is essential to building business. In your person, physically; in your manners socially; in your conversation, topically; in the house you live in; and above all, in your business stationery, second only to your knowledge of your business and ability to deliver.



SECOND FLOOR PLAN.



The architect's design for the owner

Questions, Answers, Kinks and Discussions

Edited by V. L. Sherman

Herein is a Department of Mutual Help for the Exchange of Experiences and Ideas. It is Not Only Well Worth Your While to Give Your Experiences for What You Get Back from Others, but National Builder Pays You for Doing So in Good Hard Cash

A Simple Stair Turn

Some very interesting letters come in. W. A. F., Hiawatha, Kansas, writes concerning the improvement in building construction demanded by the farmer, "as modern and up to the minute as his town brother." He also remarks on the scarcity of good apprentices, and states the fact that "our manual training schools do not impress on the young the dignity of useful work but instead teach them to make 'shine-boxes,' center tables, and hall-trees." He also submits this simple quarter turn, giving some short cuts on the same that may be of use to the man who lives where the less expensive house is still being erected."

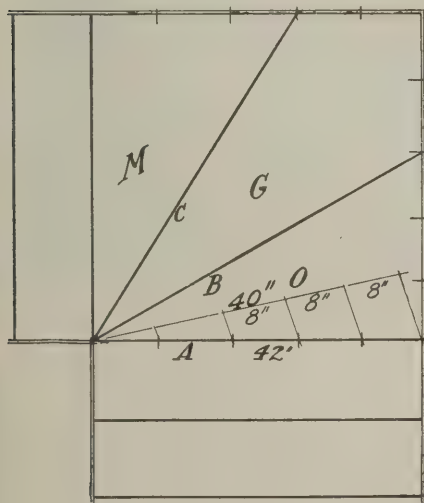


Fig. 1

Fig. 1 is the diagram. "No drafting of stairs is needed. Just cut your pitch board and space off the straight steps from the bottom to A. Divide the width of the stair into five equal spaces, as indicated. The width of the step O at the wall will be three spaces, or 18 in., as this stair is for 2 ft.-6 in. width. The width of the step G will be two spaces, or 12 in. The width of the step M will be three spaces, or 18 in. The length of the riser B will be six

spaces, or 36 in. C will also be 36 in. The cuts for the ends will be 12 and 18 on the square, again the proportion of two spaces and three spaces. The breadth of the stair makes no difference so long as you divide it into five equal parts. Hope it will help some fellow carpenter."

Regular Polygons

The problem of dividing a circle into a given number of equal parts and its solution is offered by W. I., Tipton, Iowa.

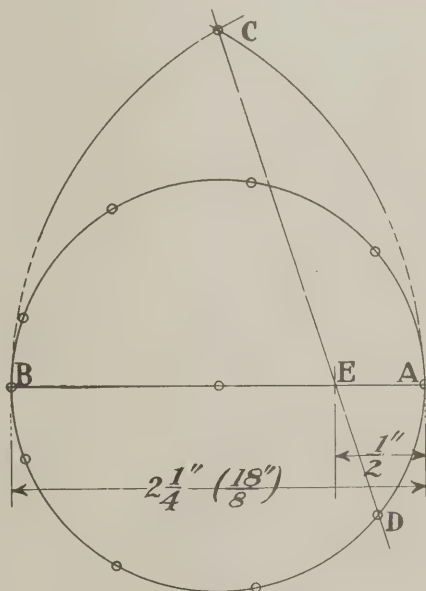


Fig. 2

The circle in the problem happens to be $2\frac{1}{4}$ in. diameter and it is to be divided into nine equal parts. See Fig. 2.

"Proceed thus: Dividing the diameter, as A B. We shall get the nine sides by finding one side first. Nine into eighteen eighths equals two eighths, or one-quarter in. Double this and get one-half in., or point E. Swing the diameter, A B, from A to C and from B to C. Place a straight edge at point C and draw a line through E and on until it intersects the circle at

D. The chord from A to D is one of the nine equal sides."

Is there any geometrician in the class who cares to argue the matter? Or is there any geometrician who will prove it as a proposition?

Valley Leaks

The replies coming in to the question on valley leaks are very numerous. The number is too great to allow publication of all of them:

F. O. M. writes: "I forward this kink in answer to 'Valley Leaks.' No doubt the roof is covered with 10 in. prepared roofing. These leak sometimes as there is only 1 in. lap and the water rushes behind the shingles to a joint and there is a leak. I take a can of prepared cement that comes with the roofing and get some tinnerns' roof cement and mix it. This thickens the can cement so it will not run. I raise up the ends of the roofing in the valley and carefully put this cement in with a paddle and then press shingles down, which keeps the water from going under the shingles to the joint."

F. R. writes: "In answer to your builder's trouble with valley leaks in the September issue, if it is shingled or slate, a short lap or misplaced joint is one cause of it. The attraction of cohesion which holds the water and the wind force back of it may be another. Here in the slate district, roofs are mostly lathed and slate pointed, and there is no trouble. But presuming that the roof in question is solid boarded, the cause, in most cases, is that the flashing does not hug the roof angle. In spite of the 'buckling' the angle must be the fixed low spot. It is advisable on new work to place a strip of heavy roofing felt under the inside edge. But this does not mend the roof in question. If the attic is not plastered drive wedges under the boarding so that all points will be above the line of valley intersection, then apply elastic slate cement under the edges, leaving an opening of two inches in each two feet of space. This will allow what water may

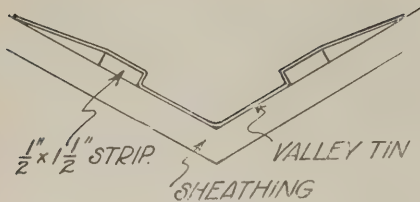


Fig. 3

work through the roofing to have a free flow outwards. Judged by the steep pitch of the roof as shown in the photo the trouble spoken of should not have happened."

C. W. J. writes: "I have made a detail sketch, see Fig. 3, showing a simple way as well as an effective way of stopping this trouble. I enjoy many of the questions and answers in this department of your publication, and have thought of joining in several times, and possibly will in the future." (We take that last sentence *cum grano salis* mixed with the hope that he will).

"Note that by the use of the strip, laying the valley tin over it you form a shoulder, and the water is prevented from forcing its way under the shingles."

Leveling Up

I. S. D., Lewiston, Idaho, writes: "In your September issue, page 64, are two methods of foundation construction. I do not believe the first one is quite as good as this method I use, (see Fig. 4), and think the second method would cost more than this method and be no better."

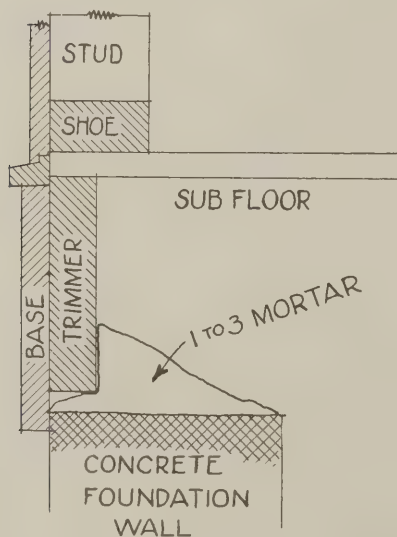


Fig. 4

"I set the floor joist on the foundation and spike them in place to the trimmer. Then they are leveled up to offset any inequalities in the foundation, and just before the sub-floor is nailed to the joists a lean mortar is mixed and plastered into the angle as illustrated."

Combination Saw and Try Square

For anyone who wishes to have a handy saw for "putting on sheathing, laying decking for concrete construction, or for any sawing where the cut does not have to be absolutely accurate." R. E. J., writes: "Take straight back saw, place steel square

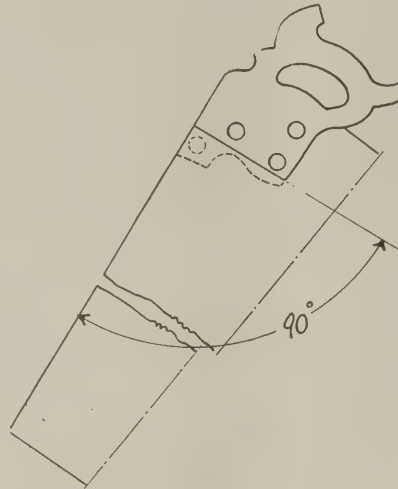


Fig. 5

on back of saw, and scribe along grip. Remove forward screw and make neat cut along this line. This makes the saw as shown in sketch." (See Fig. 5). "This can be done on either or both sides of the saw. Saw is used as square by placing cut off part of handle on edge of board and scribing along blade of saw."

Putting Up Siding

"In the August issue," writes A. N. P., of El Cajon, Cal., "Mr. Stoddard gives some useful points on putting on siding. If he had seen it done as much of it is done out West he would have had more to say. Out here the siding is usually put on before the frames are set. This, perhaps, started the fashion of nailing it on $4\frac{1}{2}$ in. to the weather, with no regard for anything else. But if proper care is given to grounds and flashing a good job may be done that way."

"I like to take a rod and nail a T strip on one end, hang it over the plate and locate the window sills and heads, etc.; and any angles like a porch beam should be considered so that the lines of siding or shingles may continue around without piecing."

"If the lines are marked on the rod from bottom to top when it is hung on the plate you can see where you are. I have never seen the carpenter who could go on measuring up on each board and make a good job of it."

Hammer Handles

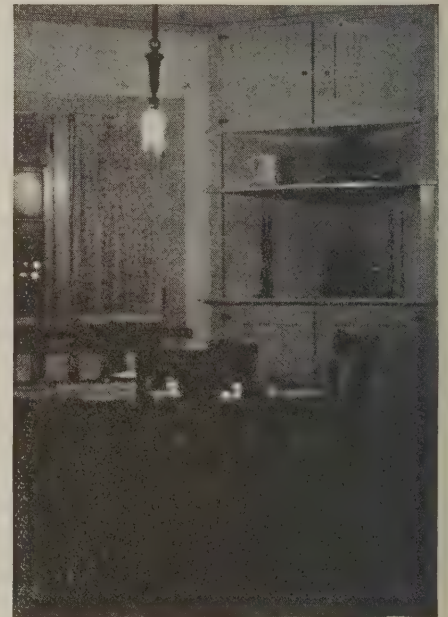
H. N. writes from Denver, "Loose hammer handles cause considerable trouble and

worry to carpenters and are also dangerous. To overcome this trouble I first fit my handle to the hammer, being careful not to get it too small, and then soak it in paint for a few minutes. (One hour is better if time will permit.) Then drive it in tight with a mallet, split the end, drive in an oak wedge, saw the end off and my loose handle trouble is over."

"Soaking the handle in paint serves three purposes. First, it allows the handle to be driven in tighter because the paint overcomes some of the friction; second, when the paint dries it acts as a glue and glues the hammer and handle together; third, it prevents the handle from shrinking."

A Dining Room Cabinet

C. R. W. sends a photograph of a dining room cabinet for a small house. He writes: "The amount of truck that goes to make up dining room equipment in small houses



Dining-room cabinet

is just about as great as it is in big ones. Since plate racks are taboo and closet space and floor space may be limited I have found this corner cabinet one way out. This cabinet stands in a dining room eleven six by eleven. Two sides of the room are taken up by casement windows, one side opens into the living room, and the kitchen door open at one end of the fourth wall. Between the windows and the fourth wall was enough space to allow a cabinet forty-eight inches wide. It is built with three shelves below and two above. The second open shelf is made with a slight bow which relieves the appearance. To give the best appearance it should be carefully built and enameled or painted with the rest of the room."

Expense Classification

No. 9—Presenting Chart of Expense Classifications—Expenses Analyzed by Departmental Sub-classifications—Basis for Cost Finding Methods and Procedure

By G. W. Hafner

PERHAPS the greatest problem before the construction industry today is that of determining accurate costs. Generally speaking, the greatest handicap to efficient business operation is that of incomplete, inaccurate and inadequate information relative to cost and profits.

When consideration is given to the fact that the majority of contractors and builders operate their business without adequate information relative to their condition, and that they determine their true financial position only at the time of taking the annual inventory, it is not surprising that so many firms are wrecked, but rather that so many inefficiently equipped business vessels do arrive at the port of satisfactory profits.

So long as all of the competitors in a given industry are equally in the dark as regards costs, the handicap resulting from this condition is more or less uniform. But this situation is entirely changed when some of the more progressive competitors energetically and systematically undertake the introduction of reliable cost methods; and, instead of working partly by intuition, partly by guesswork and partly on incomplete and inaccurate information, operate their business on a basis of accurate and complete cost data. When this condition applies, all other things being equal, the progressive builder cannot fail to outstrip his less efficient competitors.

Causes of Industrial Distress

If we eliminate such considerations as lack of capital, unwise credits, extravagance, fraud and the like, there are three factors which, whether considered separately or in combination, can cause distress to any industry.

These are:

1. Failure to ascertain correct costs.
2. Failure to base selling prices on correct costs.
3. Lack of uniformity in costing, and bidding on work.

Agreements as to bids are a difficult thing to bring about. Beyond this *fixing the price* has been declared illegal. In view of this, it is evident that some other means must be found to stabilize the selling price. A careful study of the subject leads to this conclusion:

Agreements as to bids are not necessary.

Comparison of bids is not altogether an essential. Combinations to control local situations is not the solution. The one way to control the situation is this: Such uniformity in ascertaining and compiling costs and figuring profits as to insure against wide difference in prices—a measure making possible stable prices, without any general agreement or secret understanding.

What Is a Cost System?

Hence the importance of the right kind of cost-keeping methods should engage the attention of every progressive contractor and builder; and now seems the logical time to present plans and methods by means of which accurate and dependable costs may be ascertained in the construction industry.

A cost system is a tool of management; and, like any other effective tool, it must be carefully designed to suit the particular industry, and operated and administered with discrimination and purpose. Such a cost system will produce results which will abundantly justify, on a pure financial basis, every penny of expense involved in its installation and operation.

Times have changed. There was a time when the proprietor knew how much money there was in the bank for him to draw upon, and that was the way he knew whether he was making money or not. But today the margin is too close. The business man cannot afford to keep any considerable amount of money on hand—not enough, at least, so that he can afford to be without information as to just how he stands. Beyond this, he knows that, today, his cash account has very little to do with his prosperity.

The present day proprietor or manager needs to know tomorrow where he spent the money today—needs to know, *month by month*, whether or not he is earning an adequate profit. Good management, today, is predicated on a cost system which acts as an *insurance* that cannot be secured in any other way.

What Constitutes Cost?

The word "cost" is sometimes very loosely used. Used in its true sense, as applied to the building industry, it properly includes the *total* expenditures of

carrying on the business; not alone in money, but in materials and equipment. A cost system to be productive of dependable results must, above all else, include in its totals every single element of cost. Thus the wearing out of machinery and equipment, necessitating its final replacement, is as much an expenditure of the business as the payment of workmen's wages. If depreciation is omitted, reliable costs are not possible, nor will the anticipated net profit be nearly realized.

Likewise, the proprietor's salary should be included, for without this, even though the earnings of the business seem sufficient, at the end of the year profits are greatly reduced by the amounts withdrawn by the proprietor.

Then there are uncollectible accounts or bad debts. These are inevitable and the contractor who does not include in his costs predetermined losses through this means is fooling himself, to say the least.

Taxes of all kinds; insurance, both general and compensation, and other items sometimes overlooked until the end of the year, must all be taken into account as a part of the costs.

Definition of Cost

This then may be stated as a definition of cost for the construction industry; that portion of the expense which properly belongs to each and every building erected, or other jobbing work done, constitutes cost.

The primary object of the general ledger is to show through its various accounts, at any time, the operations of the company; and, by a comparison of the asset and liability items, the condition or net worth of the company at such a time.

The purpose of the various accounts of the general ledger are for recording the investment in property of all kinds; for recording purchases of material and other merchandise to be used in construction, the cost of the material so used, and in keeping a record of the expenses incurred in running the business in its administration, buying, selling, and construction functions; all with the object of determining the amount of profit existing in its various transactions.

To determine this profit it is necessary to know the cost, not alone of the material

used, but also of the various and sundry expenses applicable to each separate contract or job.

The cost of the material or merchandise used is easily ascertained, as has been illustrated in the article dealing with the subject "Accounting for Purchases," but the correct distribution and apportionment of expense, so that each job may bear its true share, is a matter requiring the most careful analysis. In other words, the cost problem lies in the proper distribution of expenses to departments and apportionment to the work being done.

Now, in classifying expense items, it is impossible to charge all the various items making up the total directly against contracts or jobs, with any degree of accuracy. Therefore, in order to simplify the work of classification, all expense items are first charged to one or more of the eight departments or divisions of the business, and then, at the end of the month, these departmental totals are apportioned to contracts or jobs, as will be shown in subsequent articles.

Mapping the Cost System

The first step, therefore, in the proper mapping out of a cost system, is to determine the logical departments of the business. In the construction industry these are:

1. Excavating.
2. Concrete.
3. Carpentry.
4. Masonry.
5. Iron Work.
6. Direct Overhead.
7. Prorated Overhead.
8. Administration and General Office.

Each of these departmental divisions of the business has its own expense variously subdivided and classified as to its bearing upon the business as a whole. In drawing up the list of subclassifications, as 01, 02, 03, etc., clean-cut lines of distinction between each and every other class has been made. This will not only be conducive to more accurate records, but will also be of great assistance in the actual work of classifying. Where such clean-cut lines of distinction between expenses are made, the clerk doing the classifying does not have to draw on his imagination as to the proper distribution of charges. He simply refers to the "Chart of Expense Classifications," which determines the disposition for him.

By establishing the classification of expense accounts, in detail, on a basis of the various departmental divisions of a contracting and building establishment, a means is found by which expenses may be so analyzed as to make them readily available for application to the various contracts.

The accounts are classified or numbered to correspond with the various departments of the business. In illustration, suppose, instead of using the *names* of departments as shown, *numbers* are used. Excavating is, therefore, department No. 1; Concrete, de-

Figure 29

CHART OF EXPENSE CLASSIFICATIONS
MODERN BUILDING CONSTRUCTION CO.

EXPENSES		DEPARTMENTS							ADMINISTRATIVE & GENERAL OFFICE
		OPERATING							
		EXCAVATION	CONCRETE	CARPENTRY	MASONRY	IRONWORK	DIRECT OVERHEAD	PROFITED OVERHEAD	
NO.	NAME	1	2	3	4	5	6	7	8
01	LABOR	101	201	301	401	501	601	701	
02	FOREMAN	102	202	302	402	502	602	702	
03	SUPERINTENDENT						603	703	
04	TIMEKEEPER						604	704	
05	WATCHMAN						605		
06	WATER BOY						606		
	MAINTENANCE								
07	REPAIRS TO BUILDINGS							707	807
08	REPAIRS TO MACHINERY & EQUIPMENT	108	208	308	408	508			808
09	REPAIRS TO WAGONS							709	
10	REPAIRS TO TRUCKS							710	
11	FEED							711	
12	SHOING							712	
13	VETERINARY							713	
14	GASOLINE, OIL AND GREASE							714	
15	TIRES AND TUBES							715	
16	MAINTENANCE SUPPLIES & EXPENSE							716	
17	SUPPLIES - GENERAL	117	217	317	417	517	617	717	
	INSURANCE								
18	FIRE AND TORNADO						618		
19	LIABILITY						619		
20	COMPENSATION						620	720	820
	TAXES								
21	REAL ESTATE							721	821
22	PERSONAL PROPERTY	122	222	322	422	522			822
23	CORPORATE (EXCEPT FEDERAL INCOME)								823
	DEPRECIATION								
24	BUILDINGS							724	824
25	MACHINERY & EQUIPMENT	125	225	325	425	525			825
26	HORSES & WAGONS							726	
27	TRUCKS							727	
	SHED CONSTRUCTION								
28	MATERIAL						628		
29	LABOR						629		
30	RENT							730	830
31	TEAM AND TRUCK HIRE	131	231	331	431	531	631	731	
32	EXECUTIVE SALARIES								832
33	OFFICE SALARIES								833
34	COMMISSIONS						634	734	834
35	ARCHITECTS FEES						635	735	
36	ADVERTISING								836
37	AUTO EXPENSE							737	837
38	TRAVELING EXPENSE						638	738	838
39	POSTAGE								839
40	TELEPHONE AND TELEGRAMS								840
41	STATIONERY, PRINTING & OFFICE SUPPLIES								841
42	WATER, FUEL AND LIGHT						642	742	842
43	POWER						643		
44	COLLECTIONS, CREDIT AND EXCHANGE								844
45	LEGAL AND PROFESSIONAL SERVICES								845
46	BAD DEBTS								846
50	UNCLASSIFIED	150	250	350	450	550	650	750	850

partment No. 2; Carpentry, department No. 3, and so on.

Our second step is likewise simple. For the expenses, as depreciation, postage, rent, salaries, wages and the like, numbers are also substituted for names.

Expense Account Classification

By combining these two we are able, with a degree of ease and facility not found otherwise, to signify any sort of expense chargeable to any particular department of the business, as illustrated by Chart of Expense Classifications (figure 29).

When classifying a charge for, say, repairs to excavating machinery, the classification would be 108, in which "1" is the department number and "08" the particular

kind of expense chargeable to that department. Likewise repairs to concrete machinery would be classified as 208, and repairs to office equipment as 808, and so on throughout the entire range of expenses. This is an extremely simple, and yet an entirely adequate, method of classifying, and makes possible rapid sorting of charges to specific accounts and subclassifications of expense.

It will be understood that there is nothing fixed or static in the chart presented herewith. Expense classifications may be indefinitely extended to include any number of subdivisions of the particular kind or class of expense; although in our judgment the subdivisions presented in the Chart of Expense Classifications are sufficient for

all practical purposes.

These subdivisions of expense as 101, 201, 301, 401, 501, 601, 701, etc., should not be understood to be General Ledger Accounts. They are used for the purpose of arriving at certain charges more readily, and for the further purpose of exercising control over expenses, and are analyzed through a subsidiary Expense Ledger, where each classification is considered as a separate account, as illustrated by Figure 28 in the preceding article.

This subsidiary ledger is used for analyzing

the charges of the General Ledger controlling accounts with expense, and aside from that, does not affect the General Ledger accounts in any way.

The next article will analyze and explain each expense account shown by Figure 29.

Beveling Edges of Wall-board

IN working with wallboard, it is sometimes desirable to bevel the edges to form a neat

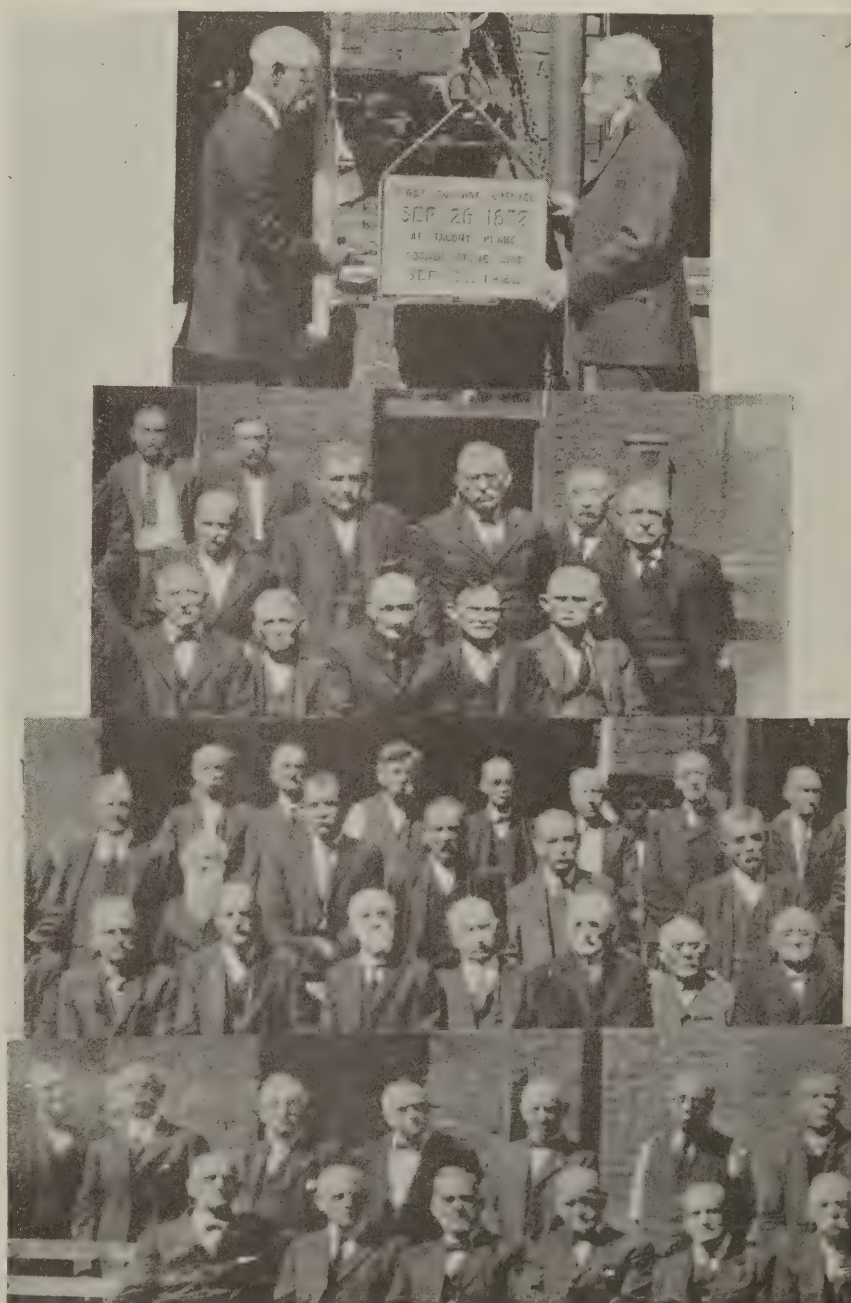
joint; this can be done without sawing, which generally leaves ragged edges, by means of a simple device that uses sandpaper for forming the bevel. A piece of wood, about 6 in. square, is cut diagonally to make two 45-degree triangles, and these are fastened together by two braces, as shown, a handle also being provided. A piece of wallboard is nailed to the hypotenuses of the triangles, and the sandpaper is fastened to this with thumbtacks. In use, the sanding device is moved back and forth across the edge of the panel, and, by raising or lowering the panel, the whole surface of the sandpaper can be used.—Karl L. Martin, Cleveland, Ohio, in *Popular Mechanics*.

"The Old Man Experienced"

ESTIMATING the productive values of young and old men offers many illusions in favor of youth. Where precision, care and experience are required it appears the old man has the edge on the situation as evidenced by the experience of Henry Disston & Sons, Inc. This concern celebrated the fiftieth anniversary of breaking ground for its factory at Tacony, a suburb of Philadelphia, on September 27, the main feature of the celebration being the laying of a cornerstone—fifty years after. The reason why was that September 27, 1872, was Friday—no sort of day to lay a cornerstone. So the matter was deferred for fifty years to be carried out in the presence of the veteran workers shown in the illustration to whom William D. Disston, grandson of the founder of the concern said, "We are proud of the fact that we are in the presence of you fifty-year veterans who, by your loyalty and efficient workmanship, have had a great deal to do with the expansion of the plant. This cornerstone is not only dedicated to the ground-breaking incident on this site, September 26, 1872, but also to the loyal co-operation of you men and the veterans who have gone before you." Of the fifty-four veterans, thirty-two are actively engaged in the Disston plant, the lengths of service ranging from 50 to 60 years. The workers are represented by generations, the most notable being three men and their six sons, aggregating 264 years of Disston service. The name of the company since its inception by Henry Disston in 1840 is synonymous with the best in saw, tool and file making.

The illustration shows Jacob Disston, Sr., the only surviving son of the founder, at the left, and William Smith, who, 50 years before, assisted Henry Disston in the original breaking of ground, at the right, laying the cornerstone and sealing in it models of the Disston products.

In these days of labor troubles and wasteful labor turnover, there is a striking lesson in the incidents here recorded.



Veteran workers of Henry Disston Sons, Inc., at fiftieth anniversary of breaking ground for the factory at Tacony. At top: Laying the cornerstone

The Situation

THE general complaint at present is shortage of common labor. In the early spring and summer the sluggish condition of all the industries except construction and its allied production fields left a good supply of labor to draw upon. But since construction hit its record-breaking pace in mid-summer, there has been a general recovery of business in other lines, and the wages of construction labor have been steadily advancing. Highway contractors, in particular, have had hard sledding.

The primary cause of the shortage in common labor is said to be the restrictive immigration laws. This country has always depended on fresh influxes of immigrants for "pick and shovel" men, because every year many who began in this class graduate to what is considered more dignified kinds of labor. If this is the case there will be shortage of common labor whenever the country is prosperous or "normal"; and the wages of common labor will be subject to much fluctuation. Wages are likely to follow the same course each year as they have this year—start low in the early spring and perhaps double before the end of the season. Contractors whose contracts will run the year out must certainly take this into consideration.

On the other hand shortage of common labor may prove a blessing in disguise. It may lead to a more seasonal distribution of construction work instead of attempting to pile it all into six months of the year. In commenting on the unusual activity in cellar excavation this fall, in New York City and vicinity, the Dow Service building reports state: "Scarcity of common labor has forced excavating contractors to employ mechanical digging, hoisting and carrying devices. In other days it was almost impossible for human brawn to make profitable progress against frost, snow, ice and sleet. Then it was necessary to wait until the spring thaws came before rock and earth work could be started. Now these factors are no real barriers and by the time the excavating work is finished, the rail deliveries are less likely to be delayed by snow and storm and the operation goes through with better progress and is in better position to be handled by the renting agents than are those, forced to operate on over-time bases toward the finish of the job, thereby often adding considerable to the cost of the building, in extras, etc."

In the cities there is also a considerable shortage of skilled building mechanics and in San Francisco, Minneapolis, Chicago and other cities much progress has been made in the establishment of trade schools. Conditions in Chicago are more or less typical

of conditions in other cities. They are described in a recent bulletin of the Illinois Society of Architects as follows:

Architects' Views

"Notwithstanding all that has been written and said about the building situation in Chicago, conditions are about what any student of economics would expect under similar circumstances. For the past few weeks, however, the situation has been greatly aggravated by the railroad strike which has resulted in an uncertain supply of many of the basic building materials and the consequent profiteering of dealers who are fortunate in having a supply on hand. Prices quoted are as of date of delivery, with no guarantee of when delivery will be made.

"There is a shortage of skilled mechanics in some trades and the labor unions, by taking advantage of the situation, have forced the wage rate to a level even higher than existed during and just after the war. One of the worst offenders is the plasterers. Plasterers are now receiving from \$15 to \$18 per day with double time for Saturday afternoons and Sundays, and in many cases will not work for any contractor unless assured at the time of employment of the Saturday afternoon and Sunday double time.

"The cost of many building materials are somewhat higher than they were four months ago, and altogether it would appear as if the very great falling off in the number of permits issued is perhaps justifiable and will, no doubt, have a tendency to stabilize building costs at a lower level than exists today.

"Much has been heard about a building boom in Chicago, but a comparison of the figures of the number of building permits issued in Chicago, the total feet of frontage covered, and the estimated cost of buildings constructed for the past 15 years would seem to indicate that the present year's construction work in Chicago is only about normal, when the changed purchasing power of the dollar of 1922 is compared to the purchasing power of the dollar in 1914 and previous years.

"The cause of the present high labor costs on building construction is not so much the present high cost of living as the scarcity of men. Even when the thousands of mechanics brought into the Chicago territory by the Citizens' Committee is added to the mechanics who were already here it will still be found that there are some 40,000 less mechanics available to handle the Chicago building program than were available in 1914.

"At the beginning of the year there were no large available stocks of basic materials other than in one or two lines, and as the scarcity of labor exists in connection with the production of basic building materials, just as it exists among the building mechanics, it is hard to conceive of any reasons why building costs will for some years be much lower than the average of 1922.

"With the available building mechanics and with the normal growth of our city it is impossible to conceive of the city being over-built. Indeed it is difficult to figure out how with the available men it will be possible to produce even a normal amount of building of all classes, without possibly further enhancing labor costs. In the last analysis, labor is a commodity and its value as a commodity is regulated by the same law that regulates the price of brick, cement, lumber, steel, or the dollar itself; that is, the available supply and the affective demand."

Price Quotations

Price quotations on lumber and building materials in Chicago, as of October 24, are as follows:

YELLOW PINE

4" B & B't'r Flooring.....	\$71.00
5 1/2" B & B't'r Ceiling.....	60.00
6" B & B't'r Drop Siding.....	75.00

Fencing and Boards

	No. 1	No. 2	No. 3
1x4	\$48.00	\$35.00	\$31.00
1x6	50.00	40.00	32.00
1x8	50.00	42.00	33.00
1x10	53.00	43.00	34.00
1x12	63.00	45.00	36.00

No. 1 Dimension, 16'

2x4	\$47.00
2x6	45.00
2x8	47.00
2x10	48.00
2x12	49.00

Timbers

	Long Leaf	Short Leaf
8" & under.....	\$50.00	\$47.00
10"	55.00	53.00
12"	59.00	57.00
14"	62.00	

DOUGLAS FIR

4" V. G. Flooring, Clear.....	\$88.00
4" Flat Sawed Flooring, Clear.....	68.00
5 1/2" Ceiling, Clear.....	62.00
6" Drop Siding, Clear.....	70.00

No. 1 Dimension, 16'

2x4	\$47.00
2x6	45.00
2x8	47.00
2x10	48.00
2x12	49.00

No. 1 Boards

1x4	\$40.00
1x6	45.00
1x8	47.00
1x10	48.00
1x12	50.00

No. 1 Timbers (32' and under)

6x6 to 8x10	\$57.00
6x12, 8x12, 12x12.....	59.00
8x14 to 14x14.....	62.00

NORTHERN HEMLOCK

No. 1 Piece-stuff, 16'	
2x4	\$47.00
2x6	45.00
2x8	47.00
2x10	48.00
2x12	49.00

No. 1 Boards, 8 to 16'

1x4	\$40.00
1x6	43.00
1x8	45.00
1x10	45.00
1x12	47.00

NORTHERN PINE

Boards, 16'

	No. 1	No. 2	No. 3
1x4	\$83.00	\$68.00	\$46.00
1x6	84.00	69.00	50.00
1x8	84.00	69.00	48.00
1x10	87.00	69.00	48.00
1x12	92.00	74.00	49.00

NORWAY PINE

No. 1 Dimension, 16'

2x4	\$48.00
2x6	47.00
2x8	48.00
2x10	50.00
2x12	52.00

WESTERN PINE

Siding

	B & B't'r.	C.	D.
4"	\$54.00	\$52.00	\$40.00
6"	58.00	55.00	44.00

SHINGLES

Red Cedar

Clears, 5 to 2	\$6.50
Clears, 6 to 2	6.00

White Cedar

Extra Star A Star	\$6.50
Standard Star A Star	5.50
No. 1	3.50

LATH

Northern Pine

No. 1	\$12.00
No. 2	11.00
No. 3	8.50
32-inch	5.00

OAK FLOORING

13-16x2 1/4"

	13-16x2 1/4"	3/4x2"
C'T P'I White or Red	\$125.00	\$95.00
Select P'I White or Red	115.00	80.00
No. 1 Com	80.00	55.00

MAPLE FLOORING

13-16x2 1/4" 3/4x1 1/2 or 2"

	13-16x2 1/4"	3/4x1 1/2 or 2"
Clear	\$110.00	\$87.00
No. 1	100.00	70.00
Factory	45.00	

Truck-load curb deliveries of cement, lime, plaster, sand, etc., are quoted as follows:

Portland cement	\$2.85
This price does not include sacks, which are 40c a bbl. extra.	
Torpedo—Lake and bank sand	Per Yard \$3.25
Crushed stone, gray screenings	3.25
Hydrated lime, Ohio, paper	Per Ton \$20.00
Hydrated lime, Wis., paper	18.00
Bulk lime, Wis.	1.50
Neat plaster	16.00
Prepared plaster	14.00
Magnesite Stucco	\$45.00@53.00
Dashes (all kinds)	21.00@30.00
Wood fiber	16.50
Prepared finished	35.00
Tile—	Per Foot
3-inch gypsum tile	.12
4-inch gypsum tile	.14
Partition Tile—	
3-in. clay, per M feet	\$82.50
4-in. clay, per M feet	88.00
6-in. clay, per M feet	121.00
8-in. clay, per M feet	165.00

Flue Lining—

	Per Foot
4x8 inch	.18
8x8	.24
8x12	.36
12x12	.46
18x18	.90

Coping—D. S.—

9-inch	.16
12-inch	.24
18-inch	.52

Sewer Pipe—

3 & 4-inch	.12
------------	-----

5 & 6-inch	.18
8-inch	.28
9 & 10-inch	.42
12-inch	.54

Face Brick—

Standard, vitrified red	32.00@34.00
Smooth, Indiana red	30.00@32.00
Smooth, gray	48.00@50.00
Smooth, buff	45.00@48.00
Common brick	12.00
Smooth, Ohio red	40.00@42.00
Smooth, Pennsylvania red	45.00@48.00
Smooth Silica Slag, gray	23.00@25.00

Wage Scales in Chicago

TO obtain first-hand information on wages paid men ostensibly working for the pay fixed by Judge Landis, *The Chicago Tribune* caused a survey to be made of several Landis and non-Landis award jobs. In every instance wages paid were higher than provided for in the Landis award.

In nearly all cases workers receive two pay envelopes—one for the Landis rate and the other for the excess over that. Some contractors pay the excess by giving bonuses. The following table is compiled from wages paid on numerous Landis and non-Landis award jobs:

Trade	Landis award	Wages paid
Plumbers	\$.95	\$1.25-\$1.50
Bricklayers	1.10	1.35- 1.50
Boilermakers	1.00	1.00
Steamfitters	.95	1.25
Hoisting engineers (high pressure)	1.10	1.35
Tile laying (fireproofers)	1.12 1/2	1.20
Cement finishers	.85	1.00
Composition flr. finishers	.97 1/2	1.00- 1.10
Cement workers	.72 1/2	.80- 1.00
Drain layers	.82 1/2	1.00
Electricians	1.10	1.10
Gasfitters	.95	1.25
Ornamental iron w'k'rs.	.95	1.10
Structural iron w'k'rs.	1.05	1.10
Common laborers	.72 1/2	.80- 1.00
Caisson men (windlass and niggerhead)	.85	1.00
Laborers (plasterers)	.78 3/4	1.00
Lathers	1.00	1.25
Marble setters	.97 1/2	1.00
Marble setters, helpers	.70	.80
Marble polishers	.75	.80
Mosaic and tile workers	1.02 1/2	1.10
Pipe and boiler coverers	.95	1.00
Composition roofers	.92 1/2	1.25
Slate and tile roofers	1.00	1.25
Stone cutters	1.02 1/2	1.10
Terrazzo mechanics	.95	1.00
Tuck pointers	1.00	1.25
Carpenters	1.00	1.00- 1.10
Elevator constructors	.95	1.15
Plasterers	1.10	1.50
Sheet metal workers	.95	1.25
Painters	.95	1.10
Glaziers	.95	1.10
Fixture hangers	1.00	1.10

Prior to the Landis award all trades received \$1.25 an hour. The laborers received \$1 an hour.

Building a Home in Motion Pictures

"SOME speed," will be the verdict of visualists who see the motion pictures of breaking ground, laying foundations, building, hurrying, carrying and hauling incident to the practical exposition of house construction being arranged for at Glen Ellyn, Ill., by the Atlas Educational Film Co., of Oak Park, Ill. A handsome Colonial residence, designed by A. B. Maiwurm, architect, Oak Park, Ill., is being erected at Glen Ellyn, Ill., as an enterprise by C. A. Rehm, vice-president of the film company, backed, it is said, by numerous important building interests. The scenario presents all the phases such as the investment problem, selection of the lot, the contractor, the architect, choice of materials, and furnishing the home. The idea is to constitute a traveling "Own Your Home" exposition, at a nominal charge, arrangements for which may be made direct with the film company.

"Saving the Surface"

HOW much are words worth? Frequently there are heard details of writers being paid fabulous sums of \$50, \$100 and even \$1,000 per word for their production. But now a value of \$1,000,000 is set upon each of three words. These are "Save the Surface," which phrase is estimated to now be worth \$3,000,000 to paint and varnish manufacturers and allied businesses. Arthur M. East, business manager of the committee that has spread this educational propaganda broadcast, tells this about the work:

Deterioration Costs \$1,200,000,000 a Year

"It is estimated that the annual loss to property owners in the United States through deterioration approximates \$1,200,000,000 a year, exceeding the loss by fire nearly three times. Through the proper protection of surfaces, by means of paint and varnish, a considerable part of that tremendous loss can be saved. The purpose of the "Save the Surface" campaign is to impress that fact upon the public.

Worth \$1,000,000 a Word

"Beginning in 1919 with a fund of \$100,000, the movement has expanded until now the annual appropriation is about \$200,000, derived from manufacturers, jobbers, dealers, master painters, contractors and salesmen in the paint, oil and varnish trades. Through advertisements in periodicals of national circulation and also in trade papers, the campaign slogan, "Save the surface and you save all—paint and varnish," has been made perhaps the best-known of all trade mottoes. Its value to the country is placed at more than \$1,000,000 a word."

Announcements and Publications

Underwriters' Laboratories Classify Protected Wood Construction—The use of metallic lath and gypsum plaster applied to ordinary wood construction, the engineers of the Underwriters' Laboratories have found to be fire protection sufficient to resist an unusually severe fire for periods greater than one hour. They have recorded the remarkably high rating of "one hour" upon floors and bearing partitions so constructed. The monumental report of the Underwriters' Laboratories recording the tests, findings and classification is memorable as extending over a long period of investigation and from being issued on the anniversary of the historic Chicago fire.

"Wire, Iron, Brass and Bronze Work, Window Guards and Railings." In a new catalogue, No. 67, the Fred J. Meyers Manufacturing Company, Hamilton, Ohio, show in classified illustrations, numbered and indexed, one of the most comprehensive exhibits of the manufactures indicated by the catalogue title quoted in this note. From name plates to steel flag poles, from fences to marquise, seemingly every imaginable line in wire, iron and bronze work is shown, forming a most valuable reference work for architects and builders.

"Lumber," by Ralph Clement Bryant, 6¾x9¼, 539 pp., illus. The subject matter is grouped under three main headings which cover lumber manufacturing equipment, lumber manufacture, and markets and marketing. The illustrations consist chiefly of catalog pictures of sawmill machinery and equipment. The book is intended primarily as a textbook on lumber manufacture, but there are many chapters of interest to users of lumber. Moreover, it is presumed that the up-to-date builder and architect desires to know some of the details of lumber manufacture in order that he may buy and use the material more intelligently. To such the book is a valuable addition to the literature of building. The chapter headings cover such subjects as log storage, sawmill equipment, saws, lumber handling and transfer equipment and methods, the sawmill power plant, labor, sawing, edging and trimming, seasoning lumber, remanufacture of lumber, products of the lumber industry, mill refuse and its disposal, fire prevention and insurance, lumber trade associations, lumber grades and inspection, transportation, domestic markets, foreign markets, tariff, etc. Published by John Wiley & Sons, Inc., New York City. Price \$4.50 net.

"Sheet-Metal Pattern Drafting and Shop Problems," by James S. Daugherty, 10½x8, 173 pp., 114 illus. The title of this book describes it very well. It is intended for a textbook for use in vocational schools, trade

schools and high schools. The problems are practical and easily adaptable to varying courses of instruction in sheet-metal work. The descriptions are clear and well graduated, step by step. The demonstrations are rendered clear by excellent illustrations, including photographic reproductions of models. Published by the Manual Arts Press, Peoria, Ill. Price \$2.50.

"The Designers of Our Buildings," by L. Copeland Cornford, 6x9, 85 pp., illus. The author was for several years secretary of the Royal Institute of British Architects, and the illustrations are fine reproductions of famous British architects. The book is a plea for the greater employment of architects, particularly in housing developments; and for recognition of architects and their work by the general public. The subjects treated in their order are as follows: Our buildings; their designers; the Royal Institute; consultative; competitions; advisory; town planning; the code of honor; educational; imperial and domestic organization; foundation and history; the Royal Institute and the public. The book is chiefly interesting to the building industry as a whole as evidence that architects in Great Britain of the most conservative type, as well as architects in this country, are at last condescending to seek publicity and public good will as a necessary feature of their profession—very few of them would yet say business. Published by the Royal Institute of British Architects, 9 Conduit Street, London W. I. Price 5s.

Architectural Drawing, by W. B. Field, assistant professor of engineering drawing, Ohio State University, with an introduction by Thomas E. French, professor of engineering drawing, Ohio State University; 161 pages, 9x12, 79 plates; price \$4. This is both a text book and a reference book. Artistically and mechanically it is beautifully done, from the gold stamped light-brown buckram binding, the exquisitely worked plates, the fine typography and the heavy unglazed paper. The author as a practicing architect and a teacher of drawing takes up the articles in the sequence in which the work naturally goes forward on the board, a logical way of presenting the subjects, as it gives the reader an orderly idea of the entire process. A suggested course of study has been added as a guide to the student. The work bears the imprint of the Maple Press, York, Pa. Published by McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York City, N. Y.

"Carpentry for Beginners," by William Fairham, 5¼x7¾, 217 pp., illus. This is one of the "Woodworker Series." The object of this particular volume is to assist

the ordinary "handy-man-about-the house," young men, apprentices and possibly journeymen carpenters in acquiring a knowledge of the principles of simple carpentry. Subjects covered include: Economical marking out; gauging and marking; saws and sawing; plans and planing; chisels and chiseling; boring and boring bits etc.—taking up and describing each operation in detail. Included also are many simple designs for household fixtures and furniture. The illustrations are all clear line drawings and the text readable and simple. Published by J. B. Lippincott Co., Philadelphia, Pa.; price \$1.50 net.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of National Builder, published monthly at Chicago, Ill., for October 1, 1922.

State of Illinois, County of Cook, ss.

Before me, a Notary Public, in and for the state and county aforesaid, personally appeared Geo. P. Miller, who, having been duly sworn according to law, deposes and says that he is the Manager of the National Builder, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Trade Press Publishing Corp.; Editors, N. C. Rockwood and A. H. McQuilkin; Managing Editor, N. C. Rockwood; Business Manager, Geo. P. Miller, all at 542 S. Dearborn St., Chicago, Ill.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) Trade Press Publishing Corp., individual stockholders: W. D. Callender, T. J. Sullivan, Geo. P. Miller, N. C. Rockwood, W. B. Mayor, D. R. Hicks, A. H. McQuilkin, H. P. Sessions, C. O. Nelson, all at 542 S. Dearborn St., Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) There are none.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustee, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is—(This information is required from daily publications only.)

(Signed) GEO. P. MILLER.

Sworn to and subscribed before me this 23rd day of September, 1922.

CHARLES O. NELSON, Notary Public.
(My commission expires April 6, 1926.)
Form 3526.—Ed. 1916.

FREE—This Book on Wood Finishing



This book is full of practical information on finishing new floors and trim and refinishing old work of this kind. Written by experts—profusely illustrated—contains color charts—gives covering capacities, etc. We will gladly send it free and postpaid to contractors and builders.

Fill Out and Mail this Coupon

**S. C. JOHNSON & SON,
Dept. N.B.11, Racine, Wis.**

Please send me, free and postpaid, your book on Wood Finishing.

Name.....

Address.....

City and State.....

I Buy Varnish from.....



Make Satisfied Customers and Get More Business

Every good job you do helps to get other jobs for you, besides holding your old customers. Quality workmanship and high class materials insure a perfect job. You furnish the quality workmanship and we will furnish the quality material. That combination makes your future success sure.

The use of Johnson's Artistic Wood Finishes insures satisfaction, both with the appearance and wearing quality of your work. The Johnson Line of interior finishes includes Perfectone Undercoat and Enamel—Wood Dye—Paste Wood Filler—Floor and Finishing Varnish—Prepared Wax—Permacote—Wall Finish—and everything necessary for floors, trim and walls.

JOHNSON'S

ARTISTIC INTERIOR FINISHES

JOHNSON

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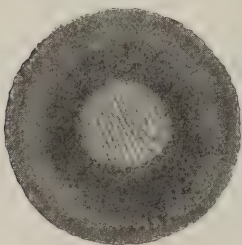
New Devices, Methods and Improvements in the Building Industry

High Speed Floor Polishing Machine

A floor waxing and polishing machine for the housewife and general purposes is the sequence or corollary of the floor scraping machines put on the market by the American Floor Surfacing Machine Company, Toledo, Ohio. The new machine operates like a vacuum cleaner and is adapted to other work besides waxing and polish-



High speed floor polisher that works as easily as a vacuum cleaner

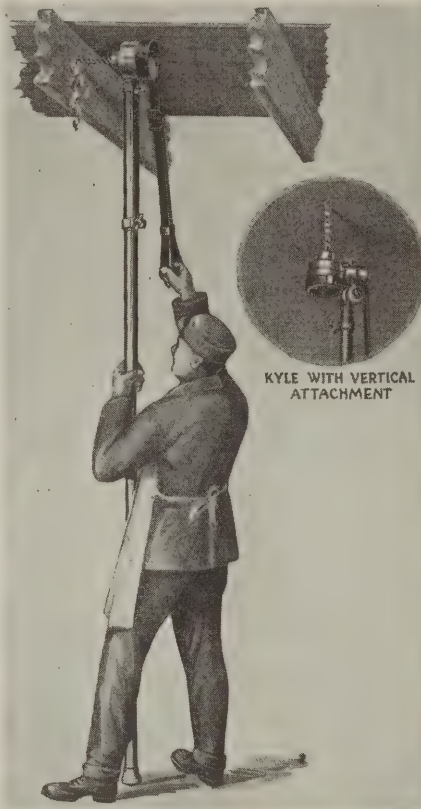


Brush for waxing and polishing. There are two other brushes for scrubbing and cleaning

ing hardwood floors; it can be used for scrubbing wood, linoleum, brick, tile, cork, rubber and composition floors, the various brushes being quickly changeable. The machine is driven with a $\frac{1}{2}$ hp. electric motor, full ball-bearing and weighs 35 lb. Rubber bumper guards prevent scratching and abrasions.

Improved Boring Machine

AN IMPROVED boring machine which will bore at any angle, and with telescopic extensions adjustable from $4\frac{1}{2}$ to



Kyle boring device

$13\frac{1}{2}$ ft., has been placed on the market by the HyKon Manufacturing Co., Alliance, Ohio, with the trade name of the "Kyle boring device." A strap of special material and construction operates the boring mechanism, the rewinding being done by a ratchet-controlled spring in the steel head. A stirrup foot rest is fastened on the base on the smallest stock, to steady the machine. After the bit has started to cut the operator may use both hands in pulling the strap. Great speed and accuracy in performing its work is certified to by numerous testimonials from users.

Miami Fordson Trailer

UNUSUAL features characterize a new special trailer for Fordson trucks announced by the Miami Trailer Company, Troy, Ohio. It is all steel construction, except wheels and tires, and has a rounded load capacity of 2 yards. Provision is made for mounting a separate flared top box of $\frac{1}{2}$ -yard or 1 yard extra capacity for materials of a total load of $2\frac{1}{2}$ tons but of greater volume than 2 cubic yards, the

(Continued on page 84)

carrying capacity being $2\frac{1}{2}$ tons with ample factor of safety. The body is of 10 gauge steel reinforced with heavy angle arms. It is designed with a rear bottom dump door. The size of the opening can be controlled so that the entire load may be dumped in one spot or spread 60 yards wide to any depth desired. The load is balanced on the axle, sufficient weight being placed on the drawbar to prevent wear in the hitch connections. A special automatic hitch bolts on to the rear housing of the tractor. The tractor is backed to the end of the trailer drawbar and the coupling is completed with-



Miami Trailer

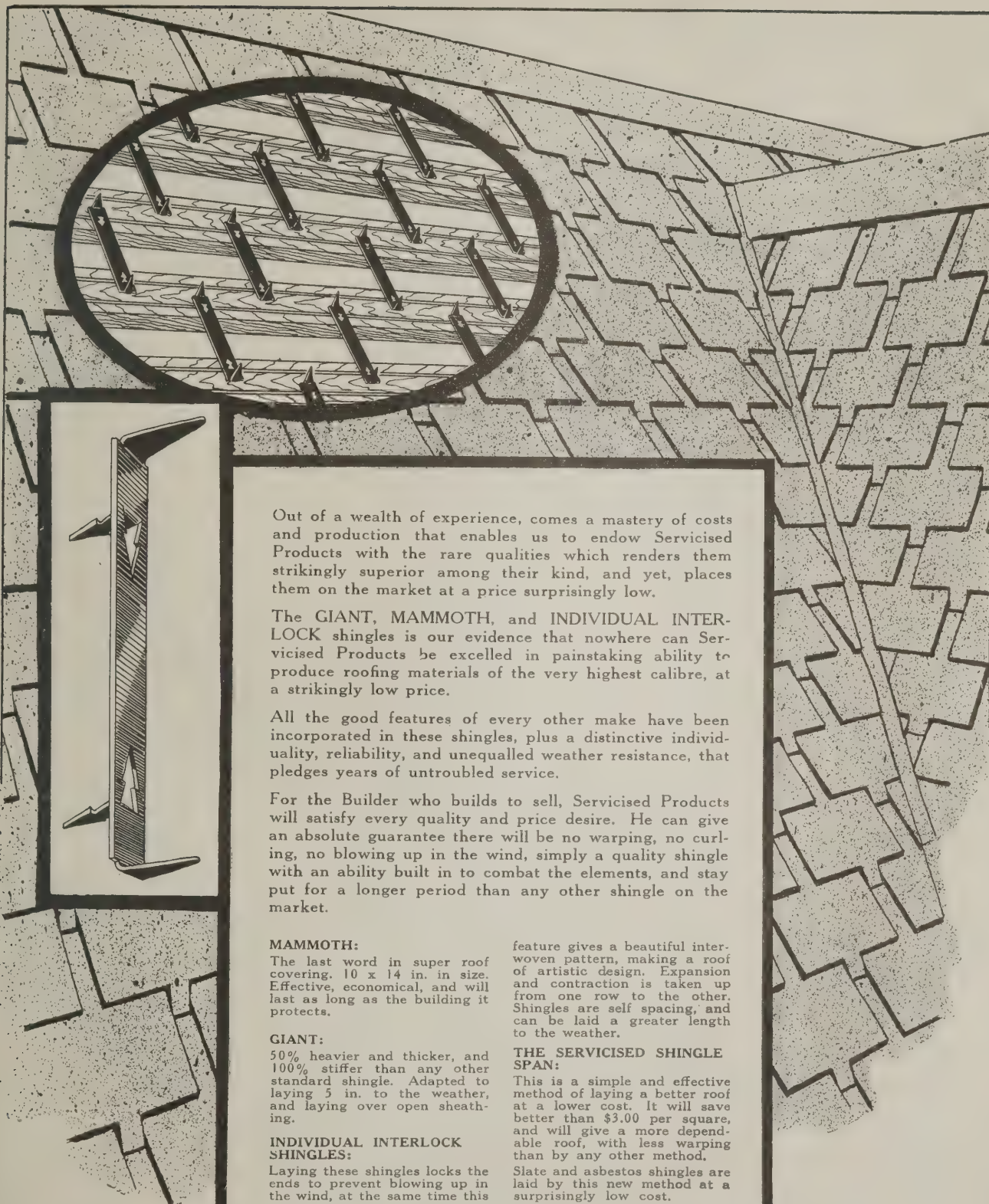
out pins or cottar keys. A slight upward pull on the drawbar disconnects the trailer from the tractor. Both releases and winding levers of the trailer are at the right hand of the driver. There is no stopping necessary, therefore, to dump or spread the load or to rewind the dumping door. The turning radius is that of the tractor. It can be backed into any position or turned around on the sub-base of a road, an important feature in working in close quarters. It is claimed that the Miami Fordson trailer can easily transport as much material in a 10 hour day as three men and three teams.

A Roofing Bracket

ASIMPLE and effective roofing bracket has been placed on the market by D. P. Kurtz Co., Elkhart, Ind. As the illustration



Kurtz roofing bracket



Out of a wealth of experience, comes a mastery of costs and production that enables us to endow Servicised Products with the rare qualities which renders them strikingly superior among their kind, and yet, places them on the market at a price surprisingly low.

The GIANT, MAMMOTH, and INDIVIDUAL INTER-LOCK shingles is our evidence that nowhere can Servicised Products be excelled in painstaking ability to produce roofing materials of the very highest calibre, at a strikingly low price.

All the good features of every other make have been incorporated in these shingles, plus a distinctive individuality, reliability, and unequalled weather resistance, that pledges years of untroubled service.

For the Builder who builds to sell, Servicised Products will satisfy every quality and price desire. He can give an absolute guarantee there will be no warping, no curling, no blowing up in the wind, simply a quality shingle with an ability built in to combat the elements, and stay put for a longer period than any other shingle on the market.

MAMMOTH:
The last word in super roof covering. 10 x 14 in. in size. Effective, economical, and will last as long as the building it protects.

GIANT:
50% heavier and thicker, and 100% stiffer than any other standard shingle. Adapted to laying 5 in. to the weather, and laying over open sheathing.

INDIVIDUAL INTERLOCK SHINGLES:
Laying these shingles locks the ends to prevent blowing up in the wind, at the same time this

feature gives a beautiful interwoven pattern, making a roof of artistic design. Expansion and contraction is taken up from one row to the other. Shingles are self spacing, and can be laid a greater length to the weather.

THE SERVICISED SHINGLE SPAN:
This is a simple and effective method of laying a better roof at a lower cost. It will save better than \$3.00 per square, and will give a more dependable roof, with less warping than by any other method. Slate and asbestos shingles are laid by this new method at a surprisingly low cost.

SERVICISED

First Nat. Bank Bldg.



PRODUCTS ©

Chicago, Illinois

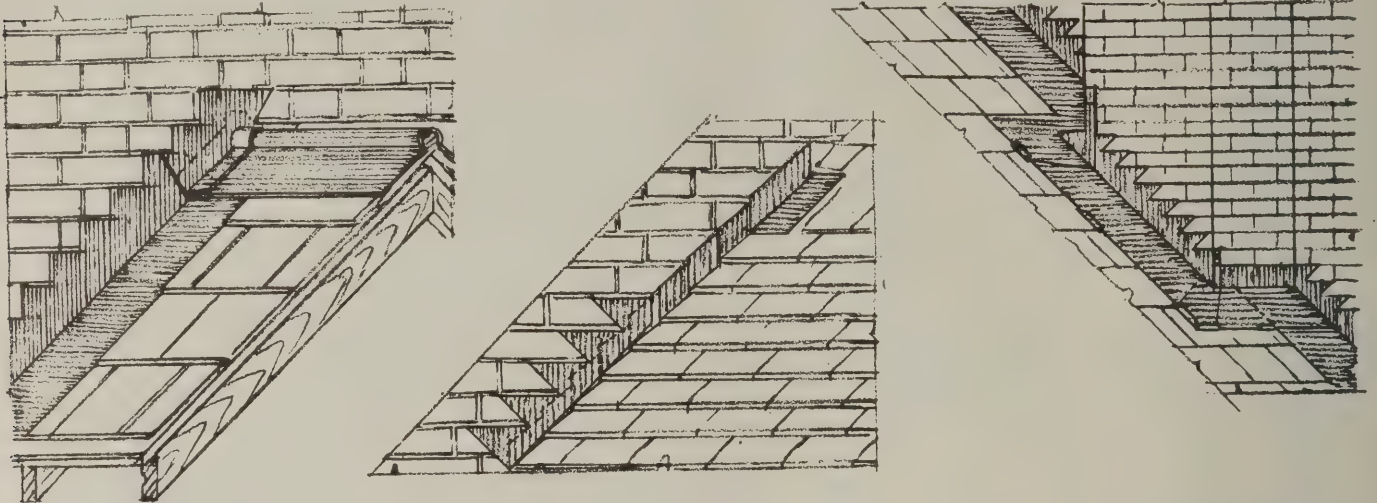
When writing advertisers please mention National Builder

tion shows, its construction consists of heavy bent strap-iron with a nailhole for fastening to the roof. These straps with a piece of two-by-four in the loops makes the bracket. The device has been used with success locally for many years.

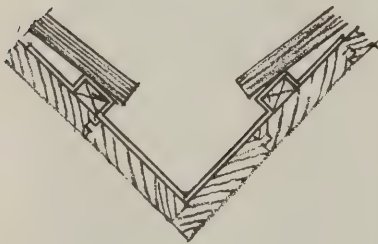
Lead in Building Construction

NEARLY every one is familiar with the uses of iron, steel, zinc and copper in building construction, particularly in the

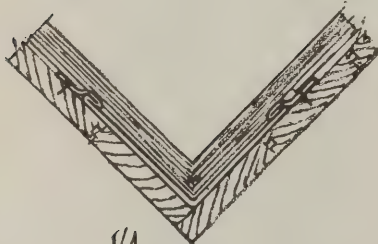
last year or so when much publicity has been given to the possibilities of using such materials as zinc and copper for shingles or roofing tile. These two metals are universally recognized as being much less subject to corrosion than iron and steel,



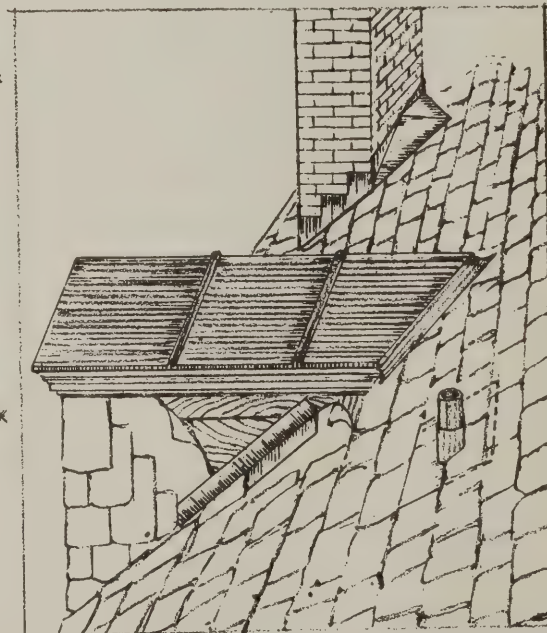
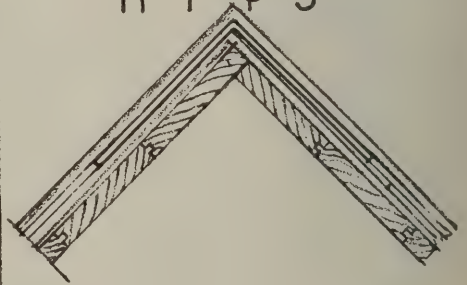
TYPES OF HOYT HARDLEAD FLASHING



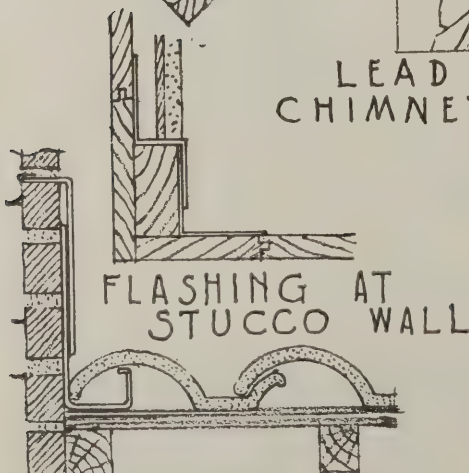
VALLEYS



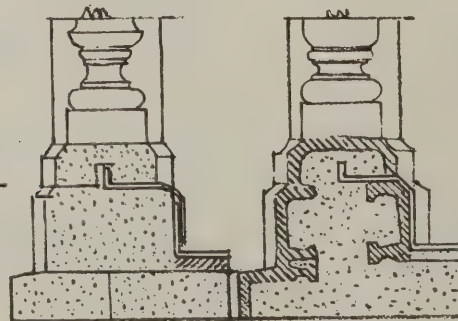
HIPS



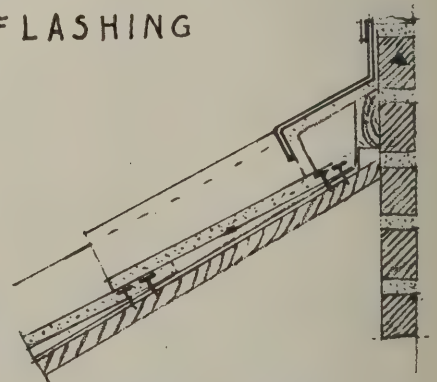
LEAD ROOFED DORMER
CHIMNEY, DORMER, & VENT, FLASHING



FLASHING AT
STUCCO WALL



STONE T.C.
BALUSTRADES



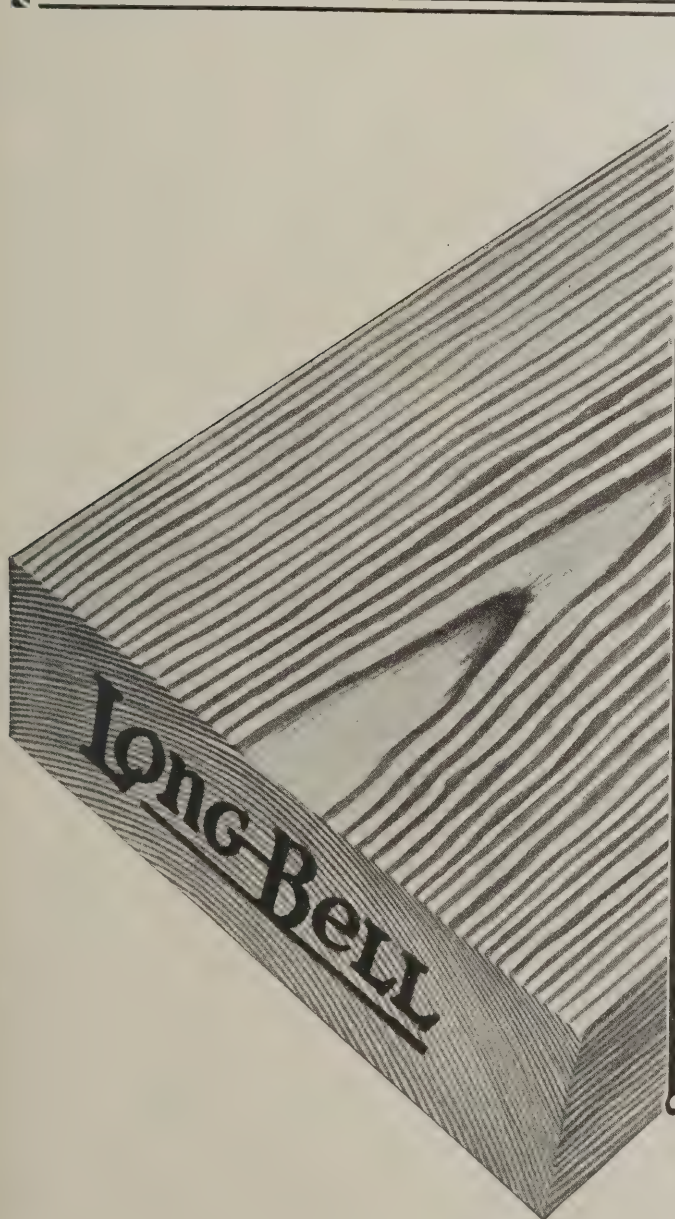
TILE ROOF
FLASHING

TILE ROOF
FLASHING

(Continued on page 86)

Long-Bell

Trade Marked L U M B E R



"Know the Lumber You Buy"

It is a commonly accepted truth that trade-marks are *guides* to good merchandise. The reason is obvious. A manufacturer could not afford to put his name upon an article that did not stand up to the claims he made for it.

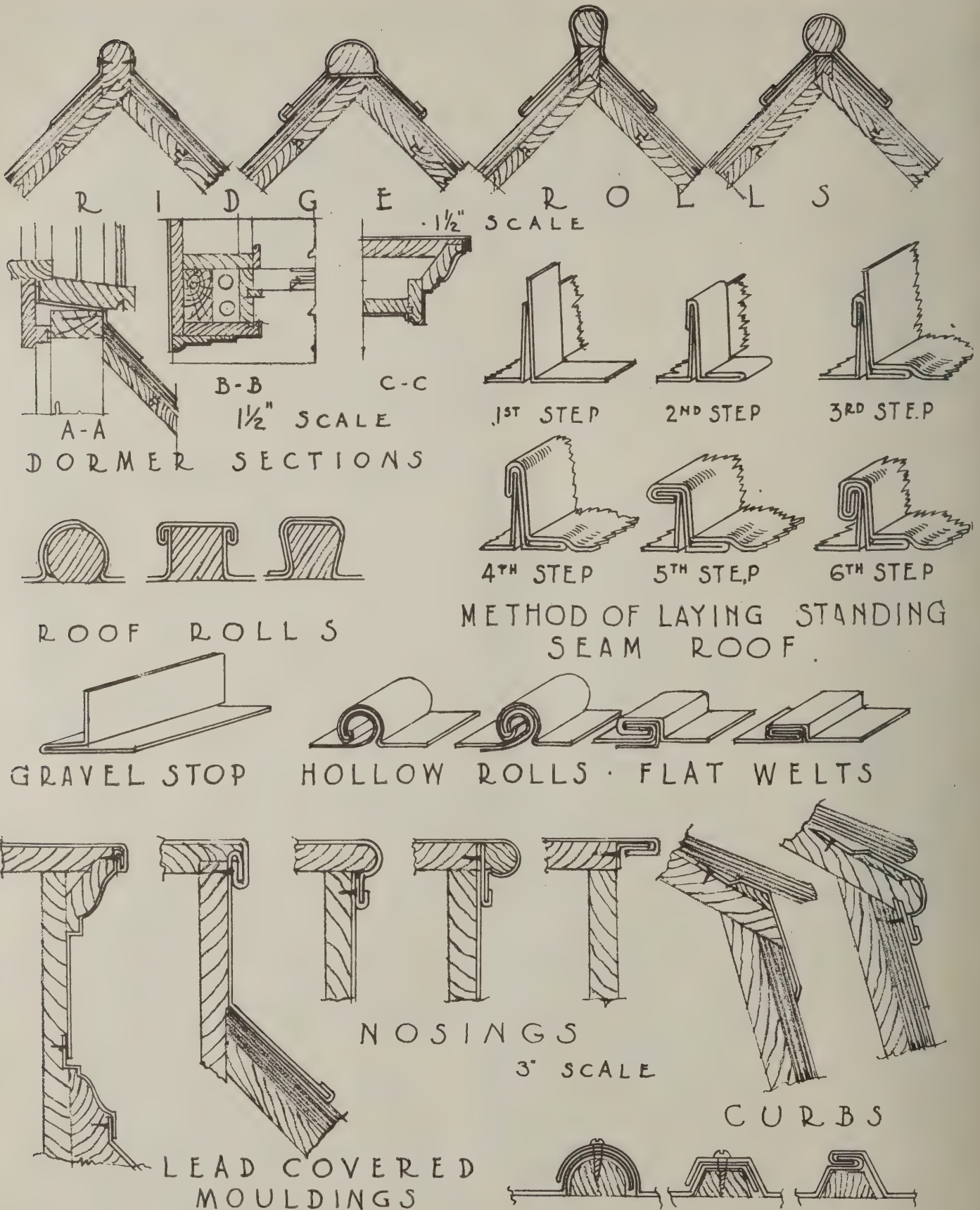
The Long-Bell Lumber Company takes unusual pains to produce lumber, timbers and lumber products that will maintain a reputation for uniform high quality. It is therefore proud to put its name upon them.

You should know the lumber you buy—and the Long-Bell trade-mark provides the way.

Ask Your Lumberman for Long-Bell
Trade-Marked Lumber

The Long-Bell Lumber Company
B. A. LONG BUILDING Lumbermen since 1875 KANSAS CITY, MO.

Southern Pine Lumber and Timbers; Creosoted Lumber, Timbers, Posts, Poles, Ties, Piling and Wood Blocks; California White Pine Lumber, Sash and Doors, Standardized Woodwork; Southern Hardwoods, Oak Flooring



and are used as coatings for iron and steel as well as in pure metal sheets and shapes. Galvanized steel is merely zinc-coated steel.

Another metal said to have been used at least 7000 years ago for building purposes is lead, which is also one of the most dur-

able of all metals. To compete with zinc and copper for various building purposes the United Lead Co., New York City, has placed on the market a hardened lead known under the trade name of "Hoyt Hardlead." Some of the claims made by

the manufacturer for this material are as follows:

"It is rust proof, galvanic proof and acid-resisting.

"The color is permanent. The expense of painting or other treatment for preser-

(Continued on page 88)

FUEL COSTS CUT

In the Face of an Imminent Coal Shortage

**Average Consumption to
Be Much Lower**

The threatening aspect of a general coal shortage brings the announcement that—

Public Buildings — Schools — Hospitals—and Residences in all parts of this country and Canada will meet the problem of getting more heat from less coal by supplementing their otherwise sound building construction with a time proven fuel saver—the weatherstrip.

A history of the development will demonstrate the wisdom of this method of construction.

DATES FAR BACK

The memory of this generation can recall, no doubt, grandmother's early efforts to combat the nuisance of drafts with rags—papers and what-not. Her admonitions—"You'll catch your death of cold over at that window" and, "Come away from that door" were well meant but it remained to the inventor of the wood and felt door strip to give at least temporary relief. Soon these crude forerunners of the modern weatherstrip became worn and frayed, often outliving their usefulness in less than a single winter season. Frequent replacements, unsightly appearance and short lived usefulness brought into being the metal weatherstrip. Kansas was well pleased with this brain child of a native son, but more general adaptation brought to light some disagreeable facts in the service to be had with this Kansas metal weatherstrip. It seems there was no allowance made for shrinking—swelling or warping of the window frame—nor could the strip be easily removed for repairing the windows—sash cord, etc.

LIKE ALL GOOD STORIES

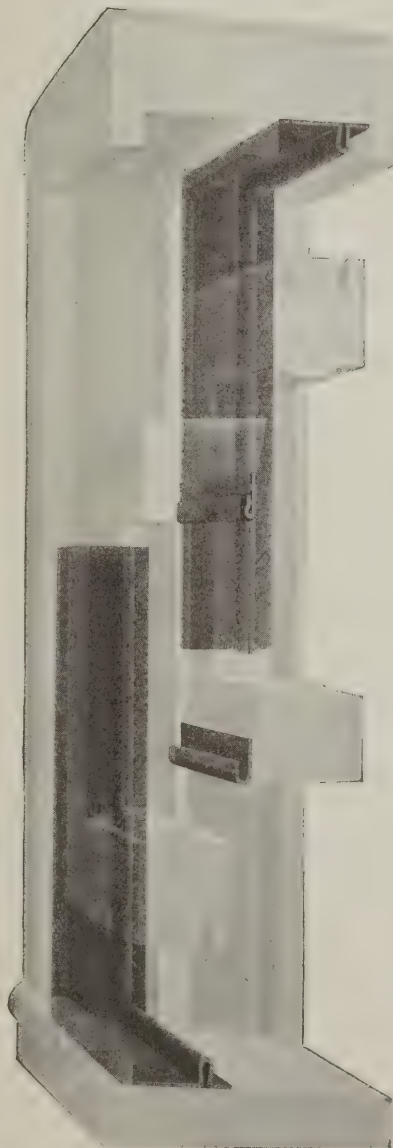
Ours has a happy conclusion in the development of the DIAMOND FLEXIBLE METAL WEATHER-STRIP so constructed that it will slide easily—allow for shrinking, warping, swelling, and at the same time allows quick removal for repairs without damage to sash, frame or strip.

Strongly constructed of pure commercial zinc, it is rust-proof and durable.

It has been estimated that a saving in general of from 20 to 40% of the fuel costs will be affected by the installation of DIAMOND FLEXIBLE METAL WEATHERSTRIPS.

Carpenters and Builders Profit

**BETTER HEALTH
IS ASSURED**



The above illustration is a phantom view of a window equipped with DIAMOND FLEXIBLE METAL WEATHERSTRIP.

By eliminating drafts, soot, dirt and rain, this device performs the double service of conserving heat and preserving the general health of the building owners so equipped.

**General Adoption of
Diamond Flexible
Metal Weatherstrip**

BRINGS GOOD NEWS

**Alike to Home Owner,
Carpenter and Builder**

The fact that the building owner who installs a complete equipment of

**Diamond Flexible
Metal Weatherstrip**

is prepared to keep on saving from 20 to 40% of his fuel bills long after he has saved the original installation cost and the fact that that first cost is last and is low makes a leader of—

**Practical Metal Weatherstripping
The DIAMOND Way**

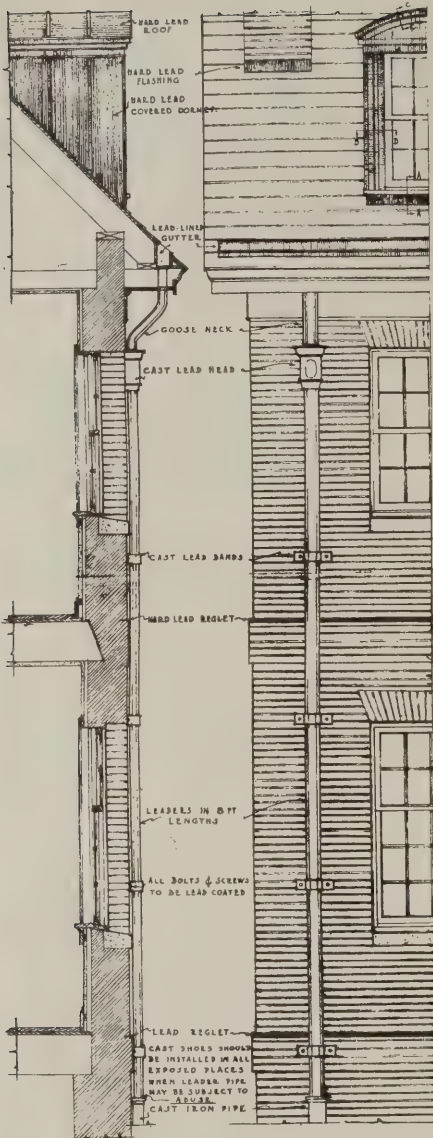
There is still some very desirable territory open for real go-getters. There are also some mighty good profits to be made in these territories. The pressing need for quick action in installing the strips makes it imperative that you get in touch with us as soon as possible.

If we have no agency in your vicinity we want you to represent us.

DIAMOND
Metal Weatherstrip Co.

**632 Kerr Street
COLUMBUS, OHIO**

When writing advertisers please mention National Builder



vation or artistic purpose is unnecessary. Exposure to air leaves it a soft gray, harmonizing beautifully with the finish of the building.

"It will outlast the building. There is only one labor cost—the first. When necessary to renew installations, all other metals have labor costs for taking down the old and putting up the new material.

"Repeated freezing will not rupture seams. No possibility of staining painted woodwork, marble walls, terra cotta or other expensive building material.

"Roofs properly installed with 'Hoyt Hardlead' sheets are water-tight and permanent, consequently no danger to building contents and decorations from leaky roofs.

"It always has a salvage value, equal to market price of scrap lead.

"The expansion and contraction are exceedingly small. It has a high tensile strength and five times the elastic limit of soft lead.

"Sheet metal workers will find its easy working qualities a decided advantage.

"'Hoyt Hardlead' sheets are so pliable

that they can be shaped on the edge of a straight piece of wood, or by hand if necessary.

"The sheets can be furnished in extra large sizes, reducing labor cost at time of application.

"It is superior for flashings, valleys, ridges, chimneys, dormer windows, gravel stops, cupola domes. These are costly and difficult parts to renew.

"Heads and bands are solid castings, completely finished to size, so there is no labor expense to the sheet metal worker in making up these products."

Pressed Roofing Plates

The newest hard lead product put on the market is pressed roofing.

This product has been tested on the manufacturer's own buildings at Perth Amboy, N. J., where the air is probably as bad as any place in the United States. There is salt air from the Atlantic ocean and acid fumes from such concerns as National Lead Co., Barber Asphalt Co., Standard Oil Co., New Jersey Zinc Co., American Smelting & Refining Co., all of whom have refining, smelting or corroding plants using acids, the fumes of which are continuously in the air. The Hoyt hardlead pressed roofing is claimed to have stood up under these conditions with perfect satisfaction. It has gone through the greatest heat of the summer and below zero weather of winter; recent examination showed no evidence of expansion or contraction and the sheets and clips were in perfect condition; severe wind storms have not had any effect, according to the claims made by the manufacturer.

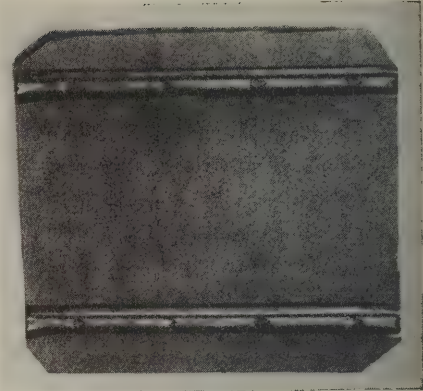
Hoyt hardlead pressed roofing is made of sheets 1/32 in. thick, in sheets laying 24x24 in. to the weather. Each sheet contains nine shingles, 8 in. on center. It is applied directly to the roof slope without any mechanical preparation. The sheets are laid diagonally on the slopes and secured by Hoyt hardlead reinforced clips at the upper edges, leaving free movement for expansion and contraction in each sheet installed. Each sheet interlocks with the adjoining ones and forms a complete waterproof joint. No soldering is necessary. Starting sheets are provided with lip over eaves board.

The price of these lead shingles is around 70c. per sq. ft., or \$70 per square.

"Plastuc" Lath

A PATENTED lathing material with the trade name of "Plastuc," manufactured by the Plastuc Products Co., Inc., 642 West 14th Street, New York City, N. Y., is a combination of wool felt, fiber-board, bituminous waterproofing, and steel. It comes in rolls of 25 yards, weighing 75 lb. Its first cost is no greater than ordinary lath, it is said, and it is claimed to be crack

(Continued on page 90)



Section of Plastuc lath

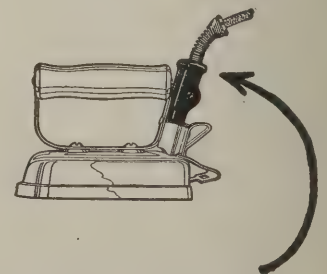
proof, damp proof, vermin proof, fire retarding, everlasting and easy to erect. Its use for more than 10 years is declared to have never disclosed an unsatisfactorily finished job.

Improved Switch Plug

A SWITCH plug in which the improvements consist of a construction which enables separate contact shoes to adjust themselves to any curved or flat surface of the appliance terminal; a flexible spring between the cord bushing and the plug; an

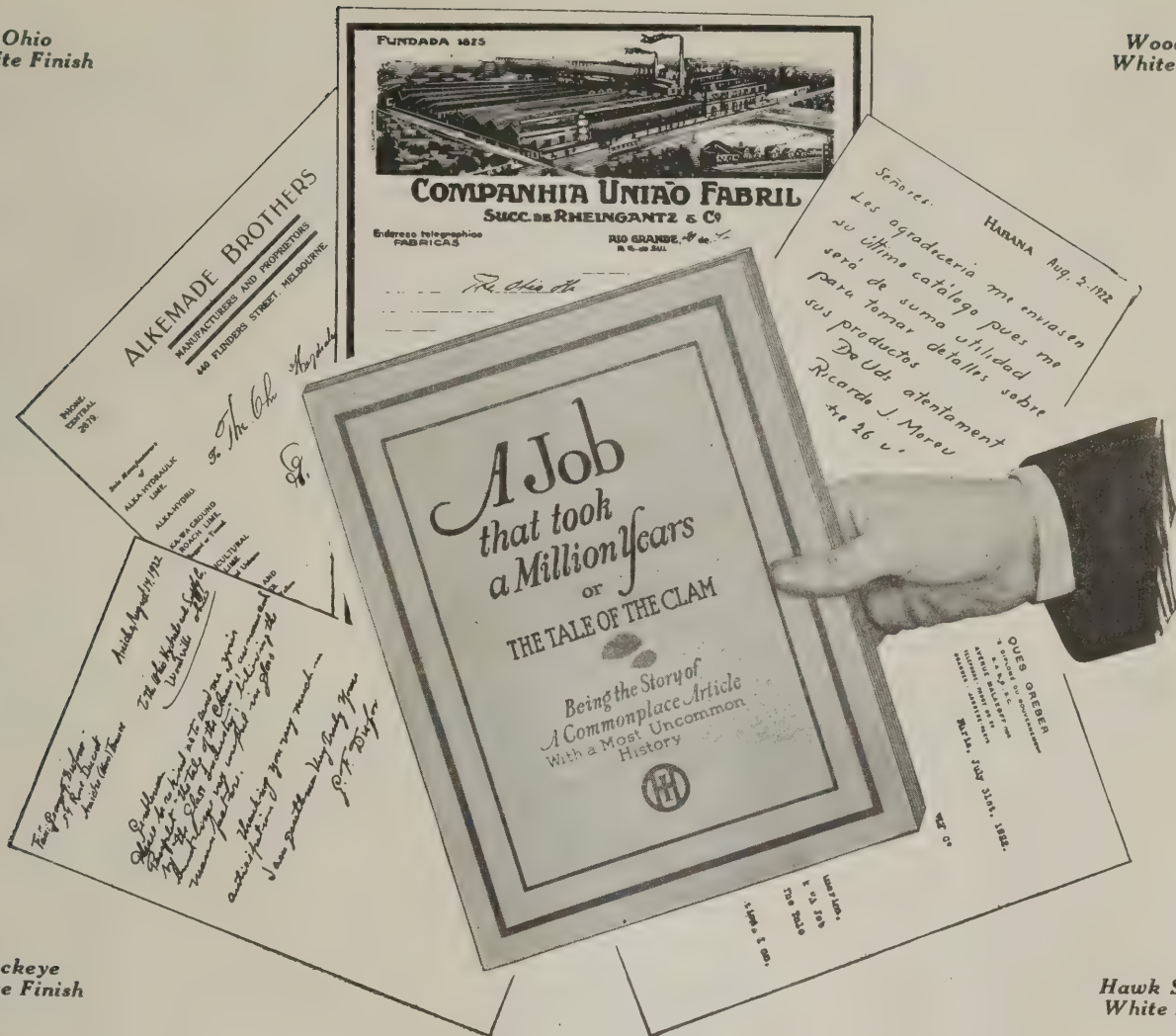


"Gripall" switch plug



Showing application

"on" and "off" switch indicated by red and black buttons and by lettering on the casing. Figs. 1 and 2 indicate the improve-

Ohio
White FinishWoodville
White FinishBuckeye
White FinishHawk Spread
White Finish

What Architects and Contractors Say

Architects and Contractors in Australia, Cuba, France, Brazil, Canada and every part of this country have requested copies of the booklet pictured above, "A Job That Took a Million Years or the Tale of the Clam."

After reading it they have pronounced it the most interesting and practical story of Hydrated Finishing Lime ever told.

You'll say the same. Write today for your copy.

The Ohio Hydrate & Supply Co.

WOODVILLE, OHIO

"The Lime Center of the World"

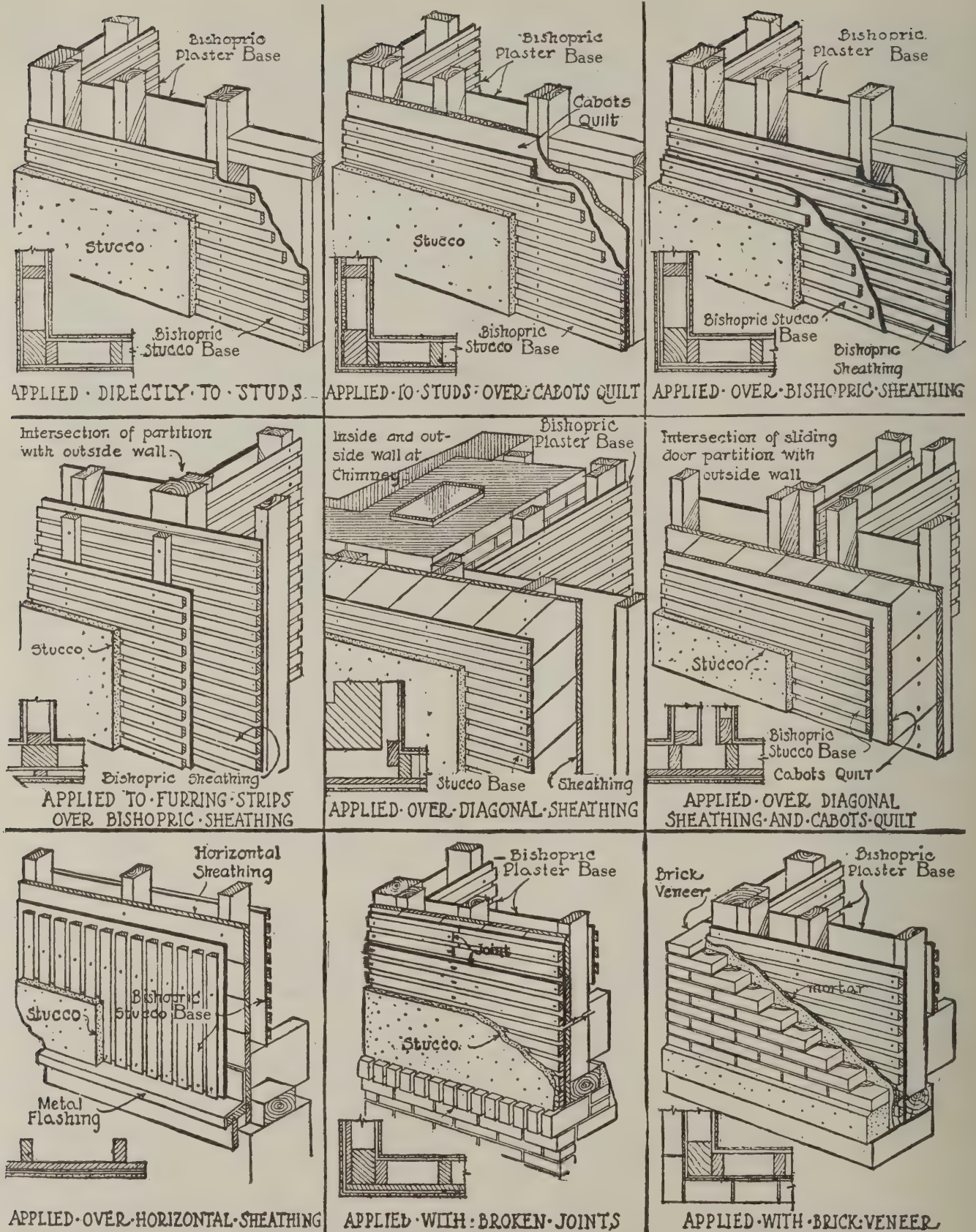


Fig. 1—Bishopric board as a stucco base

ments and application. Demonstration sets of these "Gripall" plugs will be supplied on request by the Beaver Machine and Tool Company, 50 Church street, New York City, N. Y.

A Versatile Building Material

WHILE by no means a new material, or commodity, the patent lathing and

(Continued on page 92)

sheathing known as "Bishopric," is constantly being put to new uses. The following summary of its uses probably describes at least one application that the average contractor and builder is ignorant of.

American Universal Floor Surfacing

THE BIG PROFIT SYSTEM

The American Universal Floor Surfacing Machine is the best money maker the contractor can own. It is practically "fool proof" and can be operated by any man of ordinary ability and do only the best grade of work, for its operation is automatic. When your building is about ready to turn over to the owner, it does the last big job, the floors, when every one is anxious, quickly and perfectly, leaving every one feeling satisfied. One man and one American Universal does the work of six men and does it perfectly.

Old Floors Made Like New—New Floors Made Perfect

Contractors owning American Floor Surfacing Machines keep them going all the time at big profits on old floors when they are not needed on the new work—this is an excellent source of profits. Often, too, floor surfacing contracts are taken on other jobs. Just read what users say about the labor-saving, money-making ability of the American Universal. Hundreds of others have gone into the floor surfacing business and are independently well fixed.

1 Man—Big Profit



Saves Labor of Six Men and Does Better Work

We can surface more floor with our "American Universal" machine than six men can scrape by hand, considering the quality of the work.

Schneider & Hein, Nebr.

Would Not Go Back to Old Way

The "American Universal" is a great labor saver, doing the work of about eight men so naturally I would never consider going back to hand scraping again.

M. R. Warner, Colo.

Surfaces 1,500 Square Feet Per Day

The "American Universal" does all you claim, for it has surfaced 1,500 square feet of flooring per day for me and is doing the work of six men.

L. F. Walla, Va.

Customers Satisfied—Business Increases

The "American Universal" has replaced five men at least on my payroll, does better work than before, and so as my customers are so well pleased, I have found my business increasing right along.

A. G. Thompson, Ark.

Replaces 10 Men

The "American Universal" replaces 10 men on my payroll, and surely does excellent work.

I. O. Fetter, Pa.

Saves Six Men

The "American Universal" replaces six men on my payroll and I find it to be a great labor saver.

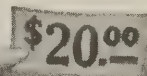
E. A. Bittner, Pa.

Afraid to Go Back to Hand Work

Since the "American Universal" has proven such a great labor saver, would not dare to go back to the old method of hand scraping.

C. E. Andrews, Pa.

6 Men—Small Profit



Machine Does Better Work Than Hand Scraping

The "American Universal" has replaced five men on my payroll, and I can do a better quality of work with my machine than by hand scraping.

L. L. Howard, Kans.

Quality of Work Only Advertisement Necessary to Secure More Work

I want to tell you that the "American Universal" is some labor saver—it replaces at least five men on my payroll, and the quality of work it turns out is all the advertisement I need for my business.

Hugh A. Cox, Fla.

Light and Easy to Handle

In the first place the "American Universal" machine is light and easy to handle and does lots more work than the other sander of a different make which I have.

Kroffganz & Frank, Mont.

No Kicks—Replaces Six Men

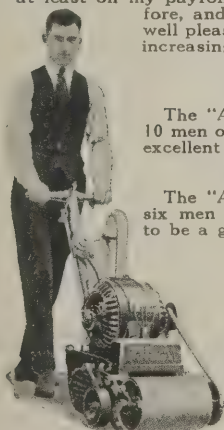
Want to tell you that I've never had a kick about unsatisfactory work from any of my customers ever since I bought the "American Universal" and it replaces six men on my payroll, too.

A. F. Grow Bros., Nebr.

Saves 10 Men

Your "American Universal" floor surfacing machine is a labor saver. It will do the work of 10 men in one and in much better shape.

M. B. Battien, S. D.



THE AMERICAN FLOOR SURFACING MACHINE COMPANY

519 South St. Clair Street

Originators of Floor Surfacing Machines

Toledo, Ohio

The American Floor Surfacing Machine Co.

519 So. St. Clair St., Toledo, Ohio.

Gentlemen: Please send me without obligation to me complete information and literature on your proposition. The following information will no doubt assist you in advising me:

() I want to become a Floor Surfacing Contractor.

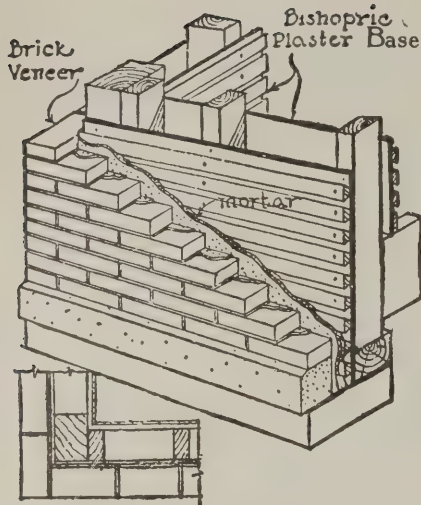
() I am not now a contractor of any kind, but was in the following business.....

() I am a Building Contractor and want to use it on my own contracts.

Name..... Street.....

City..... State.....

When writing advertisers please mention National Builder



APPLIED WITH BRICK VENEER

Fig. 2

Bishopric is a tradename for a special kind of wood lath mounted on fibre board that has been treated with an asphalt mastic,

so that this backing is pliable, but practically moisture- and wind-proof. It obviously serves the purpose of both lath and building paper, but is shipped and applied in rolls like paper. For stucco and plaster base, the lath has a special wedge shape to form a key for the mortar. For ordinary sheathing the wood strips or lath are of rectangular cross-section.

For Stucco Base—The most familiar use of Bishopric is as a stucco base, but there is a variety of methods of using it for this one purpose, as the accompanying Fig. 1 shows.

Backings for Brick Veneer—In the usual brick veneer wall construction there is merely a thickness of building paper and a small air space between the brick and the sheathing, the brick being tied to the sheathed wall by small metal clips between courses of brick and nailed to the wall. By using Bishopric as shown in Fig. 2 as a sheathing material and applying a plaster coat of mortar, the brick may be bonded into the wall itself.

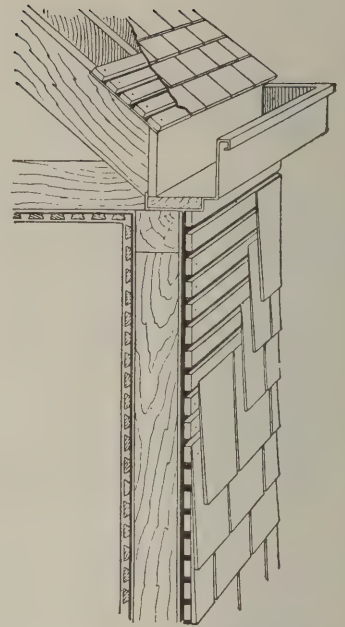
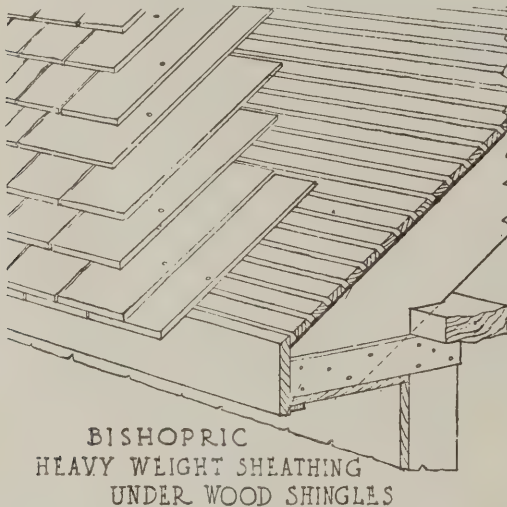


Fig. 3—Bishopric sheathing used under shingles on side walls



NOTE:—Shingles either wood or asphalt composition shingles should be stepped when laid so that strips can readily be seen.

NOTE:—In laying shingles work from center of roof towards end.

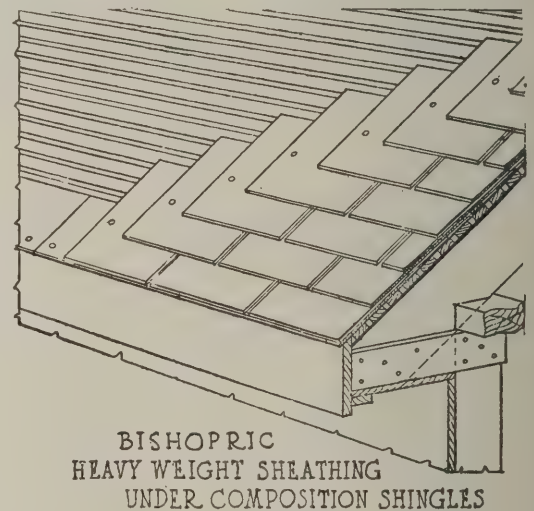


Fig. 4

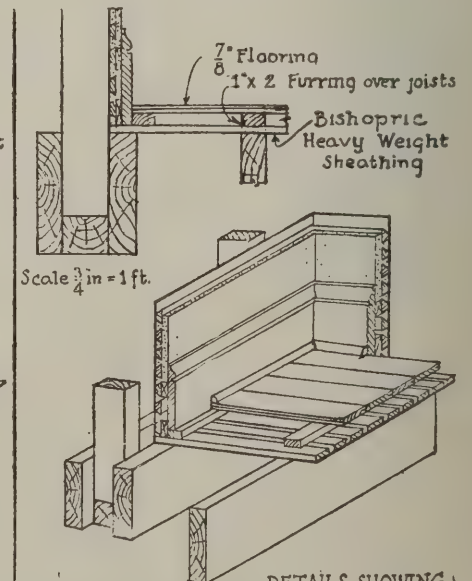
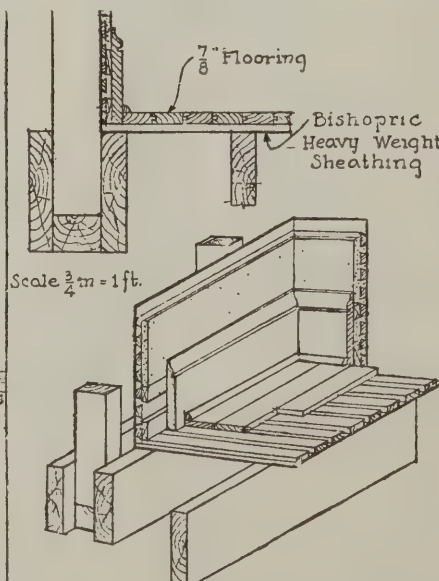
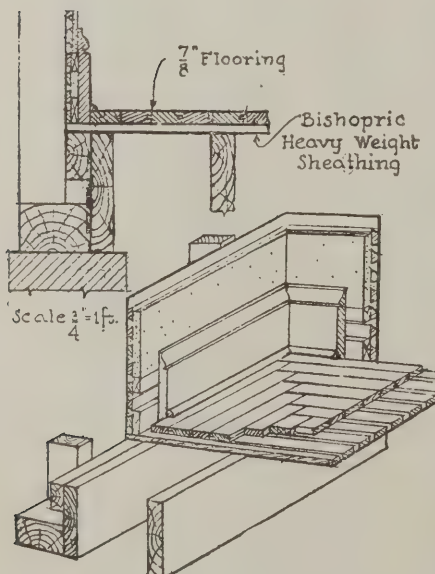


Fig. 5

(Continued on page 94)

Know More—Earn More

Plain Facts for Men in the Building Trades

Never in the history of this country have men in the building trades had the opportunities that are offered today. Building is on the boom. Able men are needed on work already started and on work for which the plans are ready.

There is big money ready for men who can read plans, make estimates and superintend construction—and this is where the ambitious man who will train as an expert will find his chance.

As a workman, a man draws pay for what he can do with his hands. As a foreman or superintendent he gets paid for what he knows. And the contractor taking small jobs who gets posted on the higher branches of building can take on the big propositions which pay the highest profits.

Some men have reached the big money class only after years spent in picking up information as they went along. This is the slow way to success and comparatively few men get very far by depending upon their experience and hard work alone. The man who trains under experts and gets the benefit of their knowledge saves years of waiting—he gets quickly to the front.

There, for instance, is a man in Oklahoma. His name is Woodside. He worked for years just as thousands of other carpenters are working, taking a job here and a job there, making a journeyman's wages and no more. He did the sawing and nailing and joining while other men did the planning and directing and made the real money.

Fortunately for Woodside he saw an advertisement of the Chicago Technical College which offered to train him by mail in his spare time to do the very things which these successful men were doing. He wrote for the catalog, got information about the Builder's Course and enrolled. Read what he says:

"I was working as a carpenter receiving \$6.00 per day when I took up the course. In less than three months I got a job as foreman on a big apartment building at \$8.00 a day. Five months later I was superintending a reinforced concrete job covering nearly half a block. I am now in business for myself specializing in theater construction."

And there is A. C. McEvoy of Chicago, who says: "I have been greatly benefited by taking your Builder's Course. I have received five times as much money as I paid to take the course, to say nothing of the material good that I derived from it. My advancement has been from an ordinary bricklayer on the wall to foreman-in-charge where a knowledge of plan reading is very es-

The man who can work best with his head is the man who gets the big pay job or makes the largest profits in business. The world pays more for brains than it does for muscle.

sential."

Another man with Chicago "Tech" training is S. J. Dickerson of Rhode Island, who says: "When I started your Builder's Course I was making \$50 a month on the average. Now making \$150 a week."

These are only three examples of what this training has done for ambitious men who say that "the big pay goes to the man who knows" and who put in some of their spare time to get the instruction of the Chicago "Tech" experts.

Let America's Oldest and Largest School for Builders Give You the Training That Means Greater Success and More Money

Hundreds of men in the building trades attend our Chicago school. For 20 years we have been training ambitious men who are now foremen, superintendents and independent contractors, making big money while other men who started with just as good chances as they had are still at the bench. You can get this same training at home in your spare hours for we teach the same courses by mail and you get the supervision of the same experts. No special, previous education required to take up this course. Send the coupon below and get the catalog with full information about our courses and about our small fees and easy terms of payments.

Get This Training in Your Spare Time

The hours that you have outside of your work time can be used to make you a building expert—the man who can "boss" a job and draw a real salary or handle money-making contracts.

Learn to read blue prints as easily as you read these words. Learn to make

estimates on time and material for all classes of construction—brick, frame, concrete. Get posted from the ground up on the direction of work—uses and preparation of material, handling help, getting the work done.

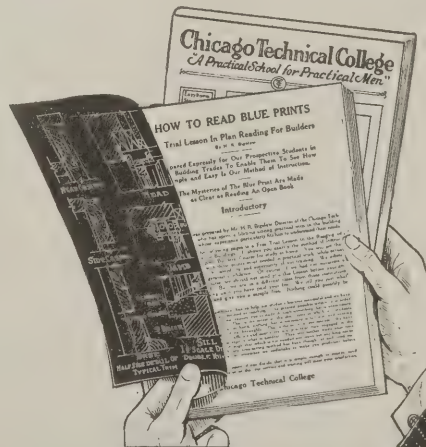
Have every branch of building at your fingers' ends. Then you can step ahead—get the pay your ability is worth.

FREE 2 Books and Blue Prints

Your request brings our two books, one on "How to Read Blue Prints" containing a lesson in Plan Reading with which we send blue prints, drawings, etc. With this lesson you can test yourself and see how easily you can learn by our method before you decide about enrolling. The other explains the Chicago "Tech" Method of training by mail.

Send the Coupon

Get these free Books and Blue Prints and find out how Chicago "Tech" training will put you ahead. Just sign your name on the coupon and mail it today to **Chicago Technical College, 1137 Chicago Technical Bldg., Chicago.**



CHICAGO TECHNICAL COLLEGE
1137 Chicago Tech Bldg., Chicago, Ill.

Please send me your Free Books and Blue Prints for men in the Building Trades. Send post paid to my address below.

Name.....

Address.....

Post Office..... State.....

Occupation.....

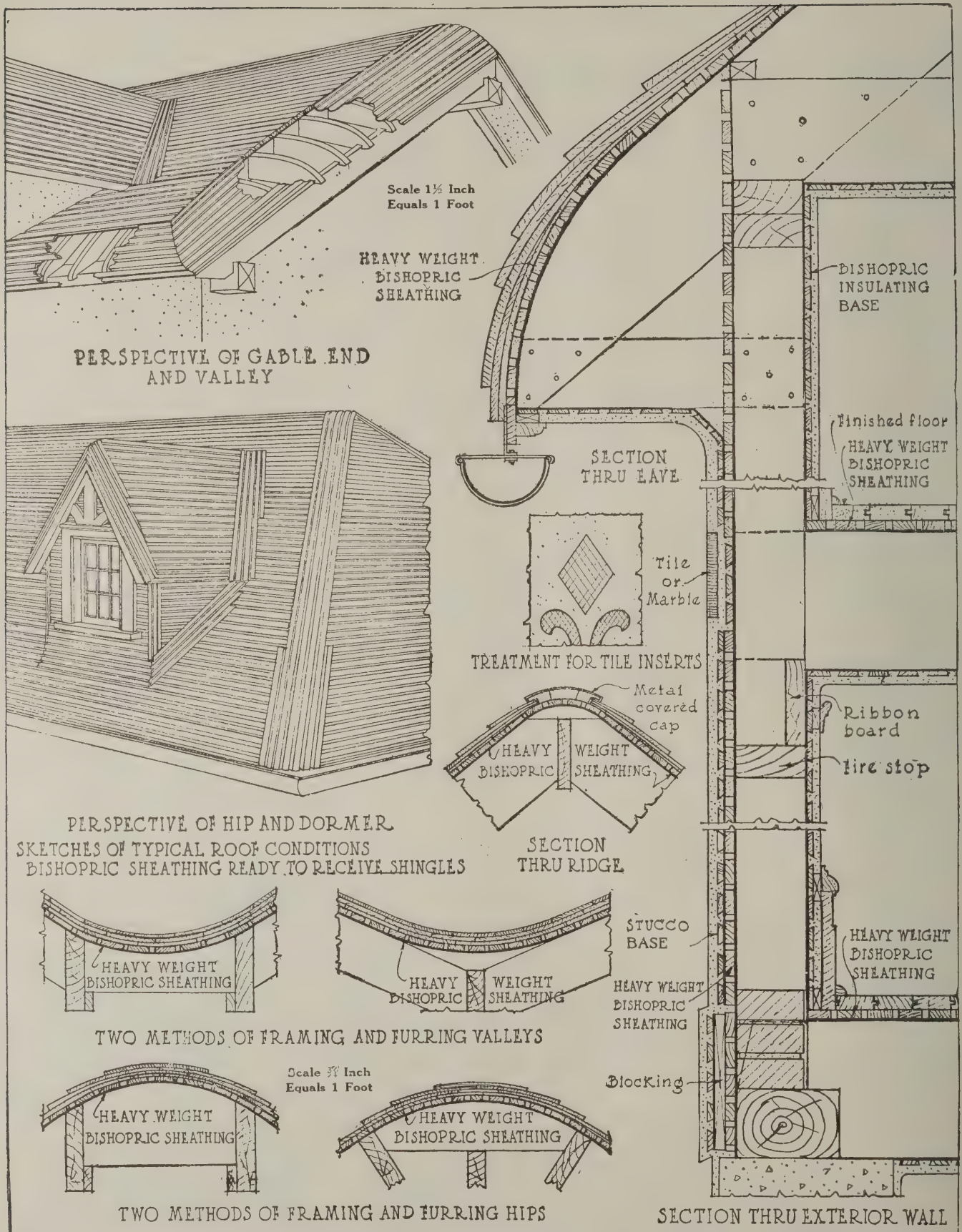


Fig. 6—Bishopric board for thatched roof effect, etc.

For Sheathing — The application of Bishopric for sheathing under shingles or weather-boarding is illustrated in Fig. 3, and for roof sheathing in Fig. 4. This

use for sheathing was at first criticized by architects and builders because one of the principal objects of sheathing is to brace the building against lateral distortion—to

give rigidity to a frame composed largely of vertical posts, or studs. In order to satisfy users on this point, the manufacturer had tests of wall panels made by R. W.

(Continued on page 96)



More Profits for YOU — and the MERCHANT!

*These Distributors
Carry Complete Stocks
of Desco Construction*

Pacific Builders Supply Co., Los Angeles, Calif.
John J. Kinsella Co., Chicago, Ill.
Thoma & Son Inc., Fairfield, Ia.
H. Neuer Glass Co., Cincinnati, Ohio.
Atlas Paint & Glass Mfg. Co., Kansas City, Mo.
S. Scherer, Baltimore, Md.
St. Paul Glass Co., St. Paul, Minn.
Toronto Plate Glass Importing Co., Toronto, Canada
John Lucas & Co., Inc., Pittsburgh, Penna.
Akron Mirror & Glass Co., Akron, Ohio.
Riddle Co., Nashville, Tenn.
Patek Bros., Milwaukee, Wis.
Jamaica Plate Glass Co., Inc., Jamaica, N. Y.

Write for name of the Desco dealer nearest you if it is not convenient to buy from one of the above distributors.

More profits for you because Desco Store Fronts are attractive and the cost of materials and installation is less; and because one job brings new contracts.

More profits for the merchant because the dollar-and-cents value of modern store exteriors and display windows is realized by business men everywhere.

How you can build up a profitable store front business—

How you can increase your profits with—

out special knowledge or experience in store front construction—

How you can establish yourself as a store front specialist is information we will gladly give you. First, get the helpful Desco Book. It is a book that gives valuable information in designing and installing modern store fronts and will enable you to become a successful store front builder.

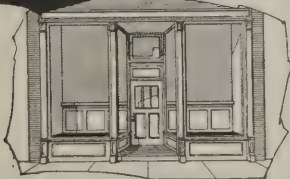
See Sweets Catalogue.

Fill out the coupon today and this book will be sent to you by return mail.

DETROIT SHOW CASE COMPANY
1655 Fort Street West Detroit, Michigan

(64)

Desco METAL STORE FRONTS



This Type of Front is Fast Being Replaced by Modern Fronts

Detroit Show Case Co., Detroit, Mich.
1655 Fort Street West

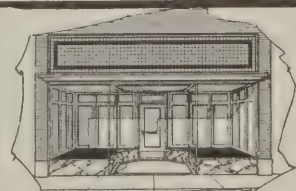
Gentlemen:

Without obligation on my part you may send me a copy of your book containing information regarding store fronts.

Name.....

Street.....

City..... State.....



Thousands of Contractors Make Money Installing Fronts Like This

When writing advertisers please mention National Builder

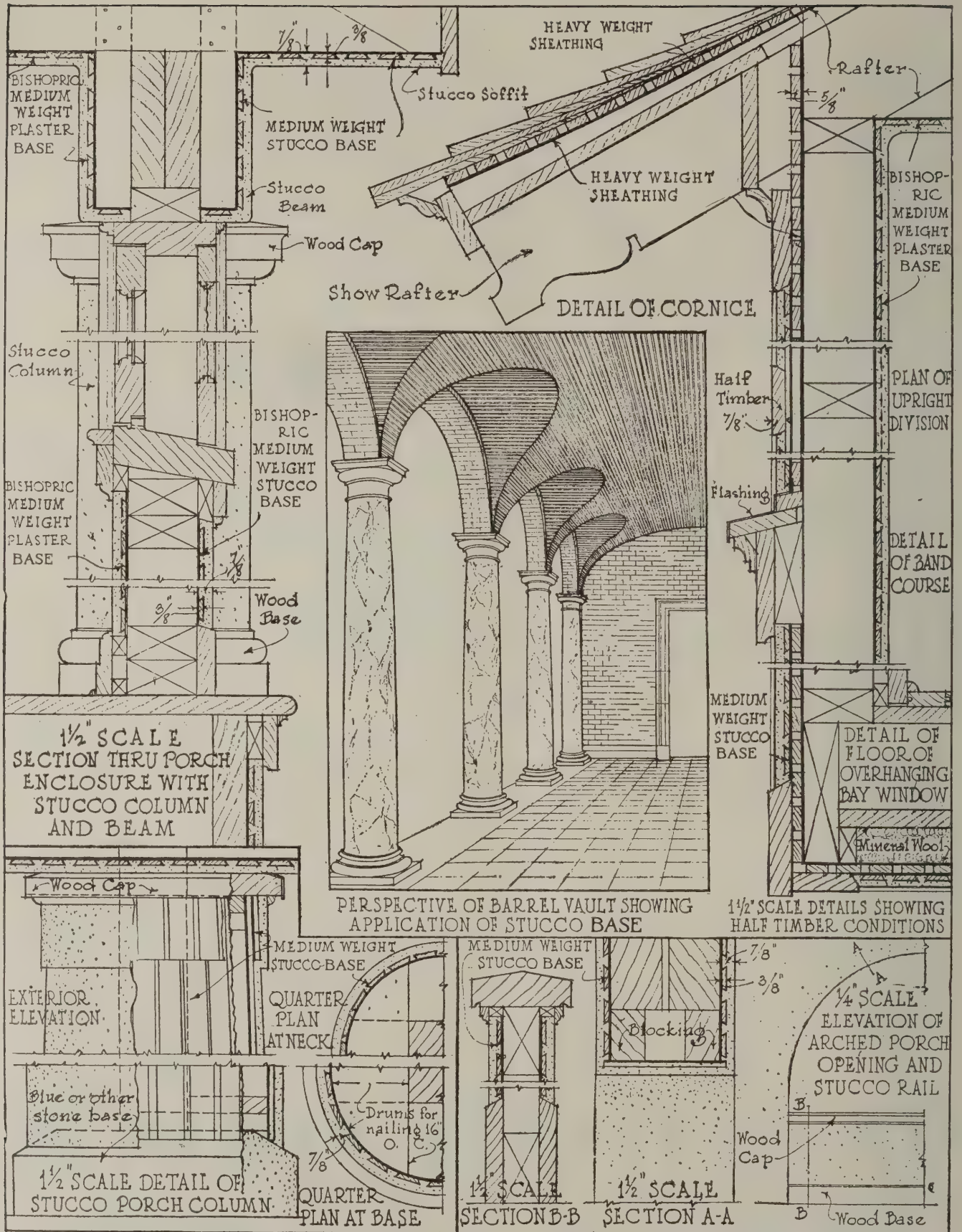


Fig. 7—Bishopric board for columns, vaults, and special details

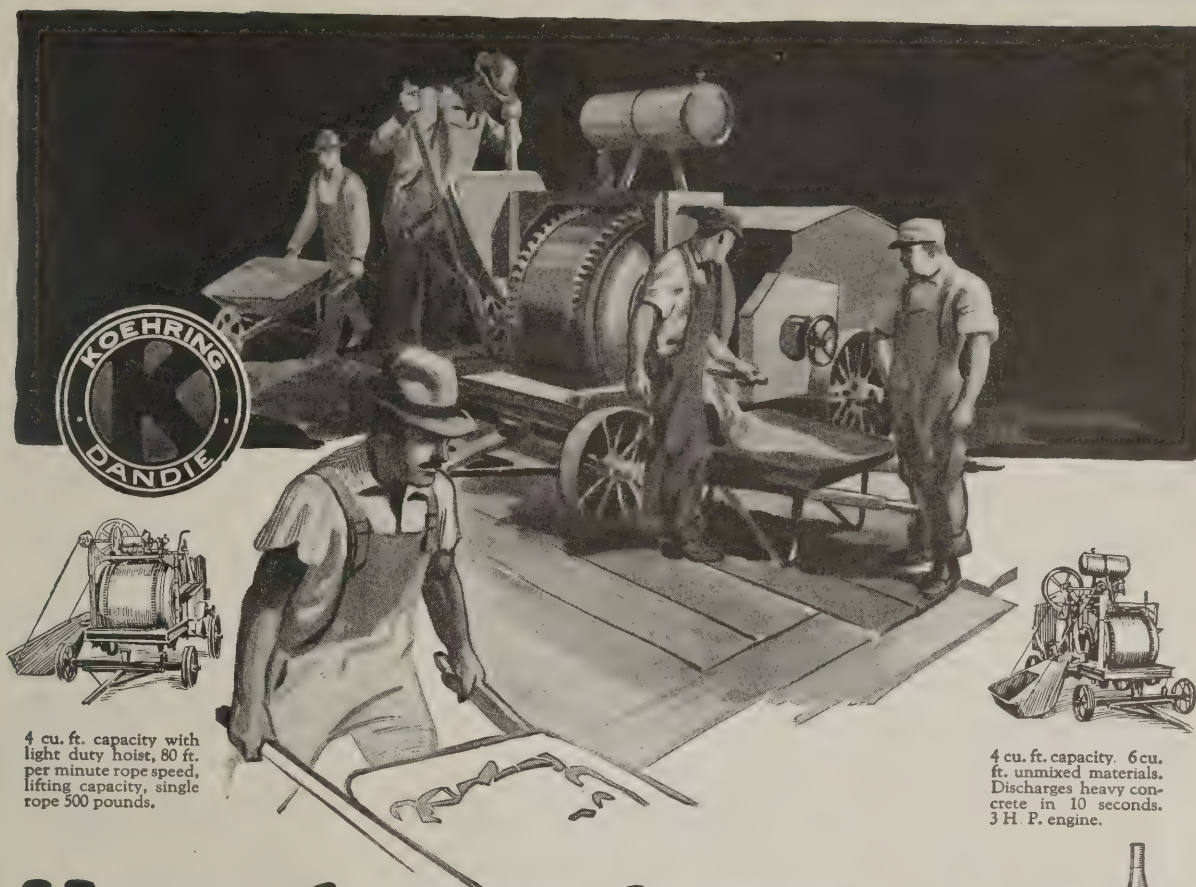
Hunt & Co., Prof. Shepard of Yale University and by the city engineering department of Memphis, Tenn.; and in these tests the distortion was less in the panels made

with Bishopric than in those with the usual $\frac{7}{8}$ -in. board sheathing.

For Flooring Base—Another use of the heavyweight sheathing is for the base of a

hardwood, or finish flooring, as illustrated in Fig. 5. One of the advantages claimed for this use is that the asphalt saturated backing forms a waterproof layer under the

(Continued on page 98)



4 cu. ft. capacity with light duty hoist, 80 ft. per minute rope speed, lifting capacity, single rope 500 pounds.

4 cu. ft. capacity. 6 cu. ft. unmixed materials. Discharges heavy concrete in 10 seconds. 3 H. P. engine.

How do we keep the price down?

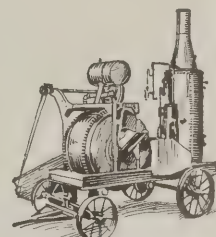
Not by taking it out of the construction of the mixer! No! The Dandie sets a new standard for light mixers, both in speed of operation, and in long service life. Yet it sells within the price range for light mixers. Big volume production, standardization in every part, and labor saving machinery only possible with the largest mixer manufacturer, keep down the price.

KOEHRING DANDIE MIXER

A light, easily portable mixer for footings, culverts, foundations, etc. Mixes concrete or mortar. As splendidly engineered as the big Koehring Paving Mixers. Great strength without excess weight! Double drum gear drive. Universal joint

bearings. The Koehring heavy duty drum roller construction! Discharge controlled from either side. Extra liberal simple power. Genuinely, a trouble-proof mixer that stands up to all you can give it. Write for catalog.

KOEHRING COMPANY
MILWAUKEE WISCONSIN



7 cu. ft. capacity. 4 H. P. engine. 5 H. P. boiler.

Dandie Capacities

4 cu. ft. mixed concrete gasoline. 7 cu. ft. mixed concrete steam and gasoline. May be equipped with low charging platform, power charging skip and light duty hoist.

Send Back Coupon

The Dandie is not the cheapest mixer you can buy, but the sturdiest, strongest construction which makes it the remarkable value in the light mixer field. Send back the coupon.

KOEHRING COMPANY
MILWAUKEE

Please send me Dandie catalog D 12, and advise me where I can see a Dandie Mixer, also send me information on equipment marked with "X".

☐ Bar Benders ☐ Bar Cutters

Name _____

Address _____

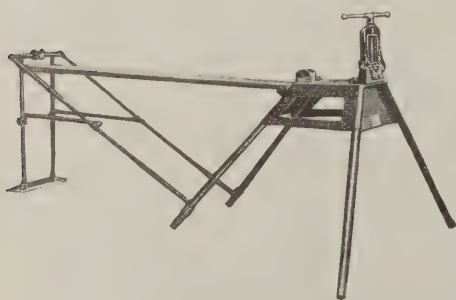
floors and saves the ceiling below from any ordinary wetting of the floor. For best results it is obvious that the finish floor should be nailed to the joists through the sheathing and not to the sheathing strips alone.

Thatched Roof Effects—Fig. 6 shows the use of Bishopric to obtain the rounded hips, valleys and cornice, essential to modern thatched-roof effects. As sheathing is ordinarily put on roofs, it is laid with spaces between the boards to allow the roof to dry out from below. In the case of Bishopric under wood shingles any doubt regarding the tendency of the wood strips to rot may be overcome by using creosoted wood strips, which are furnished if desired. In the case of composition shingles or other non-absorbent roofing material this would be unnecessary.

Columns, Vaults, and Special Details—Fig. 7 illustrates some of the other uses of Bishopric in furnishing the base for stucco or plaster on columns, vaulted interiors, and other details which require round or curved surfaces. This cut also illustrates some of the ordinary structural details of a house or building where this type of sheathing and lathing material is used. These are only a few of the working details shown in a recent booklet issued by the Bishopric Manufacturing Co., Cincinnati, Ohio, entitled, "Bishopric for All Time and Clime," which may be obtained by readers of NATIONAL BUILDER for the asking.

Portable Vise Stands

A SIMPLE and economical device in a portable vise stand is submitted by H. P. Martin & Sons, Owensboro, Ky. The time spent "in fixing to get ready to begin" is an appreciable loss on every job. The portable vise stand and pipe bender weighs 50 lbs., and when set up requires 6 x 8 ft.



Portable vise stand with rear support for large and full-length pipe

space. It is built of No. 16 sheet iron braced with angle irons. The legs are placed in position and removed and the stand set up without bolts or screws, the entire design being to achieve strength, rigidity, rapid set-up and quick take-down. It is claimed that the time required for assembling for work or packing for carrying is about one-half minute. The vise stand is made in different patterns for light

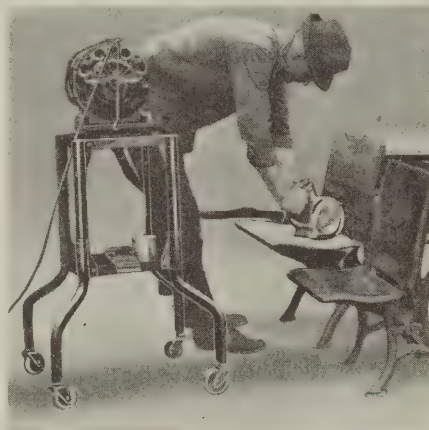


Portable vise stand with hinged or chain vise

or heavy work. Its general appearance is indicated in the illustrations.

Electric Sanderplane

A MACHINE adaptable to a very extensive line of purposes is presented in the American Sanderplane, manufactured by the American Floor Surfacing Machine Co., 518 South St. Clair street, Toledo, Ohio. It consists of a sanding drum almost completely enclosed in an aluminum casing, with a handle like a plane. It is operated by a



A machine that sands and works like a plane

$\frac{1}{2}$ -hp. motor mounted on a portable steel stand having large castor wheels, making easy moving from place to place. A ball-bearing swivel and flexible drive shaft connects the motor and sanding head. The sanding drum revolves at high speed. The cylinder surface is covered with a strip of fast-cutting garnet paper or cloth gripped in place by quick-acting clamps. Worn paper is quickly replaced. The machine is operated like a hand-plane and can be started and stopped with a push of the thumb on an electric switch mounted in the handle. A guide shoe on the drum casing holds it true with the working surface, making it easy to regulate the depth of cut. It obviates all the difficulties of even sanding that has previously made hand-scraping desirable. The garnet paper cuts very fast, and will rapidly remove an eighth of an inch of material, hard knots and nail heads cutting down as rapidly as the ordinary wood. The illustration shows its general appearance. Its utility in refinishing school desks and similar work, interior finishing, and par-

(Continued on page 100)

ticularly obliterating old markings on packing cases are indicative of its versatility. The machine can be operated from a lighting circuit.

Bottom-Hinged Sash for Double-Hung Windows

A NEW type of reversible window, first placed on the market at the time of the Building Show in New York, last May, is shown in the accompanying illustrations. The patented features are merely hardware attachments which can be applied to the wood sash of any ordinary double-hung window, old windows as well as new.

The sketch, Fig. 1, shows the method of operating the window. The lower half of the inner sash stops (on the right and left of the window) are hinged so that the two sash can be opened inwards. By means of

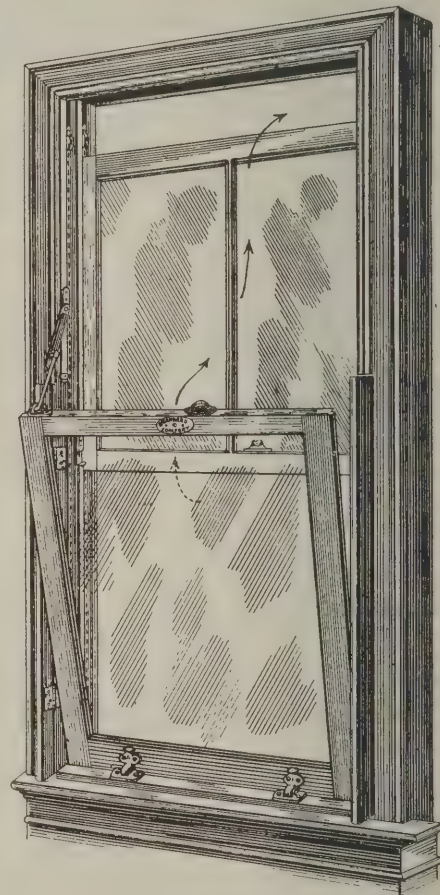


Fig. 1—Bottom-hinged sash for double-hung windows

an adjustable arm, the lower sash may be held open at any convenient angle to allow for ventilation without the draft which accompanies the opening of an ordinary double-hung window. Fig. 2 shows the operating mechanism.

The ventilating arm *A* is made to drop into a lock or eye fastened to top of lower sash. After being hooked the adjustment or degree of opening is regulated by simply pushing the sash into the desired position.



85 Beautiful and Well Planned Brick Houses Available to Every Contractor

An unusually wide range of carefully selected designs—modest bungalows to five and six-room homes and pretentious dwellings. Every plan a masterpiece—drawn by a competent architect.

Beautiful and distinctive, thoroughly practical—*every house has been actually built and lived in.*

You Can Quickly Sell Homes Built From These Plans

These homes are so attractive in design and so practical in arrangement that once built they are *in demand*. They sell quickly, profitably.

They emphasize the value of good design for even with all their advantages over ordinary houses these fine brick homes are *simple and economical to build*. They offer a wonderful opportunity to every builder.

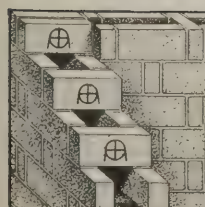
Plans, specifications and complete information are now available at nominal price. Send for "Brick for the Average Man's Home" (1.00) containing supplements which illustrate these 85 valuable plans.

"BRICK — How to Build and Estimate" (25c) contains detailed information about the Ideal Wall and other money-saving methods, together with many estimating tables. \$1.25 brings both this book and "Brick for the Average Man's Home" with the wonderful supplements illustrating these exceptional plans.

The Common Brick Industry of America

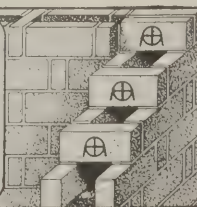
2132 CLEVELAND DISCOUNT BUILDING
Cleveland, Ohio

The Ideal Brick Hollow Wall is made of standard brick obtainable everywhere



Ideal Brick Hollow Wall

"Brick Homes at the Cost of Frame"



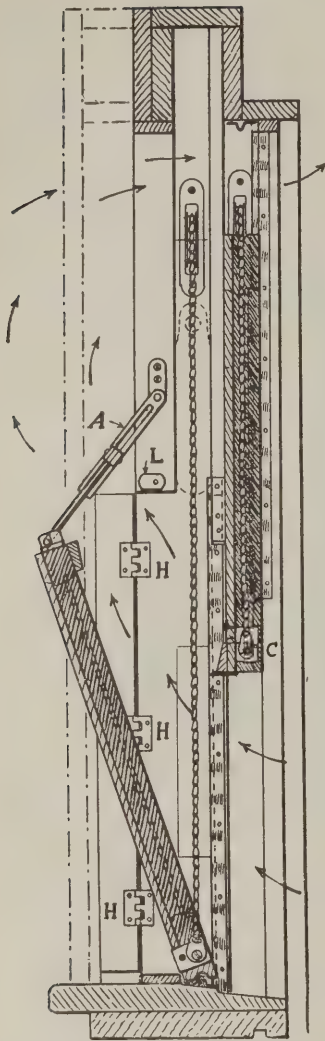


Fig. 2—Sectional view of bottom-hinged window adjusted for ventilation

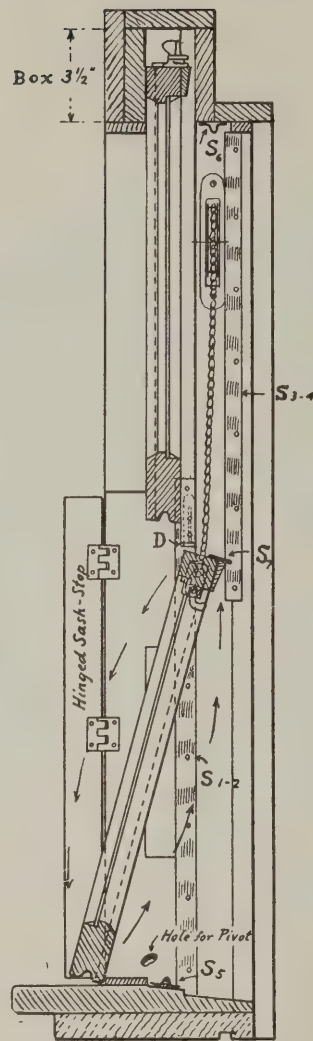


Fig. 3—Upper sash of bottom-hinged sash turned outside for convenient cleaning and still keeping wind entirely out of room

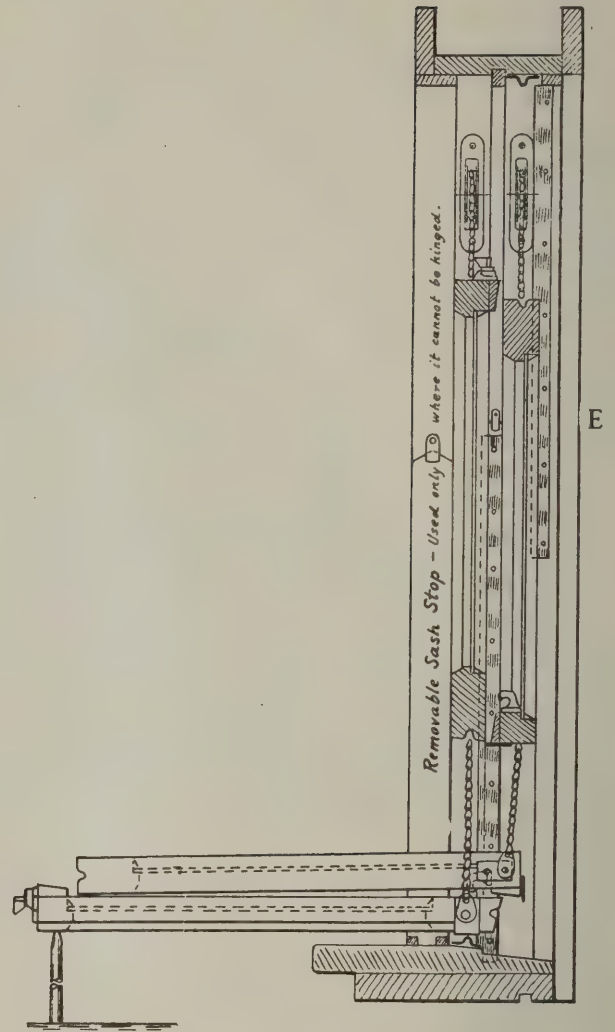


Fig. 4—Sash of bottom-hinged window can slide up and down, may be laid flat, as shown, suspended below the window opening, or be reversed, as in Fig. 3

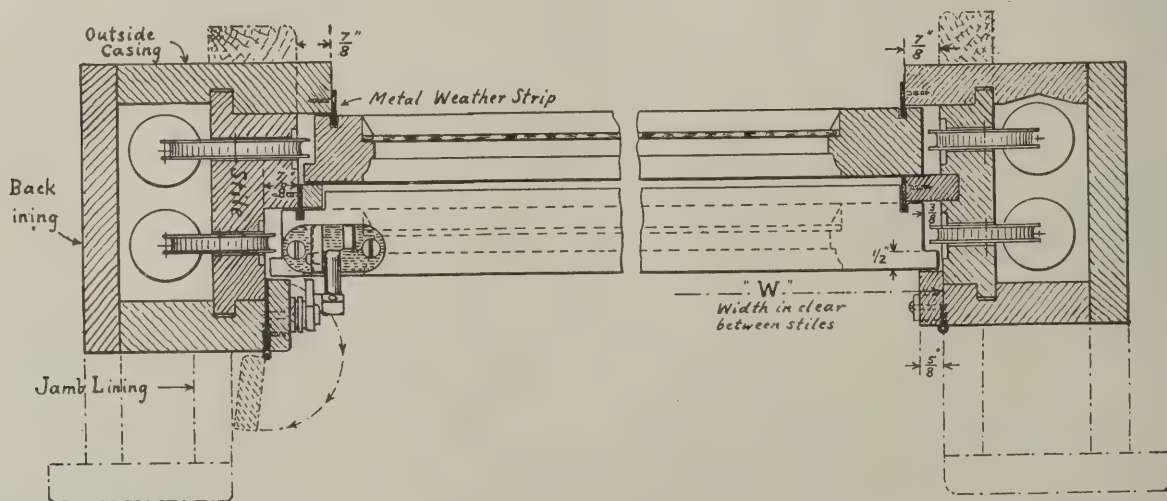


Fig. 5—Plan of a bottom-hinged window equipped with devices as shown in Fig. 4

Wind pressure will not alter the adjustment because of the friction imposed automatically by the joints of the arm. Incidentally this strong steel ventilating arm is made so

it can be unlocked only from inside, when in vertical or closed position, hence the device serves also as a burglar stop.

With this window the sash do not make

contact with the stiles or side frames; they are guided on the knife edges of the metal strips, engaging the weatherside of the sash at right angles to the glass.

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"The Hour and the Man"

THIS heading reads like the title to a movie play and it is used here just to catch your eye and so give the opportunity to suggest to you a job of thinking.

* * *

Look back a little to the time when changes came slowly; when everything was done according to the custom of the locality; when reaction to enterprise was so cold and thin that enterprise starved at its birth. Think back a little on this, and ask yourself if some of the conservatism of that time is dragging at you.

* * *

Come to the present time and look forward to what is portending: "Science has extended the means of communication." This goes in one ear and out the other.

* * *

What does it mean to you! It means that with the telephone, the radiograph, the automobile, the aeroplane, and more of such things coming, that the people who live in houses, no matter where—in village, town, city or country—are learning fast. They will want just as good and just as handsome houses, rooms and equipment as the best, and up-to-the-minute with all sorts of new ideas.

* * *

It is no longer a matter of "the times"—it is a matter of the "Demands of the Hour."

* * *

The changing Hour is here. The demand is for the Man to meet its demands.

* * *

The "Man of the Hour" needs to know what has been done, what is being done, and what should be done—AND HOW TO DO IT.

* * *

To help all such is the work of "National Builder." Are you Ambitious—do you belong? It will cost you only \$3 for two years' travel with us, giving you the best thought, the best designs, the best experiences and all that helps to keep in the front rank. Note the announcement on page 13 of this issue. Send in your \$3 Now.

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BISHOPRIC stands for and is acknowledged the best Stucco and Stucco and Plaster Base on the market. The leading architects recommend BISHOPRIC, the most prominent builders and contractors use BISHOPRIC, and the wide-awake dealers always carry large stocks of BISHOPRIC to meet the ever increasing demand. BISHOPRIC meets the consumer and builder's needs.

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provide an ideal interior and exterior
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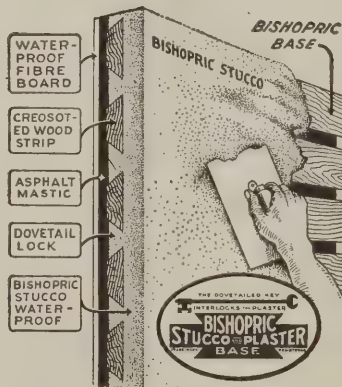
Bishopric Stucco

Tensile strength tests 1,150
lbs. to square inch, insur-
ing lasting durability.

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Fire-proof

Beautiful
Durable
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BISHOPRIC Stucco is shipped in air-tight metal drums (100 lbs. per drum), thus preserving the material in the warehouse and on the job until it is used, regardless of weather conditions, and provides against waste or deterioration.

These BISHOPRIC air-tight metal drums, attractively lithographed, provide most effective advertising value, denoting the superior quality of the product therein.

BISHOPRIC STUCCO is furnished in Alba White, Shell Pink, Sienna Buff, Ivoril Cream, Granistone Gray, French Gray, or any special color one may desire.

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Cincinnati, Ohio

NATIONAL BUILDER

Volume 65

CHICAGO, DECEMBER, 1922

Number 12

Epochal Building Service by National Builder

"NATIONAL BUILDER" has the pleasure of announcing at this time that it will open its program for 1923 with the greatest innovation for the service of its readers ever made by this or any other building trades magazine.

This service comprises the publishing each month of the complete plans, construction details, bills of material, and perspectives of three small houses, prepared especially for "National Builder" by architects of high standing and under the direction and with the co-operation of the Architects' Small House Service Bureau of the United States, Inc.

The far-reaching importance of this co-operation between

the recognized representatives of the architectural profession and this publication which serves the Contractor and the Builder cannot be over-estimated; and it is with the firm conviction that the readers of "National Builder" will appreciate this effort to bring the very best obtainable designs and plans within their reach, and that they will be quick to take advantage of this service, that the editors have undertaken the expense and the Architects' Small House Service Bureau the time and effort, of arranging for this service.

Read this article through and familiarize yourself with this service so that you can take full advantage of it.

ABOUT a half a million houses are built every year in this country. By far the greater number of these houses are less than eight rooms in size, with most of them ranging between five and seven rooms.

When the average man decides to build a home, the first person he consults in the majority of cases is the Contractor or professional Builder. He goes for help first in planning and designing the house he wants to build, and expects his Contractor to give him ideas if not actually to furnish the plans and designs.

Aside from the houses built to order through contracts let by the owners 54 per cent of the homes of this country are built to sell or to rent. In this case the professional Builder is the man who actually selects the designs and plans; so all along the line the Contractor and the Builder are great factors in the small house field. Upon them rests the responsibility of building American homes—homes that are well planned as well as economically and honestly built.

NATIONAL BUILDER would not be serving the best interests of the building industry if it failed to accept its share of responsibility for the small house architecture of this country. And at present there is little to boast of and much to be expected. This is because the Contractor and the Builder, when it comes to designing and planning

houses, are asked to do something that frequently is outside their regular field. The architect should really function in these particulars for them (if they themselves are not architects, or do not have architects in their organization), for the architect is especially trained along these lines. He knows the proportions walls and windows should bear to each other and how far the roof should project in order to insure a really beautiful home. He knows how the interior should be laid out for the maximum of comfort and convenience.

In the past, the architect has not been able to serve this small house field to any appreciable extent. There are economic reasons for this. The architect is customarily paid on the basis of a given percentage of the total cost of construction. He cannot afford, in the majority of cases, to design, plan, and detail the average small house for the fee that he would be entitled to charge. For a similar reason, few owners feel they can afford to retain an architect to render this service. As a result, the small house has had to be built without the guidance of the architect, and only too frequently has the result been a house of unlovely design and inconvenient arrangement, and often one that costs its owner more than it should have cost him and has also given the Contractor or Builder unnecessary trouble and expense in the construction. These are

facts only too well known to any thinking person acquainted with the building industry.

A Technical Education in Good Architecture for Every Reader

It is the purpose of NATIONAL BUILDER's editors to overcome this obvious general lack of good architecture in the small house field by providing the very best obtainable architectural talent for the service, not of the client directly, but for the service and benefit of the entire building profession or industry as a unit. These architects are as ready and willing to help the Contractor and Builder understand and appreciate good architecture and good construction as they are to help the prospective individual client. They also want the helpful co-operation of Contractors and Builders; and they are ready to extend to them through the columns of this journal—the recognized medium of building Contractors and Builders—the right hand of fellowship and encouragement. And unless the Contractor and Builder want to see the house owner—their clients—advance faster in knowledge of architecture and good construction than they themselves are advancing they certainly will welcome this co-operation.

Therefore NATIONAL BUILDER has contracted with the Architects' Small House Service Bureau to supply designs and construction details for 36 houses of from four

to six rooms in size. This material will be published exclusively in every issue of *NATIONAL BUILDER*, each number containing complete information about three houses. These plans and designs will be the work of architects of high standing, authorized and passed upon by the Architects' Small House Service Bureau. Houses suitable for every section of the country will be included, and each will be the work of an architect or architects located in the section of the country for which the house is intended.

These houses will vary in architectural expression. There will be Colonial Houses, English Houses, houses of the so-called Chicago School, and designs reminiscent of the popular Square Type of house but with better proportions and finer details.

There will be houses that can be built of

with such completeness that any intelligent Builder can readily understand every detail. But, in addition, complete blueprint plans will be supplied at one-half the regular price to *bona fide subscribers* to *NATIONAL BUILDER* only by the Architects' Small House Service Bureau. Subscribers for this publication will send their requests for these plans direct to the Bureau or to *NATIONAL BUILDER*, which will issue an order upon the Bureau directing them to supply the Bureau's complete service at half price to such authenticated subscribers. (By this arrangement the average price of such service to bona fide subscribers of *NATIONAL BUILDER* will be between \$8 and \$20 per set of plans, including complete specifications, bill of material and contract forms.) This arrangement is a most advantageous one for the

will never go out of fashion, and you never can tell when you may get a customer who will want to build one of them. You will find at the end of the year that you have in your possession plans and designs and complete information for 36 small houses.

The value of this service cannot be measured in dollars and cents. Certainly it is equal to many times the price of many years' subscription. Thirty-six houses are in themselves no small plan book, and no plan book has ever been offered under the conditions that make the forthcoming issues embody the latest and best thought in small home design and construction.

NATIONAL BUILDER takes great pride in offering you this service. We hope that you will make use of it and that it will result to your profit and to the satisfaction of your



Office of the Architects' Small House Service Bureau. Maurice I. Flagg, director of service, in right-hand foreground; Robert T. Jones, technical director, at the second desk

wood, brick, hollow tile, concrete, stucco and natural stone. There will be houses for narrow lots and for wide ones, for corner lots and inside lots. There will be houses for the city, country village and for the farm; houses of a variety of types and of every description.

Full Sets of Blueprint Plans, Specifications, Estimates and Contract Forms Available to "National Builder"

Subscribers at Special Rates

These designs and plans will be shown

Contractor or Builder, for if he desires a plan or design changed in any particular, the Bureau will do the work at a nominal charge and give the subscribers the benefit of special and authoritative architectural service.

Beginning with the January, 1923, issue, these houses will appear at the rate of three in each issue of *NATIONAL BUILDER*. Watch for them, study them when you receive your *NATIONAL BUILDER*, and be sure to file your copies for future reference. These houses

customers in the homes that you build for them.

What the Architects' Small House Service Bureau Is

The Architects' Small House Service Bureau of the United States, Inc., is the outgrowth of the vision of a few liberal-minded and far-seeing architects of national reputation, who several years ago conceived the possibility of helping the average home owner to obtain high class architectural service at small cost. The result was the

establishment of an architectural service bureau, owned and controlled exclusively by architects and operated under the supervision of the Board of Directors of the American Institute of Architects.

This first architectural service bureau was established two years ago in Minneapolis, Minn., and is now known as the Northwestern division of the Architects' Small House Service Bureau of the United States, Inc.,

win H. Brown, of Hewitt and Brown, Minneapolis. The director of service is Maurice I. Flagg. Both of these gentlemen have been identified with the movement from the very start.

The conception of the founders of the Architects' Small House Service Bureau is much broader than the mere selling of plans to prospective home owners. It is, in its last analysis, the assumption by the organized

—who knows the prospective owners and does business with them.

How the Bureau Operates

"The idea behind the Service Bureau plan," says Mr. Flagg, "is to assist people with limited sums of money to secure better built homes at lower cost through supplying them well prepared home plans designed to eliminate waste, to use standard-



Architects' and Engineers' Building, 1200 Second Avenue South, Minneapolis, Minn., the home of the Architects' Small House Service Bureau of the United States

for since its establishment similar bureaus have been created at Denver, Colo. (the Mountain division), at Milwaukee, Wis. (the North Central division), at New York City (the Atlantic division,) and at Portland, Ore. (the North Pacific division). Other bureaus will soon be established at the headquarters of the various geographical districts into which the membership of the American Institute of Architects is divided. The president of the Architects' Small House Bureau of the United States is Ed-

architectural profession of America of responsibility for American small house architecture. To accomplish such an ultimate objective the movement must have the cooperation, sympathy and understanding of all who are engaged in the business of building—architects, builders, contractors and dealers—for but a comparatively insignificant number of prospective home owners can ever be reached directly; they must be approached through you, the reader—the local architect, builder, contractor or dealer

ized materials, etc.

"The bureau idea is founded on a non-profit making policy. Each architect who is a member is permitted to own one \$100 share of stock and to receive 8 per cent return upon his investment. The bureau is so organized nationally that it can never be exploited toward selfish ends, nor in the interest of any special material, equipment, device, etc.

"The service is limited to six primary rooms. The reason for this is because the

average architect cannot meet the small home proposition individually on the present basis of established charges for service. On the other hand, the small home builder hesitates about making an initial investment of \$300 or \$400 for a set of plans, even though that charge may be offset a number of times through the savings the plan will make.

Cost of Plans Lessened by Volume Selling

"Now, however, through the plan of co-operation by a large number of architects, it is possible to prepare plans which are in every respect professional, and, because they are sold on a volume basis, the cost is naturally less.

"Prices for the service range from \$17.50 to \$32.50, depending upon the size of the house. This includes complete documents as follows: Thoroughly prepared and detailed plans, a quantity survey or bill of material, a complete set of specifications, two forms of agreement.

"There is no trespassing upon the legitimate field of architects. We have limited our service to six rooms. After that we urge home builders to employ an architect.

Groups of Architects Co-operate

"In brief, the Service Bureau idea is a co-operative plan. Many architects can now afford to give the time to study and production of many home plans. If these plans can be sold in sufficient quantity, the service and plans can be offered at low cost.

"And so the Service Bureau idea is the working out of a service based on large production and large distribution.

"Because the scheme is well organized under the direction of the central or parent body, the Architects' Small House Service Bureau of the United States, it is possible to eliminate waste effort, duplication of time and expense in the production of plans.

"It is possible for groups of architects to produce a very large number of plans adaptable to territorial and local conditions and by interchange and exchange of plans each group will have on hand a stock ready to meet nearly every practical condition and demand.

Integrity of Purpose and General High Standard Insured by the Supervision of the American Institute of Architects

"The central body, The Architects' Small House Service Bureau of the United States, is the governing body and clearing house. It is under the direct supervision of the Board of Directors of The American Institute of Architects. This insures a unified purpose and policy by all the regional bureaus. It is also a guarantee of integrity of purpose and high standard of service.

"It has proven that people prefer this service rather than taking home building chances. Many homes have been and are now being erected from plans supplied by

this bureau. A kind of service is being rendered that is surprisingly new and complete. There is nothing like it anywhere.

"And last, but not least, in the formation of this national Small House Service Bureau idea is the fact that the central body as well as the regional bureaus are organized as non-profit making enterprises. Whatever small profit may accrue in the sale of plans and service will go back into perfecting the service.

"The Small House Service Bureau idea is not only practical, but profitable. The one who profits most is the home owner. He can now secure the best available to assist in solving his home building problems and at low cost. He can not only save money by using the plans and service, but his home will be better built and of safe, sure investment."

Builders Can Profit from Prestige of Bureau Service

In addition to its architectural service the Architects' Small House Service Bureau conducts consistently and continuously a

national educational campaign—through the daily newspapers by the "Home Builders' Clinic" in women's and household magazines of national circulation, and through a Service Bureau bulletin, published monthly, called "The Small Home." It is obvious that all this publicity is educating the house-buying public to expect and demand constantly better houses.

It is being proved to the home buyer that houses of correct proportions and good design and construction are a better investment, that they will never go out of fashion, that like the best makes of automobiles they will always look well and be serviceable. The advantage to the builder in linking up his work with a national movement of this kind is obvious to any good business man, and it is believed that many will avail themselves of this opportunity NATIONAL BUILDER has created for them.

The aims and purposes and work of the Architects' Small House Bureau of the United States have been investigated and approved by Secretary Hoover of the Department of Commerce of the United States.

National Builder's Creed

(Reprinted from our announcement, January, 1922)

WE BELIEVE in the co-operation of the architect, builder and contractor.

WE BELIEVE each one to be as important to good and successful building as either of the others.

WE BELIEVE these three are all principals in the one profession of constructor—the creator of buildings.

WE SERVE the architect by bringing him in closer touch with the two other principals, that they may have a better appreciation of his work; and that he may have a more intimate knowledge of theirs.

WE SERVE the builder—the professional or speculative builder—with the help of the architect and the contractor, by making him better acquainted with the best in building construction and architecture; by describing how the building business is actually done under various ideas and conditions and in various localities; in the expectation that all will profit by such free interchange of information.

WE SERVE the contractor by bringing him in closer touch with architects and professional builders that he may profit by their knowledge and experience; by describing new and adapted methods of construction, the use of different kinds of building material, cost-keeping and business routine, so that he may keep posted on what is current practice.

WE SERVE all engaged in the con-

struction profession by doing our bit, through the circulation of ideas, impressions and suggestions gained from contact with constructors here, there, and everywhere, to eliminate waste in the building industry, promote progressive thought, stimulate business instincts and make the building industry bigger, better, and more prosperous in every branch.

WE SERVE the whole profession of constructors—architects, builders, and contractors—avoiding all disposition to popularize the technique of construction, believing construction to be a real profession requiring special skill and training.

WE SERVE the whole profession by extending our subscription lists to the contractor, architect and builder only. Therefore we do not maintain an architectural or engineering service bureau, infringing in no way upon the rights and prerogatives of any of the three great members of the construction family.

WE RECOMMEND to builders and contractors who ask for specific technical information or for special plans that are within the province of an architect or structural engineer, those who are equipped to furnish the service desired.

WE BELIEVE in the co-operation of the contractor, builder, and architect; and dedicate NATIONAL BUILDER to the maximum usefulness and service of the Professional Building Industry.

Building a National Builder Home

By H. T. Becker



This is how the house looks as actually built. When shrubs, trees and vines have knitted it a bit closer to its surroundings, there will not be a prettier home in the whole town, nor a better advertisement for its builders



A pencil sketch of the house before it was built, as published in National Builder for May, 1921

IN May, 1921, NATIONAL BUILDER featured in the plan supplement an unusually attractive six-room English house, one of the most promising plans it ever published. Consequently, readers would be interested in seeing how the design and plans really worked out in actual practice, and as this house has been built in one of the mid-Western towns, it is here illustrated and described.

As NATIONAL BUILDER has often pointed out editorially, there is no more important tendency in home building at present than the tendency toward good design. Most builders in the game today can look back now and realize the change from the over-ornamented houses with all sorts of eccentric (and expensive) gew-gaws to the plainer houses that have prevailed in the last decade. In fact, many of them are so extremely plain that they are just huge boxes, without any real hominess and no individuality at all. The present tendency in the better class of homes is a medium between these extremes—exteriors that are

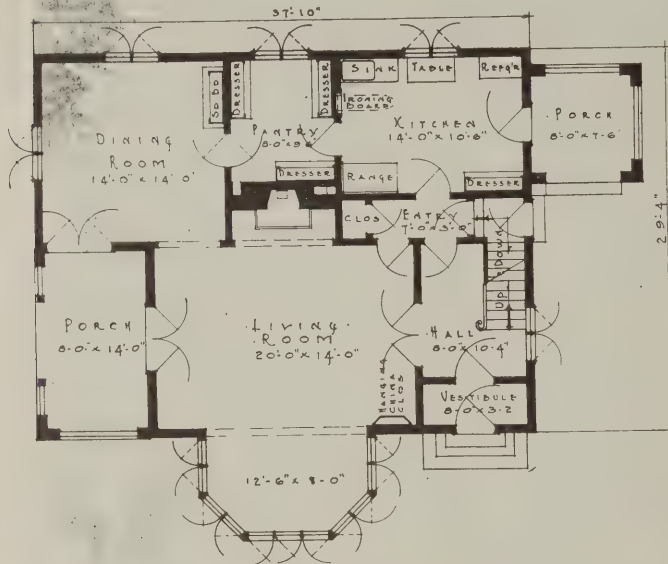
simple but pleasing, having architectural merit by virtue of good proportions, correct details and the effective use of materials. You have probably observed that stock plans put out by various manufacturers and other organizations are featuring such houses in steadily increasing numbers.

This house is one of this kind, and it is likely to be mighty good advertising for

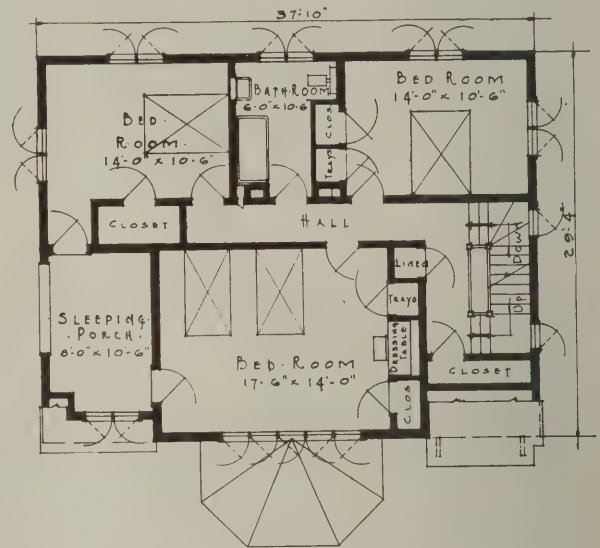
stock plans furnished by a manufacturer.

Third. It was a winter job, begun in October and finished in April. As it was not a large-town job, but just a better class home in an ordinary middle-Western town, its example holds good anywhere. The plan itself is exceptionally convenient, having six main rooms, with front hall, sunparlor, dining alcove, a small enclosed

stucco with or without exposed timbers are all appropriate materials. Here the plain stucco was chosen, creamy white in color and applied roughly with sweeping strokes. Time will weather this to a most interesting surface, and ivy will soften the rather severe outlines of the house with picturesque effect. The window frames and the muntins are properly painted white.



First floor plan



Second floor plan



The sun parlor at the front of the house is an alcove off the living room. Notice its plaster arch and the domed ceiling. The drawn shades hide the windows, which are all small-paned casements, opening outward



What feminine heart could resist such a delightful combination built-in in the bedroom? A multitude of personal belongings can be compactly put away within arm's reach. The little bench accompanies the dressing table. Note the adjustable side mirrors and the excellent position of the light

the builders for a good many years to come. It is notable for several things:

First. It represents a new departure in design. In general character it is English, and it maintains this character, in spite of the fact that a sleeping porch, sunroom and open porch are skilfully included—all of which are features unknown to English architecture.

Second. It is built of stock materials in stock sizes, all the way through, and from

porch, sleeping porch and bath. A maid's room or two can be finished in the attic, an attic stair being included in the plan. The basement is divided off into several rooms by sheathed partitions, is well lighted by cellar sash and is accessible from kitchen and grade.

The steep pitch of the roof, the narrow rake mold at the gable ends, the chimneys and casement windows are characteristic of the English type. Stone, brick, shingles or

Red brick forms a colorful border around the entrance terraces and porch floors, while the shingled roof is stained a good brown.

Perhaps the most striking feature of the exterior is the sunparlor. It is really an alcove off the large living room, separated only by a rounded plaster opening. Its unusual ceiling is dome-shaped instead of flat. There is no "built on afterward" appearance to such a solarium, as there is

in so many. The same is true of the sleeping porch, at the left front corner of the second floor. It is inconspicuous and worth careful study.

The builders carried out the English idea in the interior, as well. A few years ago this would have involved considerable expense and delay, because it was not possible to buy from stock such items as woodwork, light fixtures, finish hardware, and wall coverings in "period" designs, equal in merit to the period furniture and interior decorations to be had in practically every town. Now, however, manufacturers of these items are waking up to the necessity of correct design in their products, if they are to be suitable for use in the better-designed houses that are now being built. Nowadays, therefore, it isn't hard to select the right things from stock

casing line. The latest practice is observed in the light fixtures—that is, wall brackets without a ceiling fixture in the living room, and a central chandelier as well as wall brackets in the dining room. In the living room these are statuary bronze, and in the dining room brushed silver. The candles are stippled to match the walls of each room.

The kitchen appeals to all the women who visit it. Instead of the usual varnished yellow-pine, or the white paint that has been so universally used of late, this room presents a surface entirely in French gray, including woodwork, doors, built-in cupboards and refrigerator. The worktables and counters are all zinc-covered, and the effect is unusually good. All built-in features, including the ironing board, are stock items. Maple flooring is

terior doors, forming a neat and practical part of the room furnishing, and saving the owners the purchase of furniture. In another room the tray case and hanging closet are used, with a mirror door. The bathroom is tiled, and has a tub of the built-in type. One little point that is worthy of notice is the good idea of having a glazed door to the attic stair, with a window on the stair landing, thus transmitting an additional amount of light into the second floor hall.

The only extraordinary thing about the whole house is that there is nothing extraordinary about it. Because of the use of stock materials all the way through, its cost was moderate. Builders anywhere can duplicate it. You have heard the aphorism, "Behind every business that keeps up with the times is a man who keeps ahead



A pair of corner china closets take up no floor space that could be otherwise used, and add greatly to the charm and convenience of the dining room. They are a stock design of the utmost simplicity, and are finished in walnut stain, like the wainscot



This charming vista from the living room to the entrance hall shows some of the fine interior details. The graceful stair, the handsome eight-panel interior doors, and the French doors are all worthy of note. There is a hint of the stenciled design on the living-room walls

from the catalogs of the best manufacturers in these various lines. Every builder should be up with the times and know something about what constitutes "good design" in these things. He need not be an expert, but the time spent in acquiring a general knowledge of design is well worth while, for it promptly distinguishes you as a better-class builder. Very often the advertising literature of these manufacturers gives you all the necessary principles, in as brief, readable a way as you can secure them.

In the main rooms of the house pictured here, the floors and all structural woodwork, including stair, mantel, corner closets, and wainscoting, are of oak, English fashion, in walnut finish with dull surfaces. The walls are not papered, but finished with washable paint in stippled effect, in different shades of light greys and tans in the various rooms, with cream-colored ceilings. In the living room, a stenciled motif, suggesting an heraldic design, is repeated at intervals at the head

used, oiled rather than varnished. As the dining alcove in this particular plan is between the kitchen and dining room, it is finished in dark woodwork, to match the main rooms.

Upstairs, birch woodwork is used, finished in enamel, with plain painted walls. Ivory woodwork and tan walls are used in all except the guest room, which was varied to have light grey woodwork, light green walls, and cream ceiling. Two of the bedrooms open directly on to the sleeping porch. One noticeable point about the bedrooms is the built-in features, which are, of course, enameled like the other woodwork. Such things as built-in dressing tables, tray cases and hanging closets are comparatively new, but are coming to be regarded as indispensable by the prospective homebuilder. In this particular house, one room has a combination consisting of a dressing table in the center, with a hanging closet at one side and a chest of trays at the other. Both of these are enclosed behind one of the regular in-

of them." There is no business to which that applies with greater force than that of building homes (notice that we do not merely "build houses" any more.) The contractor who is going to be the leader in his community next year is the one who is looking ahead this year, so that his work today is not out of date tomorrow, but is still advertising him as a good workman. That is why it pays to study tendencies, perhaps even more than existing conditions. It is not only a mighty good idea to be able to advise clients as to what the tendencies in homebuilding are, but the more better class work a builder does, the better advertising it is for him that year, and the next, and as long as his work stands as an example of good building. It is poor business to know less about tendencies in house building than one's clients know.

This house is one you can recommend to any customer as one that not only looks good, but is good, for the story had a regular "happy ever after" ending.

Model Small City Newspaper Plant

"Beacon-News" Building, Aurora, Ill., Designed by Zimmerman, Saxe and Zimmerman, Chicago, Has Many Interesting Details

A NEWSPAPER building so well adapted to its purpose that the owner is practically duplicating it in another small city in Illinois is the *Beacon-News* plant

ft. below the sidewalk level. Inasmuch as the exact spot where the building stands was at one time the bed of Fox river, years ago popularly known as "the old

ing, the area walls supporting the sidewalk and the weight of the big printing presses are all supported on caissons reaching to bed rock so that the least settling of the



"Beacon-News" newspaper plant in Aurora, Ill., designed by Zimmerman, Saxe and Zimmerman, architects, Chicago

in Aurora. Through the courtesy of the owner, Congressman I. C. Copley and the architects, Zimmerman, Saxe and Zimmerman, of Chicago, NATIONAL BUILDER is able to show many of the special features of this building in considerable detail. This building represents an investment of practically \$200,000.

Caisson Foundation on Bed Rock

The weight of the building is supported by 36 caissons penetrating to bed rock, 26

swimming hole," excavation for the basement and for the caissons brought to light relics of former Aurora. Workmen dug through a stratum of tin roofs and coal scuttles to next penetrate one of cinders and ashes; then a stratum of cedar paving blocks dumped in the old swimming hole when the first Broadway pavement was torn up, and the final obstacle to digging just before reaching bed rock was some three or four feet of gravel and quicksand. However, the entire weight of the build-

ing, the area walls supporting the sidewalk and the weight of the big printing presses are all supported on caissons reaching to bed rock so that the least settling of the building on account of insecure foundations is impossible.

Fireproof Throughout

Architects and experts have pronounced the structure as immune from fire as human foresight and careful construction could insure. The entire framework of the building, pillars, floors and roof are of heavily reinforced concrete. The brick which forms the exterior wall is simply a veneer. The partition walls within the

building are all of either concrete or hollow tile. The window frames on the street side are of wood, but on the rear and east side, where they might be exposed to fire from an adjoining building, they are all of metal and are equipped with so-called fire glass, reinforced with wire netting, so that fire cannot break it in.

The only wood used in the building is in the floors, which are laid on the solid concrete and in the doors and millwork trimming. The stairways are all of iron and marble.

Special Lighting Provisions

Quite as striking are the building's hygienic provisions. Each floor has daylight from windows on at least three sides while the fourth floor, which is wholly devoted to the composing room, has windows on all four sides, with two large skylights in the roof, both equipped with big electric exhaust fans which are capable of renewing all the air in the room every four minutes.

When artificial illumination is required it is supplied by the indirect system of lighting from ceiling globes which afford



President's and editor's office



Editorial room



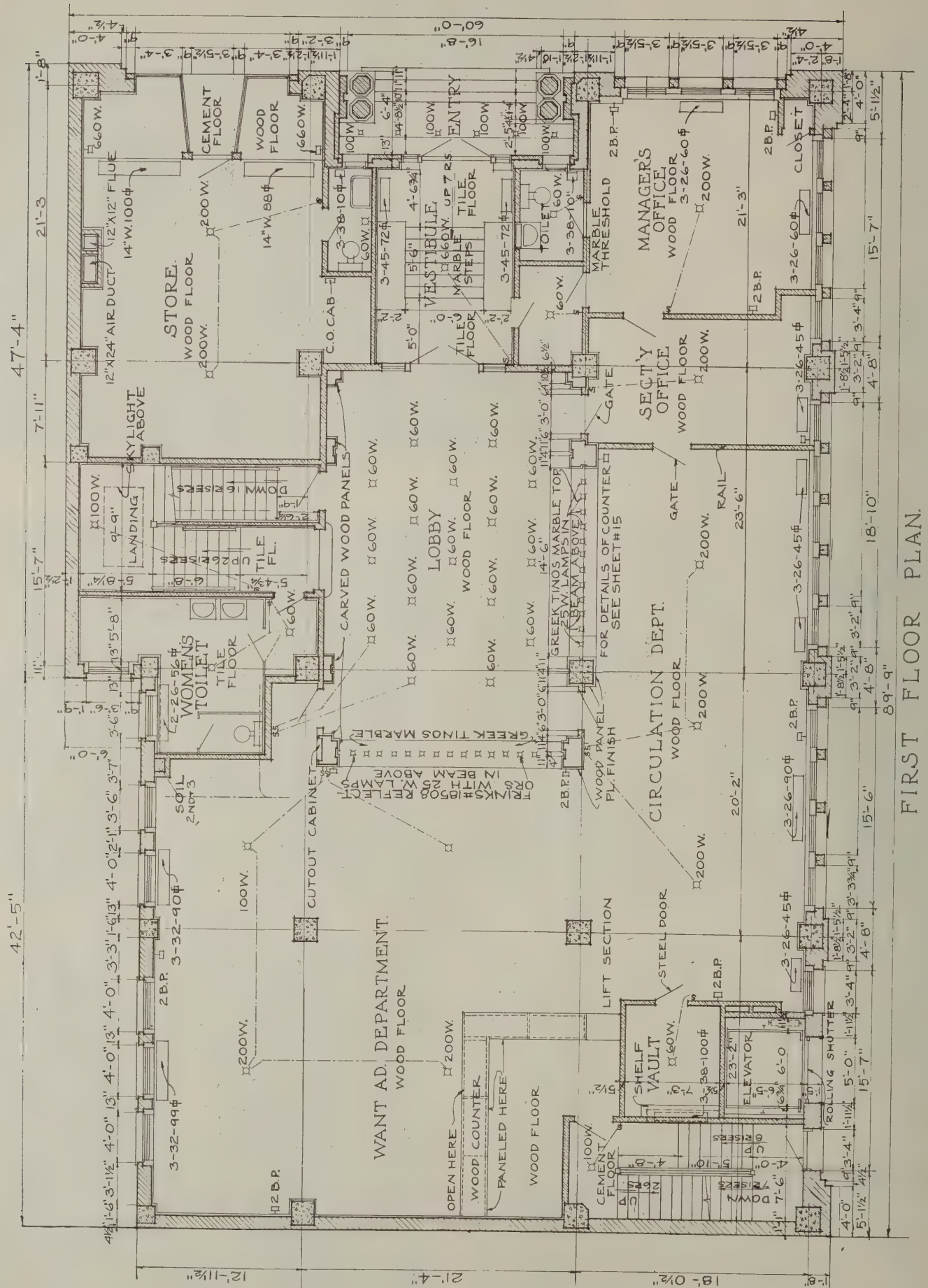
Office of the "society" editor

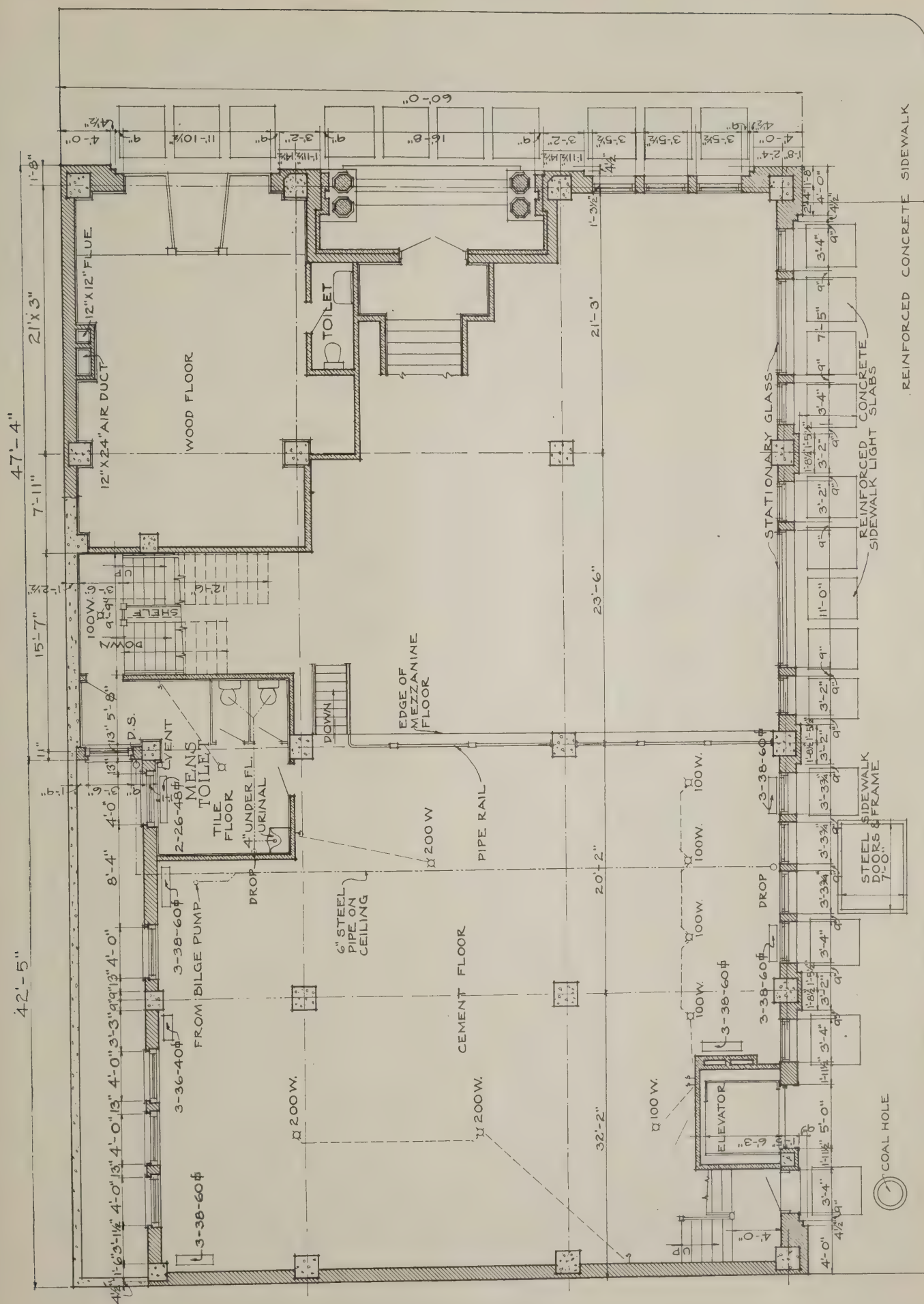


Assembly room

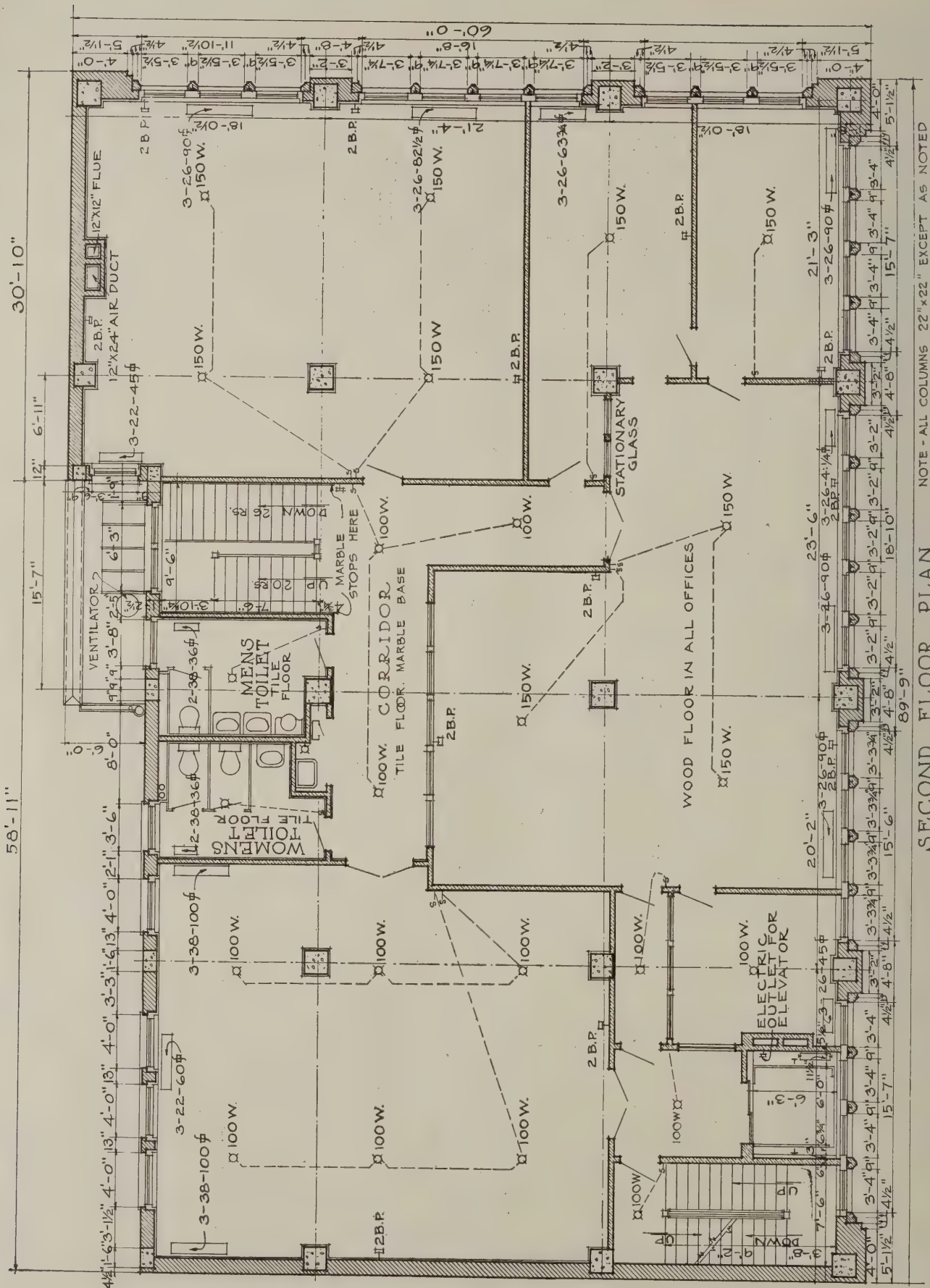


Press room

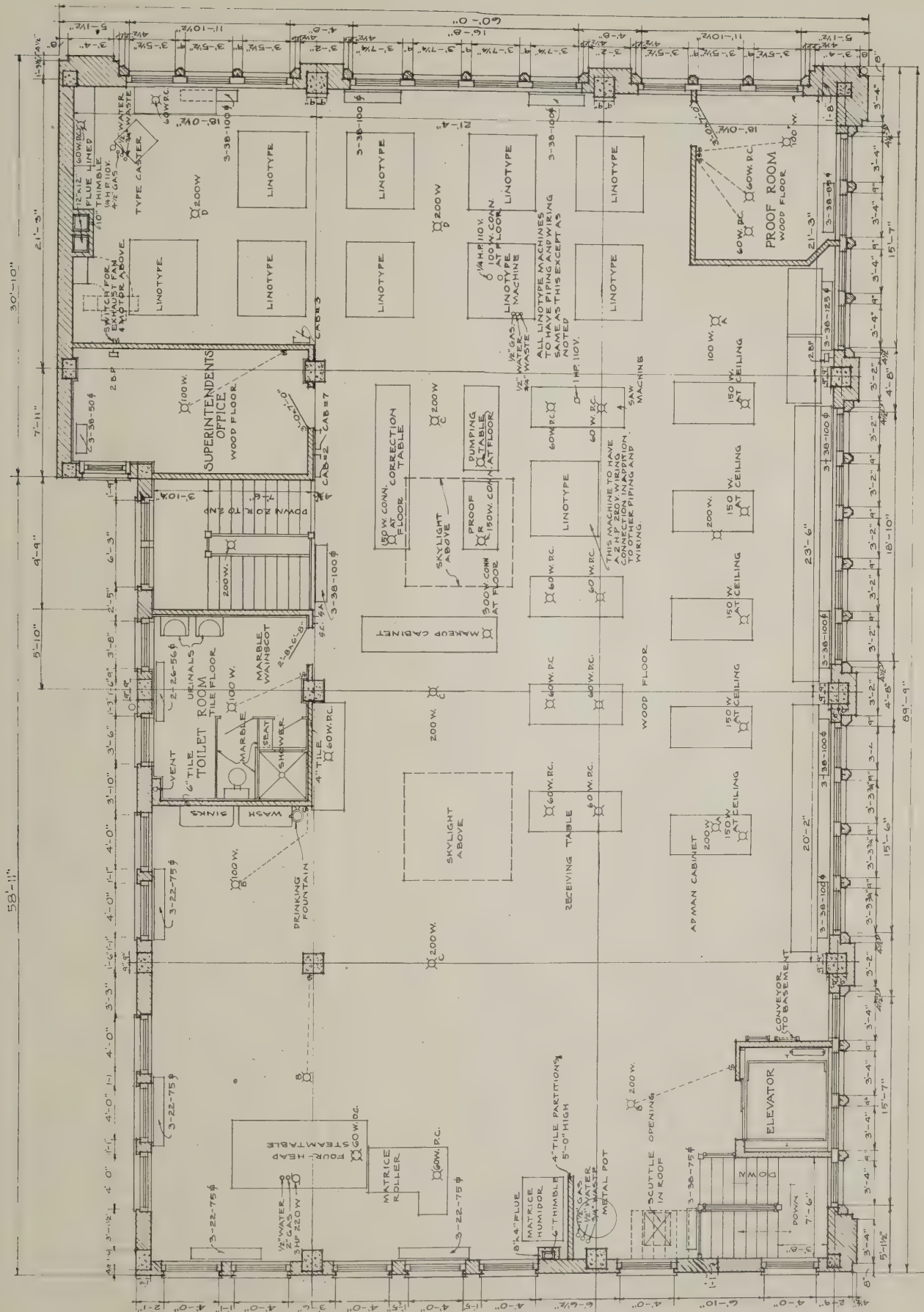




MEZZANINE PLAN.



SECOND FLOOR PLAN.



THIRD FLOOR PLAN

the brightest radiance with the least strain upon the eyes. The unusual heights of the rooms and the liberal floor areas permit an allowance of air space in proportion to the number of employes that is endorsed by all health authorities.

Building Described in Detail

The first floor containing the lobby, being much more than the remainder of the plant, a place of public resort, received at the hands of Architect Saxe a simple but artistic treatment which has been generally admired.

As one enters the main door he steps into a large public lobby with marble terrazzo floor and ornamental paneled ceiling. To his left is the black and white marble counter of the want ad department, and directly ahead is a similar counter for the use of the public in dealing with the cashier, subscription clerks and general accountants. Back of the counter is sufficient room for the entire executive and clerical force of the paper, and provision has been made for future growth.

The entire bookkeeping circulation and want ad departments operate on this floor as does also the general executive and his assistants. Though the entire building is non-inflammable a fireproof vault provides for keeping of all records, etc. The walls and ceilings of the first and second floors are finished with tinted plaster and with quarter-sawn white oak woodwork. This woodwork is finished in what is known as silver duotone, giving a dull greenish white effect, soft and pleasing to the eye. On this floor also is the girl's rest room.

To the right, going up, on entering the building, is a broad open stairway of marble, leading to the second floor, which is entirely devoted to the editorial and display advertising departments. The editorial quarters, large and roomy, occupy the entire Island avenue side of the building from the front to the rear. The society editor's department has a special room in front but the entire balance of the editorial and reportorial force do their work in a single spacious apartment where all can be in close touch with each other. Opening from the editorial room is a private office and library for use as required, and beyond that is the "ticker" room, where enter the leased wires of the Associated Press and United Press.

On the second floor also is a splendid well lighted room about 40 ft. square, which is used as an assembly room. It contains seating capacity for the entire office force when occasion calls for it and is generally used for large conferences and at other times as a recreation room for the force.

The display advertising department occupies two large rooms on the Main street side of the building. Twelve people are employed in the display advertising department.

The composing room is on the third floor (fourth, counting the basement). On this

floor system is carried to a fine point. The department as a whole is organized in two divisions, corresponding to the two kinds of typesetting to be done, news and advertising.

The news division is on the east side of the room and the advertising section on the west. Each has its separate arrangement for receiving and distributing copy. There is a battery of eight Mergenthaler linotype machines, four of them of the latest multiple magazine variety, and one of which works unceasingly on advertisements the other three working either on news or advertisements, as the case may require. Four machines constantly grind away at news alone.

On the news side the progress from the copy hook is to the linotype, to proof bank, to proof press, to correction bank and make-up table, all without retracing a step. The course is similar on the advertising side.

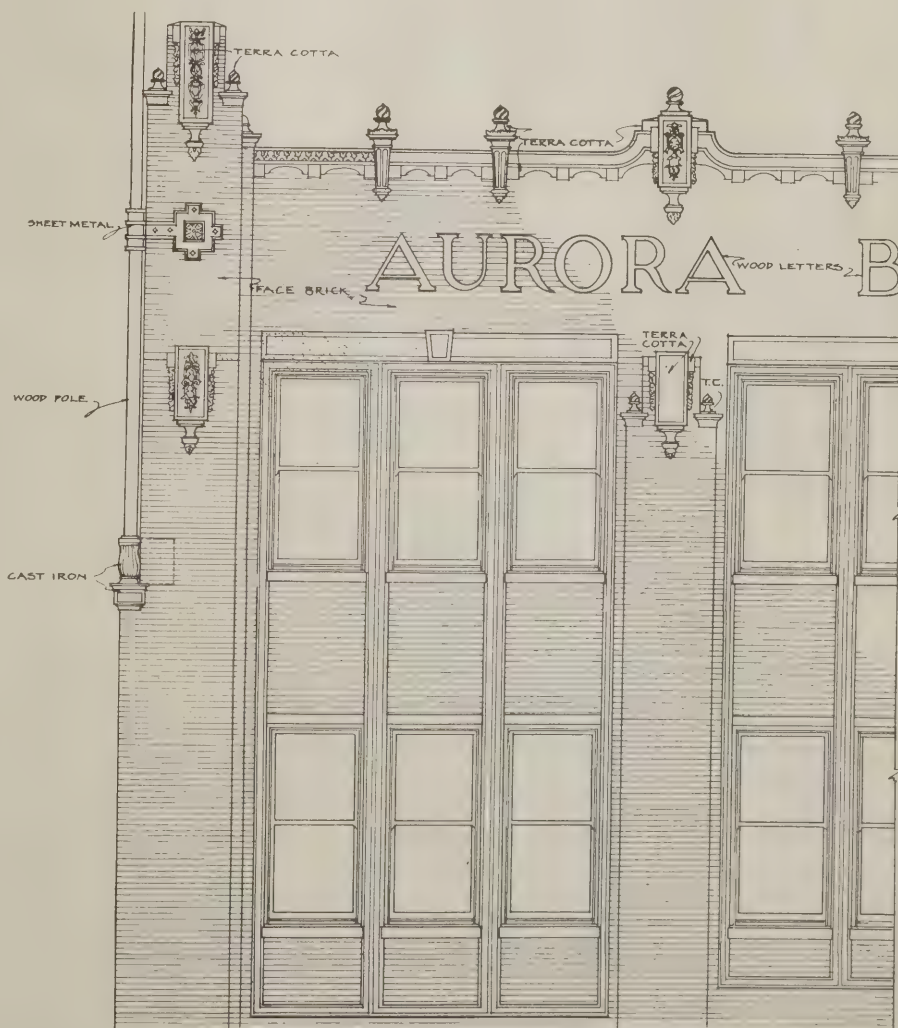
In the advertising division there are a number of combination make-up stands and type cabinets designed particularly for the *Beacon-News*. At each cabinet two men can assemble advertisements without getting in each other's way. Instead of the old fashioned single bank for slugs and leads, around which men were usually mill-

ing at once, each stand is provided with its own rack for slugs of all lengths within easy reach of the hand.

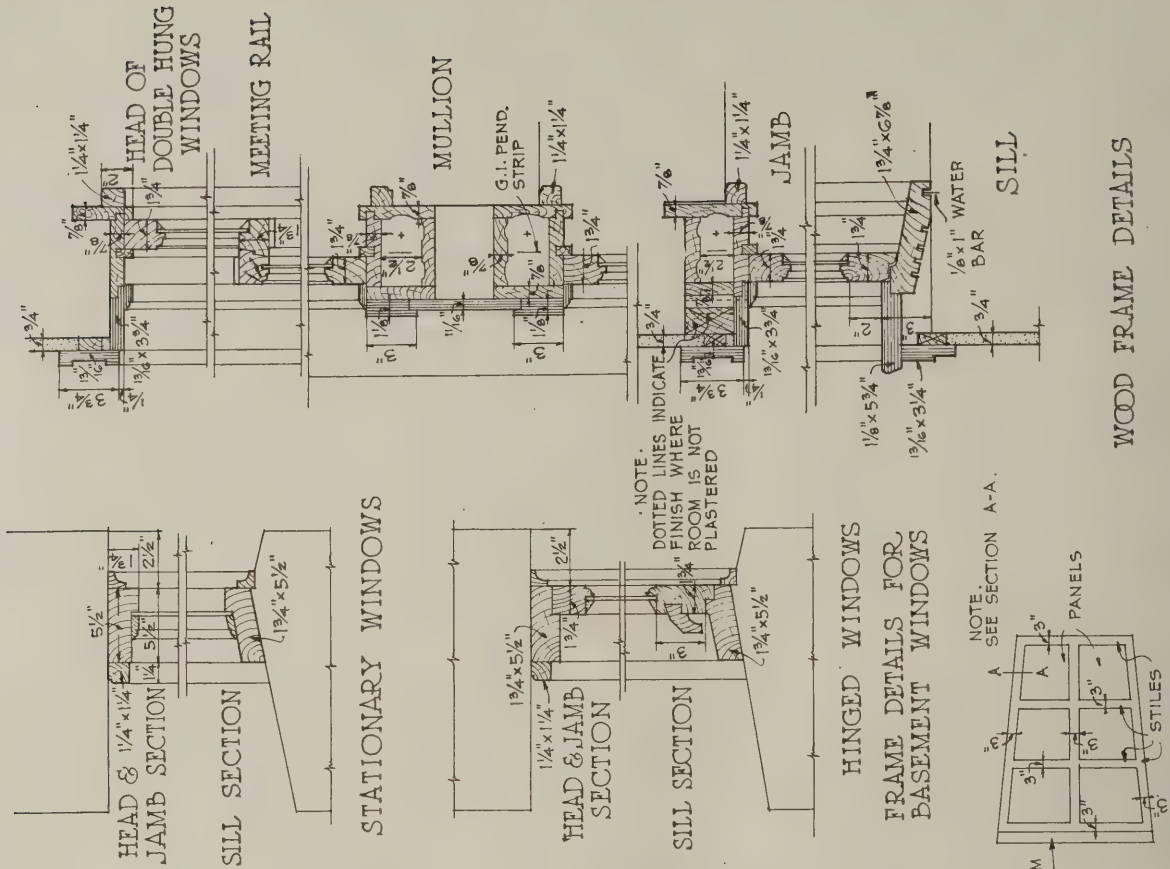
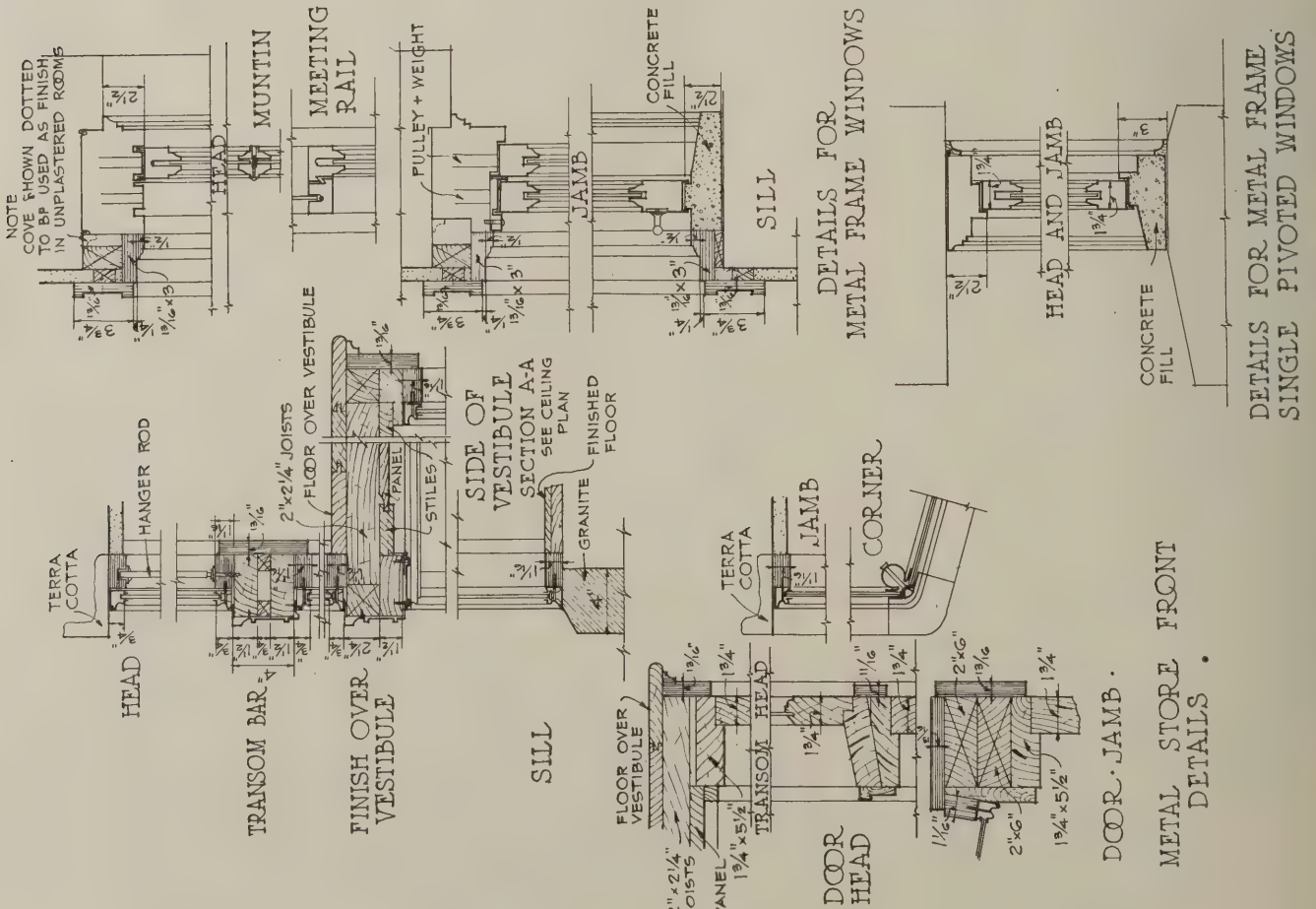
In the southwest corner of the composing room is the proof room. Proof reading demands insistent activeness of vision and the workers here receive some light from two sides. Specially constructed steel desks are of such a height that readers may stand or sit at their work with equal convenience. The sloping stands for copy may be raised or lowered or set at any angle as best suits the individual's eyes.

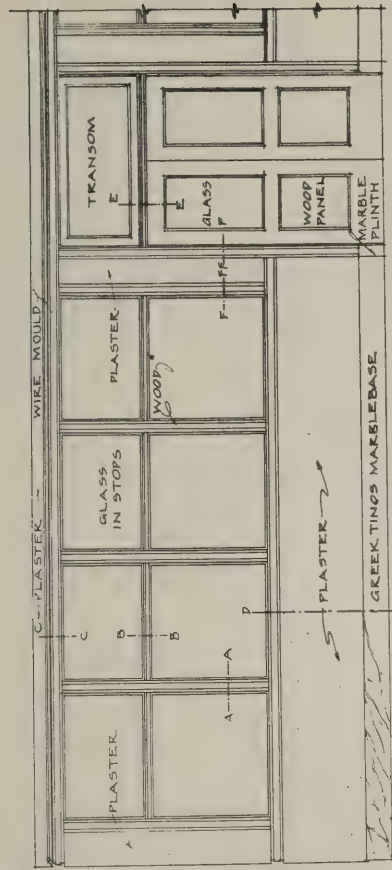
From the make-up tables in the composing room, where the news and the advertising type are assembled into the *Beacon-News* pages, the forms pursue the scheme of direct motion, proceeding to the extreme rear of the building where the first operation of stereotyping is accomplished.

The old steam table operation of stereotyping was abandoned when the new building was occupied and the more modern dry matrix system is now used. The form, containing a page of type, is shoved into a roller matrix machine; a sheet of matrix paper laid thereon covered with felt and cork pads and then passed under a powerful steel roller that exerts a pressure of 1,000 pounds to the square inch.

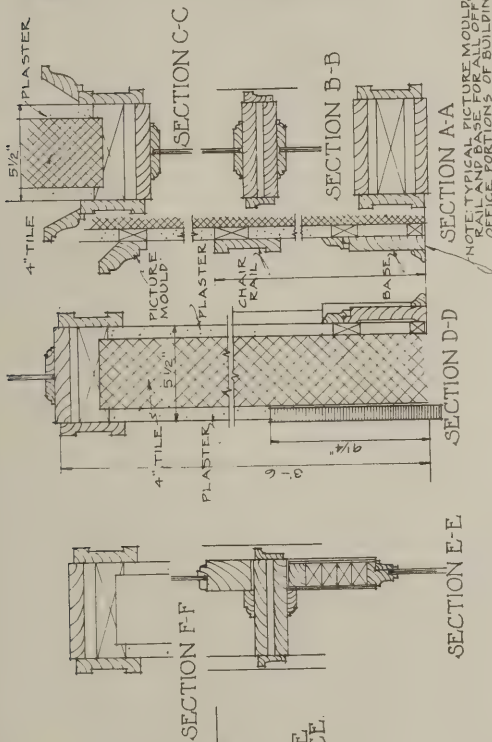


DETAIL OF STREET FRONT ELEVATIONS

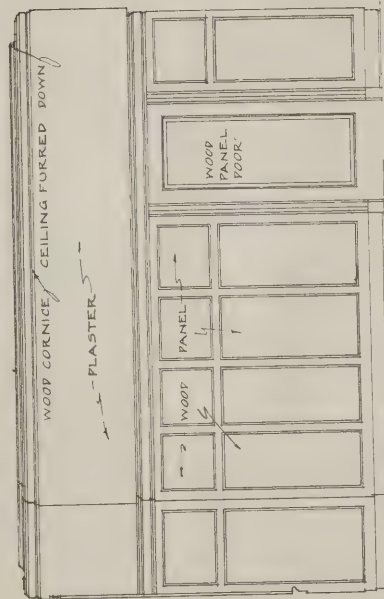
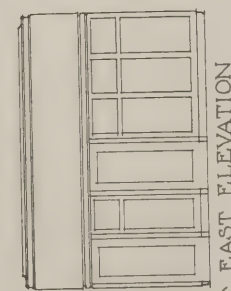
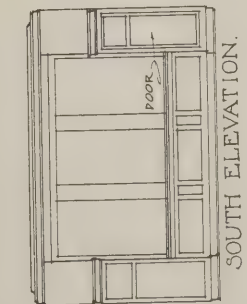
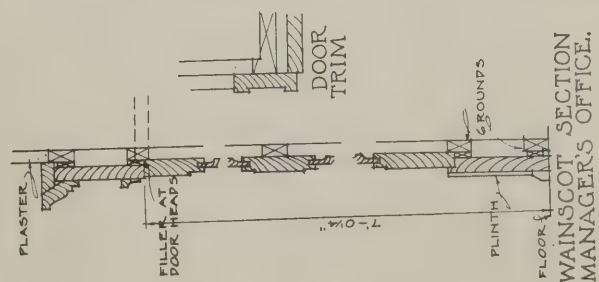




DETAIL OF 2ND STORY CORRIDOR WALLS.
PARTITIONS AT LIBRARY SIMILAR
WITHOUT MARBLE.

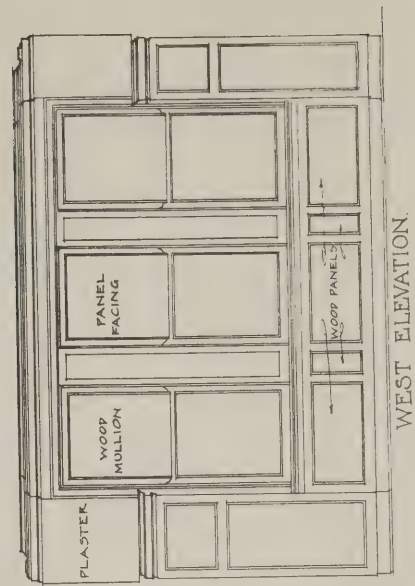


NOTE: TYPICAL PICTURE MOULD, CHAIR
RAIL AND BASE FOR ALL OFFICES AND
OFFICE PORTIONS OF BUILDING.

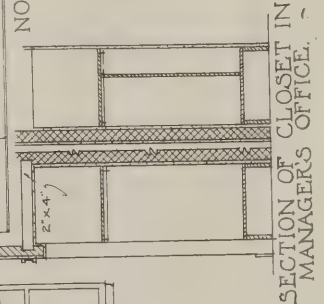


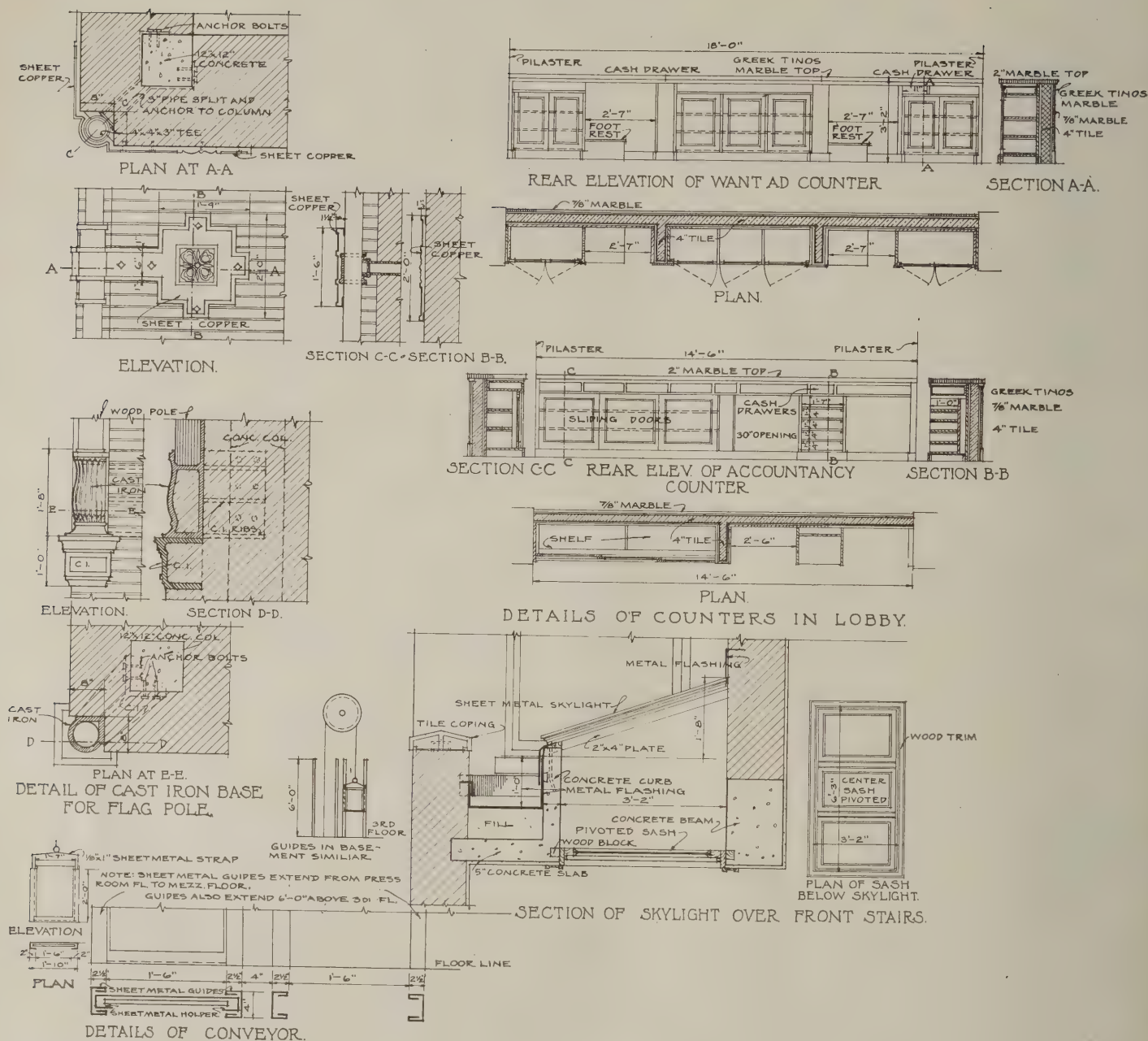
NORTH ELEVATION.

ELEVATIONS MANAGER'S OFFICE.



WEST ELEVATION





This operation completed, the entire type page is ready to be junked into the truck which takes it to the melting pot to be made into fresh metal for the next day's work.

The matrix thus made is sent through a chute to the basement of the building. Here it is fitted into a curved casting box. Molten metal is then pumped into the casting box and in just a few seconds of time the operator has a semi-cylindrical plate bearing type faces the exact reproduction of the type from which the matrix is made.

This plate finished, is clamped on the cylinders of the big press and with its fellows, is ready for its work of printing the paper.

Provision has been made in the press room for an octuple press or one double the size of the present machine, which is now running practically at its limit. The

foundations and pit for the new press were all prepared at the time the building was constructed and it is expected that the need for the new machine will be sufficiently great to cause its installation within the next year or two.

After the papers issue from the press they are carried on a constantly moving belt carrier from the press room to the mailing and delivery rooms. The employees here tie the papers into bundles for carriers' routes in the outlying districts of town and for the surrounding towns. The mailing machines stamp the names and addresses of mail subscribers on paper. The papers are then thrown into the mail sacks for different trains, saving the postoffice operatives much labor and making possible the catching of all trains without delay.

About 70 of the 100 carrier boys in Aurora receive their papers direct at the *Beacon-News* office. The others get their papers

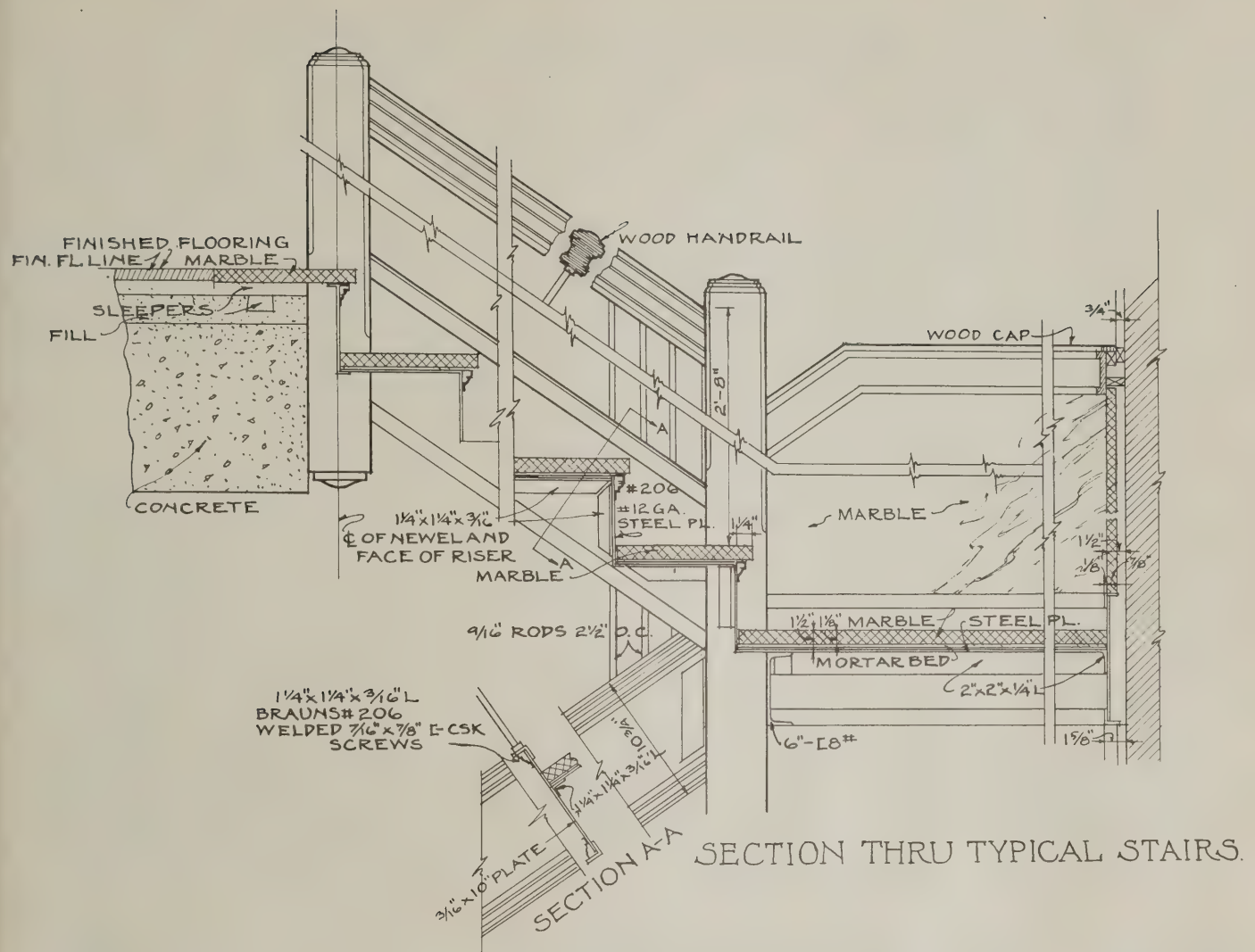
in the outlying districts at the end of the street car lines.

Structural Details

The foregoing describes many conspicuous features in a popular manner. Many of the structural details are shown in the illustrations herewith and require no other description.

The building, as already noted, stands on the bank of the Fox river and in order to avoid special provision to have the basement floor and walls waterproof, the grade of the basement floor was changed from the original figure 12 ft. 4 in. below grade to 9 ft. 7 1/2 in. below grade. This avoided double walls and floors and waterproof membranes of bituminous material. However, all the concrete used in the floors and basement walls was mixed with an integral waterproofing compound.

Wherever cinder concrete was used the



mix was 1 cement, 3 sand, 5 screened boiler cinders. The cut-stone trim was all set and pointed with lime mortar. The terra cotta was set in lime mortar tempered with 30 per cent (by volume) portland cement. The brick were laid in a tempered cement mortar composed of 1 part lime putty, 2 parts sand, and 10 per cent by volume of portland cement. For the clay tile partitions this same mortar mix was used.

All wood floors are laid on beveled 2x4 in. common pine sleepers, 12 in. centers, dressed on top and laid with tops level. The store floor and the first and second floors are 13/16-in. kiln-dried maple flooring. Before the finished wood floors were laid on top of the sleepers, a layer of waterproof felt was applied lapped 3 in. at every joint, thus insuring water tight floors, should a fire occur on any one floor.

The toilets on all floors are equipped with marble wainscots, stalls and base. The counter tops and low wainscots and base in the main lobby and vestibule are marble, as are also the stair treads and other details on the main floor. The floors in all the toilets are 1-in. hexagonal white ceramic tile. In the main lobby and vestibule the floors are 6x6-in. gray Ohio flint tile. For bedding the tile floors cement

grout mixed 1:3 was used.

Wherever plaster was applied direct to the concrete walls or ceilings a treatment of "Dun-Dun" plaster bond was first used. For all lavatories and toilet rooms the United States Gypsum Co.'s "Imperial" hard plaster was used. All other parts of the building were plastered with standard lime plaster and a lime-putty finish coat. On all except metal lath plaster was applied in two coats; on metal lath three coats. The toilet room finish coats are the United States Gypsum Co.'s "Adamant" finish. Lime plaster was of the mix 1 lime putty, 3 sand. The finish coat was lime putty tempered with plaster of Paris.

Power Required

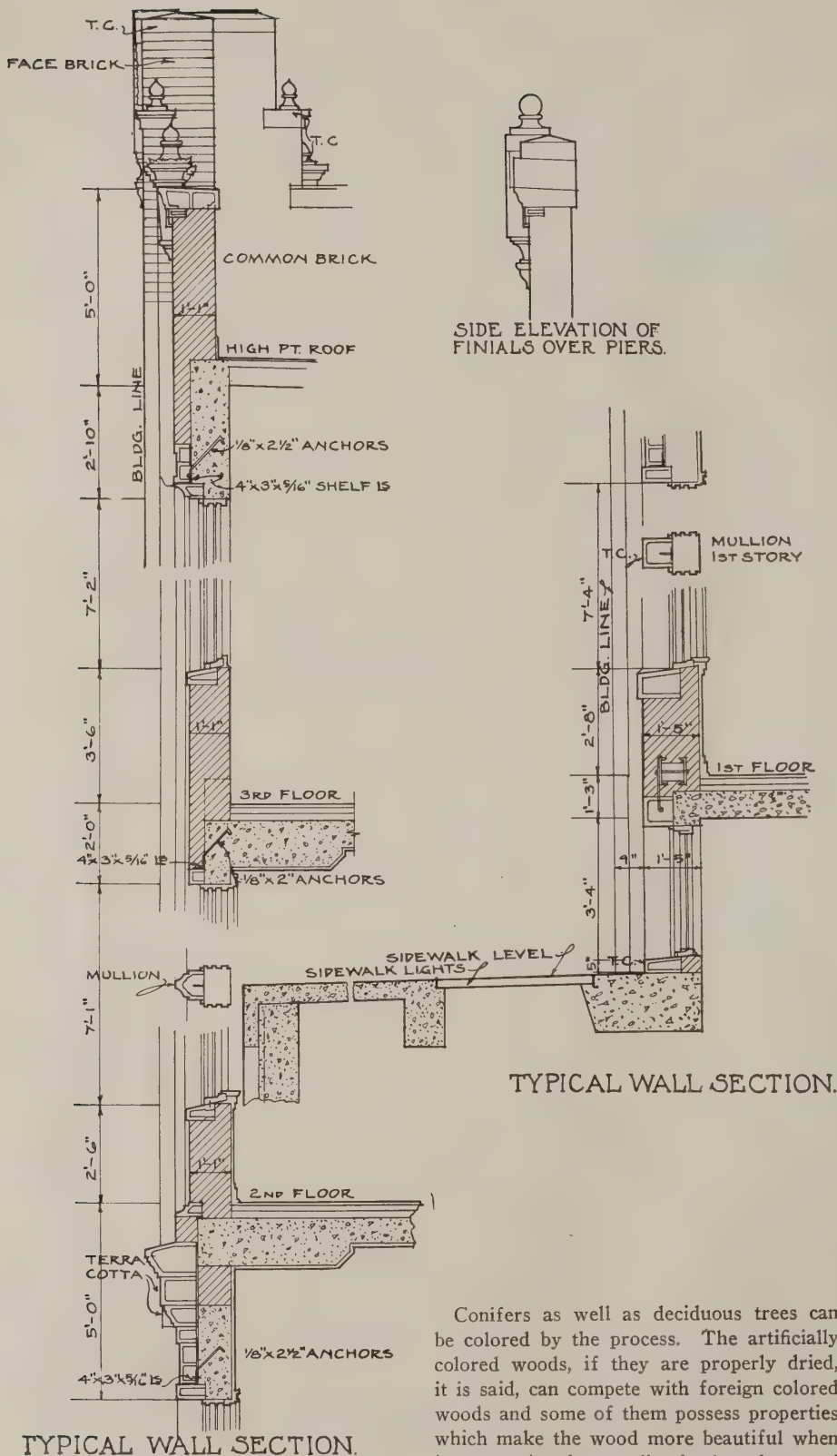
Power for operating this newspaper plant is received at 110 to 220 volts, 2-phase and 3-phase 60-cycle alternating current. The power requirements are 35 h.p. for the press now in use; 50 h.p. for the projected new press; 27 h.p. for the elevator (to be installed); 2 h.p. for the paper-roll hoist at the north press; 2 h.p. for the hoist at the south press; 2 h.p. for the plate shaver; 3 h.p. for the tail cutter; 1 h.p. for the plate router; 1 h.p. for the saw and trimmer; 5 h.p. as a spare. On the

third floor provision was made for 3 h.p. on the matrix roller, 2 h.p. on the linotype machine, 1 1/2 h.p. on the exhaust fan, 5 h.p. as a spare. On the third floor are also provisions for ten 1/4-h.p. linotype machines, 1 h.p. for saw; 1/4 h.p. for type caster; 1/8-h.p. bench drill; 1 h.p. for two exhaust fans in the skylight, and 5 h.p. to spare. One of the linotype machines referred to requires the 2 h.p. noted for an electric heater of the type metal.

Dyes Wood of Living Trees

THE U. S. Department of Commerce has received a report from Consul Anslinger, Hamburg, giving further details on the Reimann process of dyeing living trees. Reimann experimented for ten years before his process was a real success. Recent experiments have resulted in dyeing a tree from its roots to its leaves without greatly disturbing the functions of the tree's vital system.

Consul Anslinger states that a remarkable feature of the discovery is that not only can the wood be dyed to pure color tones but various color shades can be obtained in a natural way. The process of dyeing requires from two to five days, de-



TYPICAL WALL SECTION.

foot above the ground. With a number of boring machines in operation 12 trees of 35 cubic feet each (one carload) have been completed daily."

Fire-Retarding Chemical for Wood

W. O. BANFIELD and W. S. Peck, in the *Canadian Chemist and Metallurgist*, report that factors influencing the choice of fire-retarding chemical for wood are: Salt must not attract water too much or the wood will always be damp. It must not affect tools of workman and also any metal fittings applied to the wood. It should not be poisonous in case a splinter should enter a person's hand. It should be fairly effective at low concentrations. It should not be volatile at ordinary temperatures nor soluble if used for outside work. It should not affect the strength of the wood nor affect any decorative coating applied over the wood. Thus, it seems that the search for practical retardent chemical is beset with great difficulties, for those salts that are readily obtainable fail in one or more of these seven conditions. Chemicals tested fall into three classes. The fire promoters are cupric chloride, bismuth chloride, ferric chloride, alum, barium sulfate and stannic chloride. Those that have little effect on the wood are ammonium chloride, sodium chloride, boracic acid and aluminum sulfate. Those that have a fire-retarding effect are zinc chloride, mixture of phosphate and borax, magnesium chloride, calcium chloride, ammonium sulphate, ammonium phosphate, borax, sodium silicate and zinc ammonium phosphate. Ammonium phosphate was best of all tested, since it gives off an incombustible gas, ammonia, leaving orthophosphoric acid that melts and covers fibers of wood.

Investigations in Paint

J. R. MacGREGOR, in the *Canadian Dyer and Color User*, offers the conclusions that we will continue exterior application of paint along the lines we are at present using until we find a pigment that will chemically combine with the oil so that when shrinkage develops no small air pockets around the pigment particles will be developed to cause extremely rapid chalking. If we find a pigment that does combine with oil, the compound so formed must be elastic or plastic so that extreme hardness will not be developed which would cause the paint to peel. Zinc paint does not flow so well as lead paint and it therefore does not permit the oil to penetrate the wood to same extent as lead paint. Zinc paint has greater cohesion or hardness and at the same time less adhesion to surface than lead paint. This results in peeling. Paint perishing is due to shrinkage developed within the film itself.

pending on the character of the soil, climatic conditions and the kind of wood. After the tree has absorbed the color it is felled in eight days and sent to the sawmill. The colors introduced are said to be permanent and unchangeable. Wood colored by this process is said to be strengthened by the dye displacing the natural sap of the tree.

Conifers as well as deciduous trees can be colored by the process. The artificially colored woods, if they are properly dried, it is said, can compete with foreign colored woods and some of them possess properties which make the wood more beautiful when it ages. Another quality is that the wood hardens and therefore is splendidly adapted for polishing. As any shade can be obtained the most gaily colored furniture may be fabricated.

In briefly describing the mechanics of the process Consul Anslinger says: "A boring machine was constructed with a number of parallel augers working together. Holes were bored through each way, forming a lattice-like division of the trunk about 2

National Builder Style Sheet



House No. 507—Architects' Small House Service Bureau. See plans on page 41



House No. 510—Architects' Small House Service Bureau. See plans on page 41



House No. 655—Architects' Small House Service Bureau. See plans on page 42



House No. 669—Architects' Small House Service Bureau. See plans on page 42



Six-room brick colonial house. The Russell Brown Co., architects and builders, Houston, Texas. See descriptive article, working plans and details, pages 44 to 50



Ideal American home built at Larchmont, N. Y. J. Floyd Yewell, architect, for "Own Your Home" Exposition, Inc. See plans and description, pages 51 and 52



House C-119—E. W. Stillwell & Co., architects, Los Angeles, Calif. See plans on page 42



House built by Medford Construction Co., Medford, Ore., from plan 1175-E of the Hollow Tile Association



Aeroplane bungalow—Southern Pine Association, New Orleans, La. See plan No. 1085, page 43



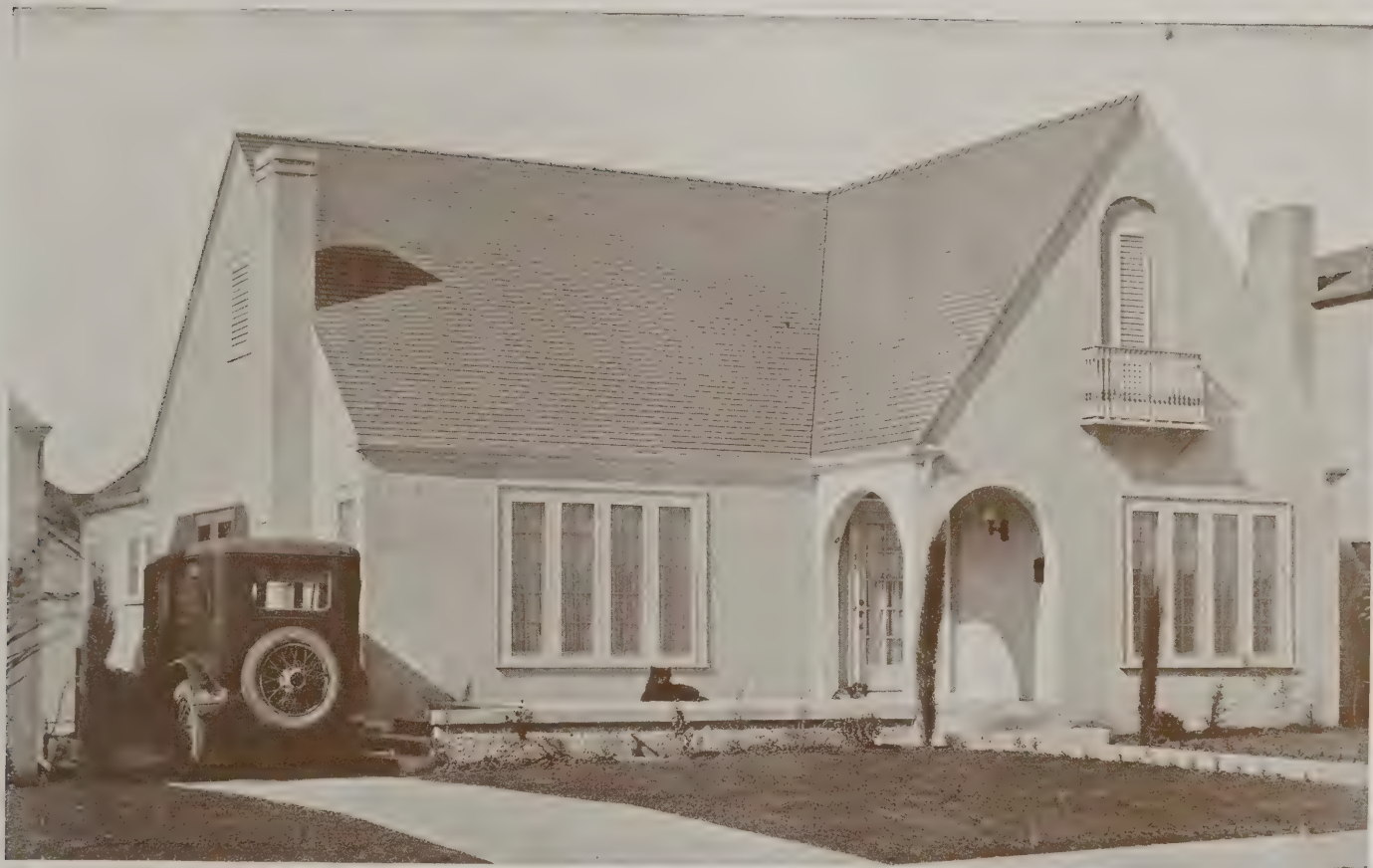
Bungalow 1145—Southern Pine Association, New Orleans, La. See plan on page 43



Bungalow design 1253, by Southern Pine Association, New Orleans, La. See plan on page 43



Admirers of the English cottage type who desire a good porch will see in this design a tasteful combination of the two in this design, No. 49590



Following no particular style to the last detail, but showing a skillful combination of several, this California bungalow, No. 50507, is worthy of study



Another California bungalow, No. 47955, reminiscent of the style very popular a half dozen years ago



The dignity of the Italian villa is imparted to this little cottage by the door-windows and the little balcony above the entrance. Plan No. 50577



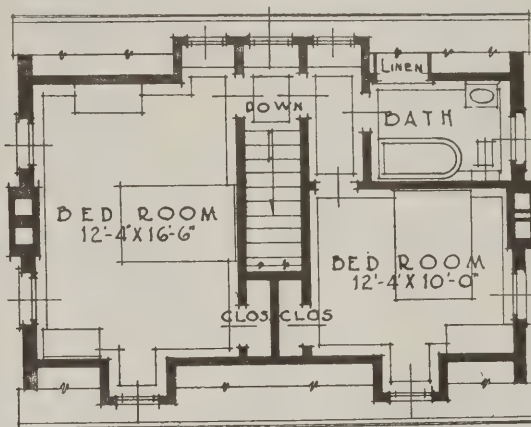
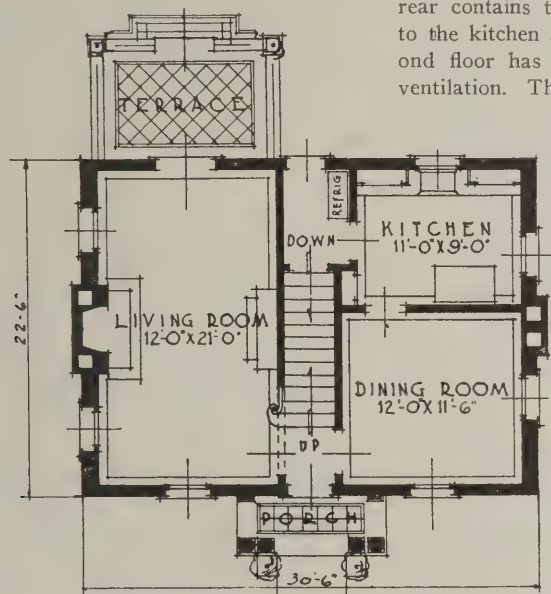
Much of the attractiveness of the cottage is due to the spacing of the casement sash and their divided lights. Plan No. 50794

Floor Plans of Style Sheet Houses

PLAN No. 507, designed by the Architects' Small House Service Bureau, Inc., as illustrated in the Style Sheet, is that of a five-room Colonial type brick house, recently built in Denver, Colo. The exterior is red

fireplace and two built-in bookcases. French doors lead from the hall to the dining room and from the living room to the terrace. Practically all the work in the kitchen may be done from one side, thus lessening the work. A passage from the outside and rear contains the ice-box and gives access to the kitchen and the basement. The second floor has large bedrooms with cross-ventilation. This house has hot-air heating.

Style Sheet was made from that building. There is a large living room, a sleeping porch connected with the two bedrooms, a good-sized dining alcove and a garage built into the house. Both garage and house are heated with hot water and an automatic water heater insures the convenience of hot water at all times. The basement is fully excavated, with heating room, laundry, pantry, fuel room and large store room. The



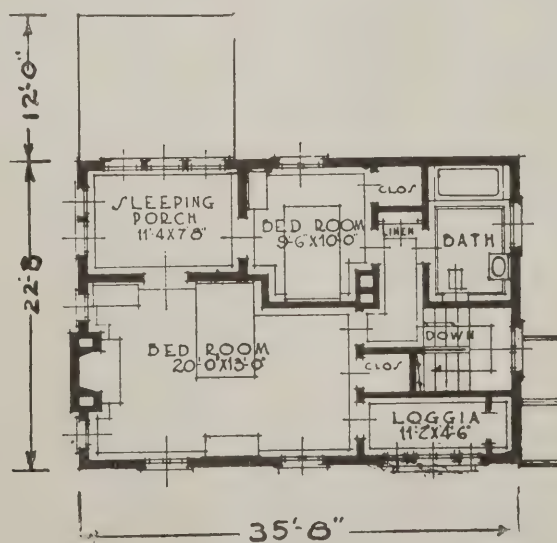
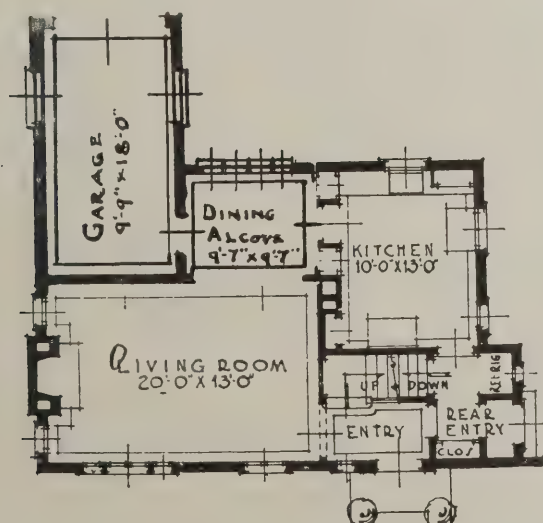
House No. 507—Cubic contents about 16,500 feet. See design on page 33 of Style Sheet

brick with white trim, walks and steps are of cement. The floors are of oak on the first floor and edge grain pine on the second floor. The walls are white plastered, and the basement also is plastered. The

House No. 510. Cubic Contents About 18,000 Feet

This house is built of 8-in. hollow tile with stucco finish in pale apricot color and white trim. The foundation walls are of

entire house is plastered, including the garage and basement rooms. There is a cement floor in the garage and cement drive from the garage to the alley. The living room has a brick fireplace and hearth.

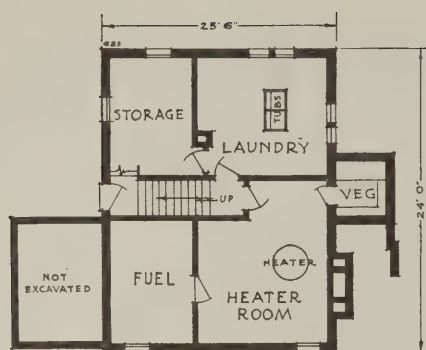


Floor plans of House No. 510. See page 33 of Style Sheet

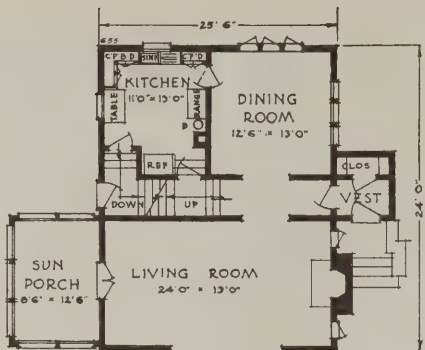
woodwork in all the rooms but the kitchen and bathroom is stained, shellacked and varnished. The generous size of the living room is a notable feature with a handsome

concrete and the roof shingled. It is designed for a 50-ft. lot and is suitable for any part of the country. It was recently built in Denver, and the photograph in

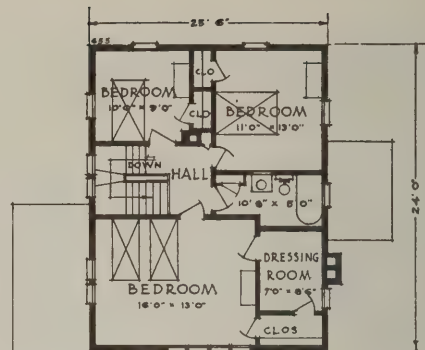
Plain oak flooring is used on the first floor, edge grain pine on the second, all finished in light brown. The bathroom has white glazed tile floor and a pale blue



BASEMENT
CEILING HEIGHT 7'4"

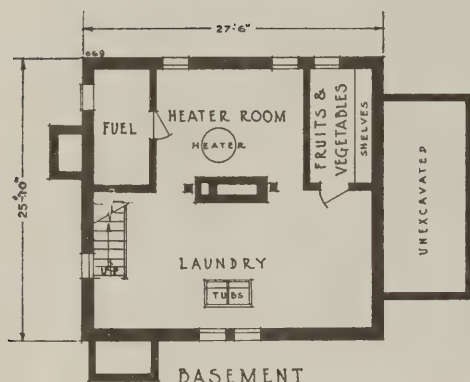


FIRST FLOOR
CEILING HEIGHT 8'4"

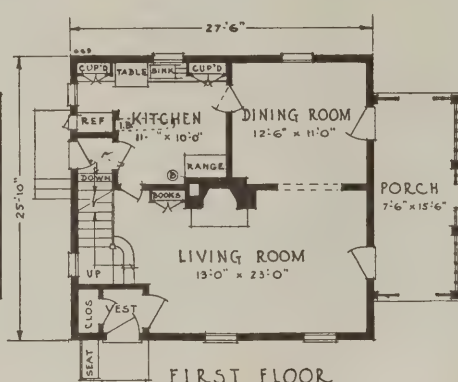


SECOND FLOOR
CEILING HEIGHT 8' 0"

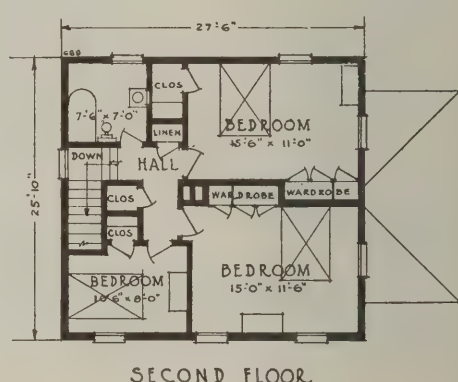
Floor plans of House No. 655. See perspective on page 34



BASEMENT
CEILING HEIGHT 7'0"

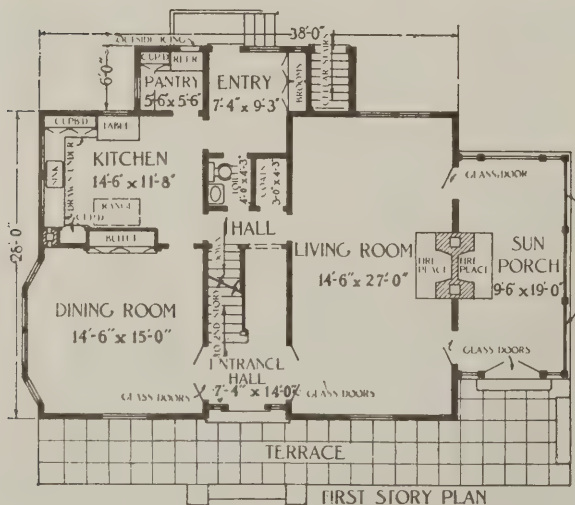


FIRST FLOOR
CEILING HEIGHT 8'6"

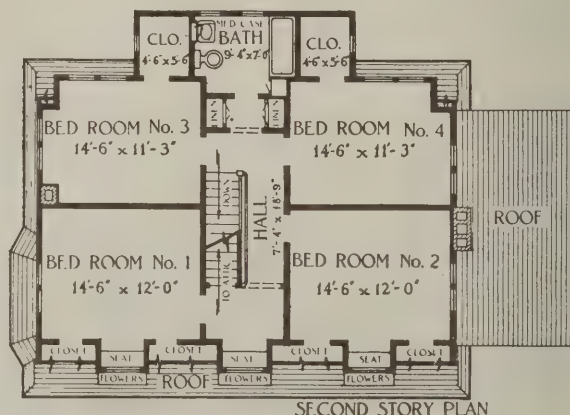


SECOND FLOOR
CEILING HEIGHT 8'0"

Floor plans of House No. 669. See perspective on page 34



FIRST STORY PLAN



SECOND STORY PLAN

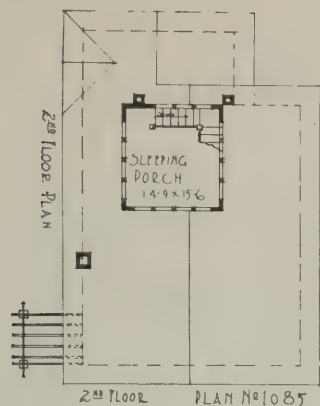
Floor plans of House C-119. See perspective on page 36

glazed tile wainscot six feet high. All interior trim is white pine. The staircase, first to second floor, is birch, and the doors are birch, mahogany finished. All interior woodwork, except in bath and basement is ivory enamelled. Basement woodwork is painted grey. The kitchen and bath trim is finished in white enamel and all walls are finished in French grey. There are built-in china cupboards in the dining alcove and built-in cupboards in the kitchen.

House No. 655. Contents 26,257 Cubic Feet

This is a six-room full two-story house with frame walls, brick veneered to the height of the first floor window sills and stuccoed from thence to the roof. The roof is shingled. The chimney, outside front steps and posts are of brick. The plan provides a full basement and requires a 50 ft. lot. This house is very suitable for a corner as its exterior is presentable from

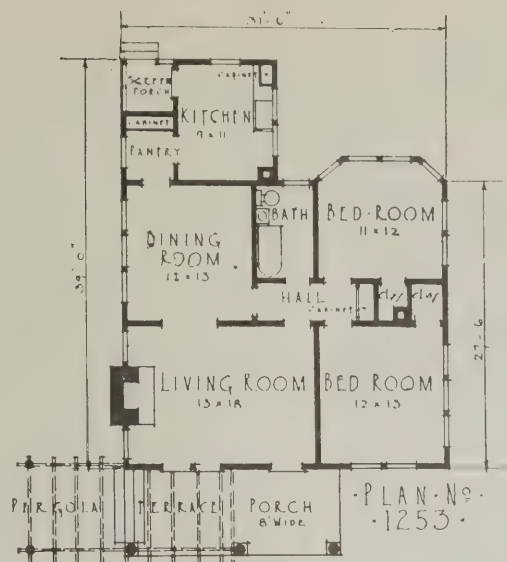
every side, though it would be advisable to give the sun porch southern exposure. The entrance being on one side the full front of the house can be devoted to provide a spacious living room, indeed the impression of commodious space is imparted by the first floor openings. A cased opening separates the hall from the living room and there are double French doors with glass panels between the hall and dining room, permitting the dining room to be



See perspective on page 37



See perspective on page 37



See perspective on page 38

good location for a radiator with a seat built over it. A full length glazed door divides the living room and sun porch. A large bedroom running across the full front of the house has numerous windows and is

as good as a sleeping porch in that regard. Opening from this is a smaller room with outside windows and cross ventilation from the larger bedroom; this can be used as a child's bedroom, dressing room or sewing room. The other sleeping rooms have windows on two sides and each room has a clothes closet. There is a linen closet in the upper hall.

House No. 669. Contents 21,945 Cubic Feet

This New England Colonial 6-room house is full two stories with full basement and large storage space in the attic. It is planned for not less than 45 ft. frontage but if the living porch is omitted a smaller frontage can be used, but at a considerable sacrifice to the effect. Foundation walls are solid concrete. Structure is frame with six-inch exterior siding covered with outside white paint. Roof is laid with fireproof shingles. Roof and ceilings are insulated. Interior finish is birch covered with snow white enamel, also vitrolite enamel. Heating plan is of hot water. Fireplace is tile faced with colonial wood over mantel. Floors are maple stained dark. Green blinds are used outside.

A Community Workshop

Members Help Each Other

AN opportunity for builders to promote co-operative workshops for farmers is to the fore. Writing from Morgan county, Ohio, F. R. C. contributes to the *Pennsylvania Farmer*, a report of the initiation and progress of a farmers' community workshop, in which there is a strong indication of the modern trend for co-operation. He says: "One of the best community investments I have yet found, is a workshop, located a few miles from my home. The farmers of that neighborhood fitted out a shed with tools, at very little cost; and they estimate the idea has saved them at least \$200 in time and money during the last two years. I spent a day there recently and learned how they did it."

"Our method is simple," said Mr. Ed Mott, the organizer, "and it can be easily copied by a group of farmers anywhere. We started our community workshop one day during the winter season by signing a bunch of ten farmers. Each man agreed to furnish \$3.00 worth of working equipment. This consisted of tools, anvil, bolts, taps and lumber. Nearly all the material was second-hand, or something which the farmer had already on the place. When all was gathered together, we had two anvils, work bench, forge, two saws, set of chisels, hammers of three sizes, a brace with bits, some tongs and an axe. We also had lumber of several kinds. It was our starting equipment and with the exception of a few tools added later, it has served us in all farm repair work.

"We agreed to operate our shop on a service basis. No money was to change hands. Each signed member is privileged to enter the shop at any time and have free use of all the tools. He may bring any repair work, shoeing, or making implements, and if the job is too big for one man, we agree to assist him in exchange for like work. After we were started, we found two farmers in the lot who had previously been blacksmiths. These were given the shoeing and welding jobs. Others were handy in woodwork, etc., so we learned that we could use our talent to help each other. We also had these restrictions: No farmer was to use the tools for work outside our ring; nor could they take a tool from the shop, except in certain instances. The workshop was fitted with a lock, and a key was made and given to each member. He agreed not to loan this key to outsiders.

"Since then we have systemized our work. Many rainy days are spent in the workshop, and before the busy season comes we often set aside one day of each week when we meet and get our implements in shape. We do nearly all kinds of general repairing, and the work is as durable as that turned out by most shops. We order our supplies together at a saving. But perhaps the main point is that we can always get our work done when we want it. There are no 'turns,' nor are we bothered by labor fluctuations."

shut off when desired. High casement windows in the rear of the dining room allow wall space for a serving table or buffet beneath them. The living room fireplace is at one end on a direct axis with the sun porch. A group of windows in a bay across the front of the living room affords an attractive outlook, and also provides a

Six-Room Brick Colonial House



Two views of exterior. See large photographic elevation on page 35 of Style Sheet

THE Russell Brown Co., architects and builders, of Houston and Dallas, Tex., are an organization which specializes in high class residential building. While they build as contractors to other architects' designs they put particular stress on their ability to give 100 per cent service from design to complete interior finish. Many of the new houses in the best residential districts of Houston, where the home office is, and in Dallas, are of their building.

A recent example of their work, both design and construction, is the brick colonial house shown in detail herewith. This house is in Houston, and is further evidence of the growing taste for the colonial type of residence in this southern city.

The details are interesting as showing how an eastern and northern type of building is adapted structurally to southern methods of construction. This house, like most houses in the south, has no cellar. The concrete footing and brick wall foundation are shown in the detail of the wall section, and in the plan. The joists run the long way of the house, supported on the inside by 6x6-in. girders resting on 8x17-in. brick piers. The face-brick walls do not rest directly on the concrete footings but on walls and backing of common brick. It will be noted that the footing is reinforced with steel bars. The soil of Houston is a gumbo which shrinks and swells with alternate wetting and drying and it is possible that under such conditions the footing is placed under bending stresses. For the same reason the detail of the front entrance and stairs is instructive as showing how one of the most experienced builders in Houston provides for such contingencies.

The first-floor layout is an interesting example of the ancient colonial central-hall plan utilizing the rear end of the hall for

an up-to-the-minute breakfast room. Two attractive features of this breakfast room are the window seat and the cabinet under the stairs, thus making use of every inch of available space.

The heating of this house is provided for



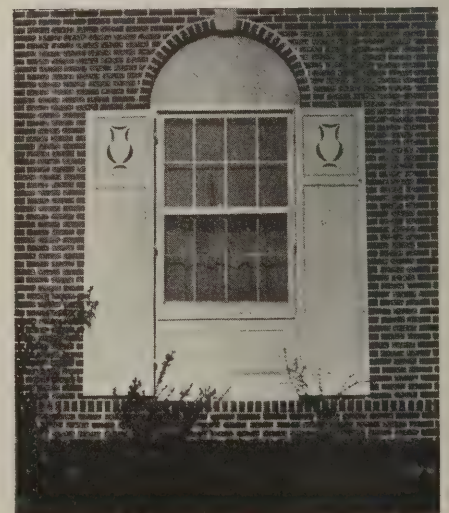
Entrance detail

by an "Arcola" hot-water heater in the kitchen. There are five radiators downstairs and four upstairs, operated by this heater. Of course, such a small furnace would not answer for a house of this size in the north, but in Houston this type of heating is growing rapidly in popularity. Hitherto no permanent provision for heating was made in

many houses of this class, dependence being had in spells of cold weather on gas and electric room heaters.

The upstairs floor plan shows a favorite arrangement of houses that are built with the comfort of the owner in mind, rather than as a show place with the greatest possible number of rooms. One large master bedroom, practically 14 ft. square, occupies the favored location. Opening out of this is the "sleeping porch," which, as the plan shows, is really not a porch at all but an airy annex of the larger room.

It will also be noticed that by an extra door from the larger bedroom into the bathroom, the effect of a private bathroom is had. Numerous other details will be noted, which have been found by these long-experienced builders to have a lasting appeal to customers of taste and discrimination.



Window detail



• F R O N T •



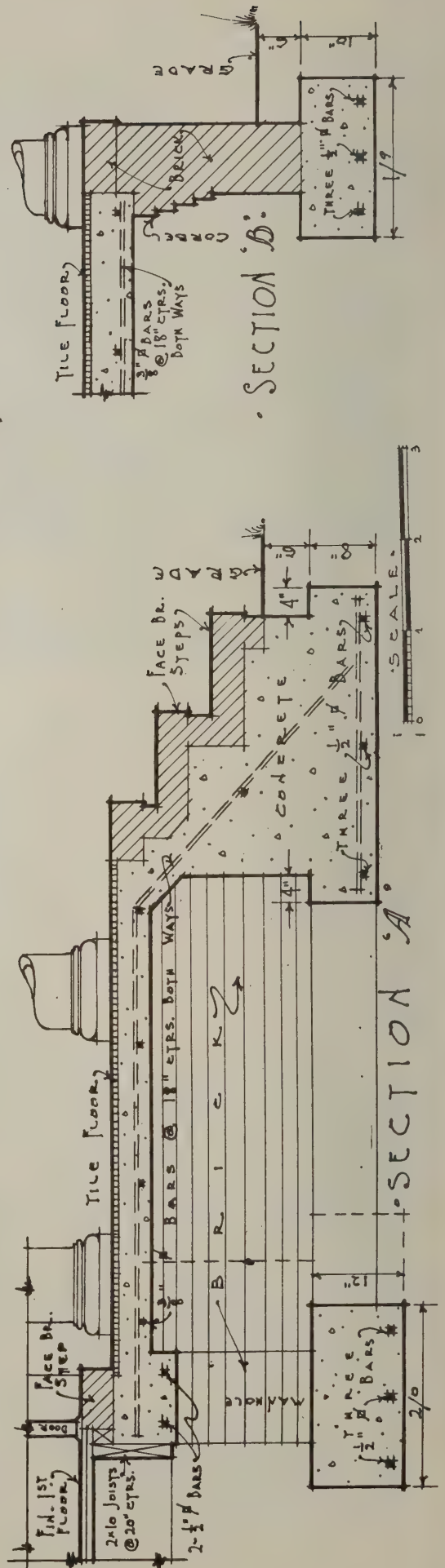
• R E A R •

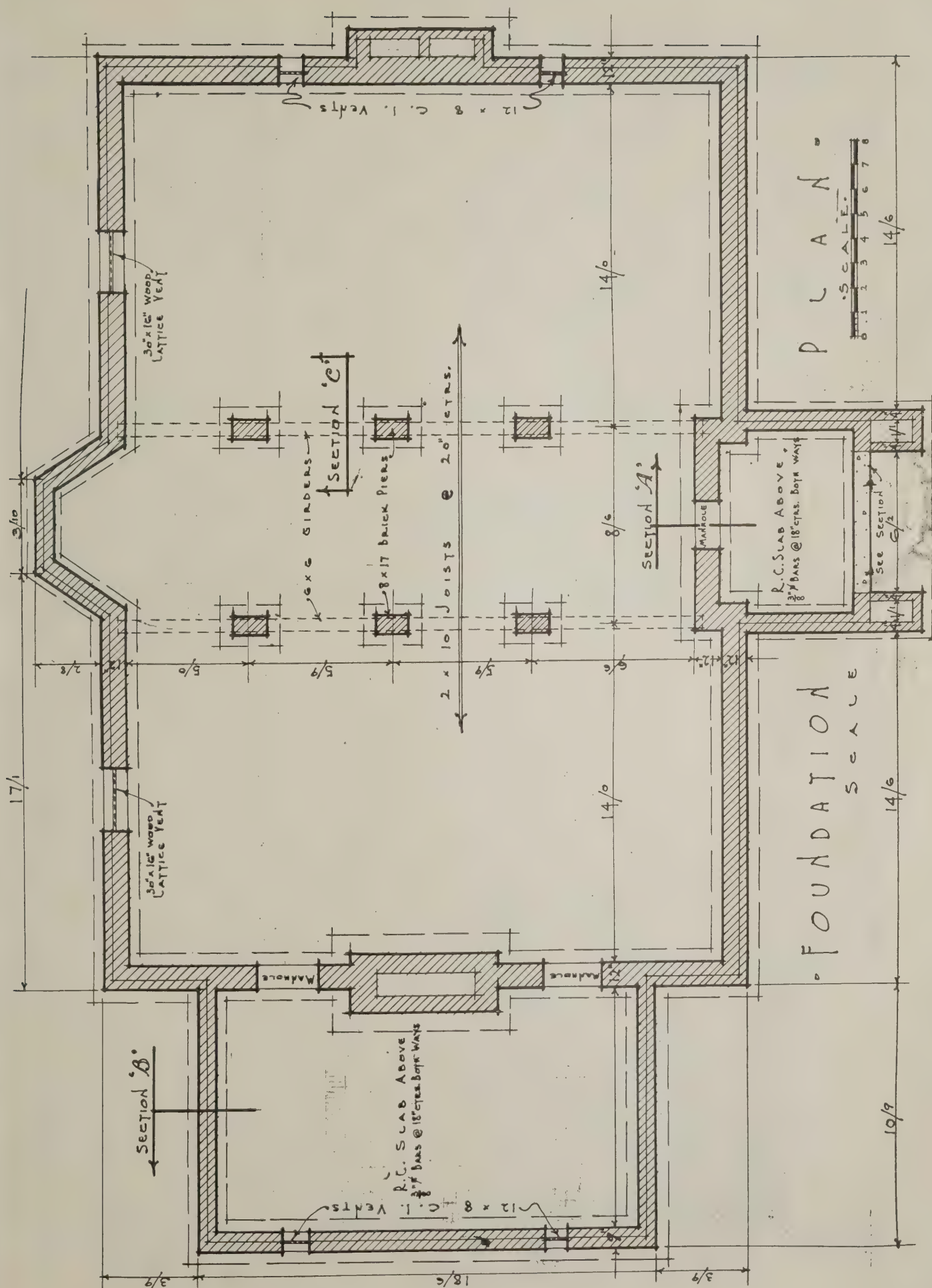


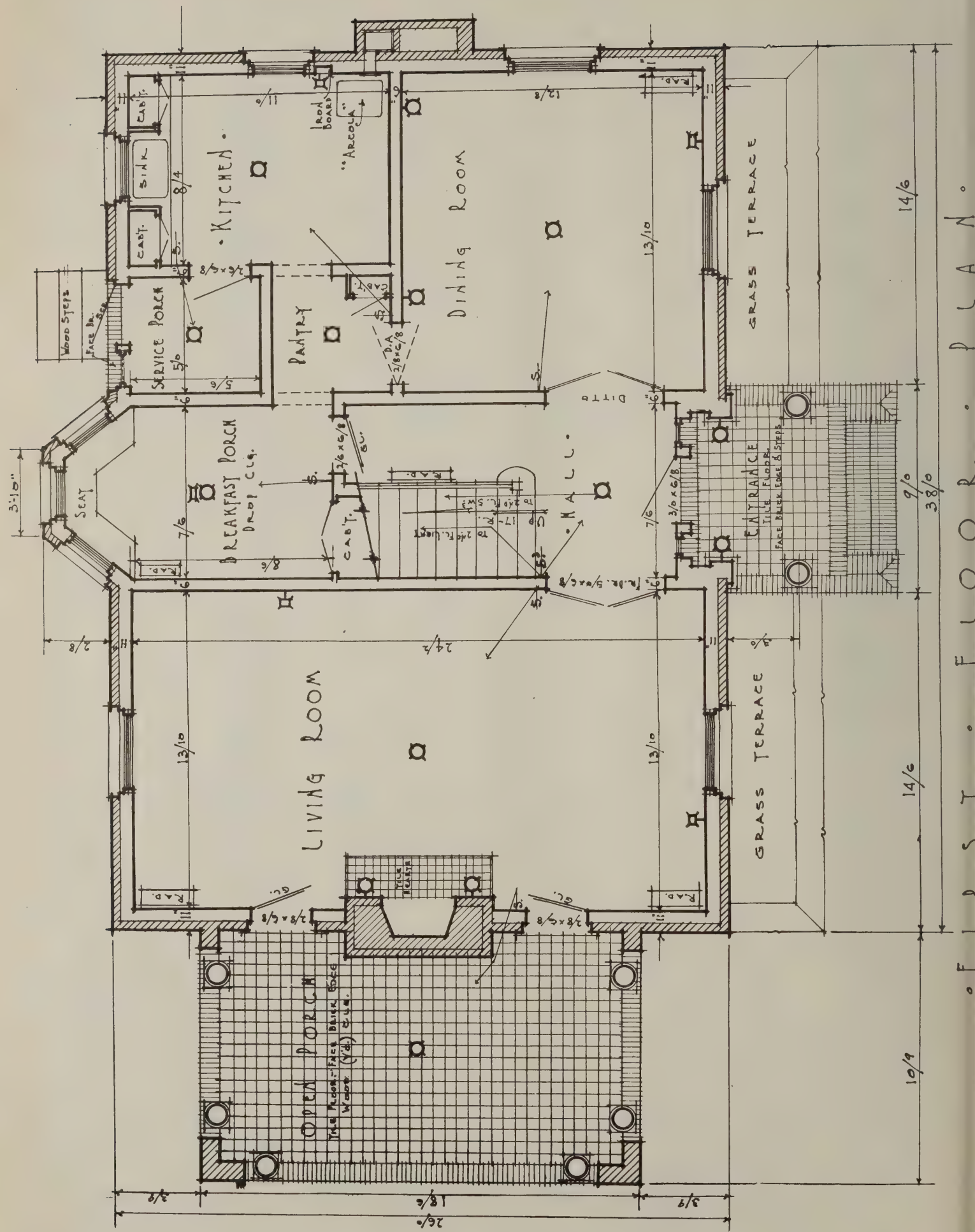
• RIGHT SIDE

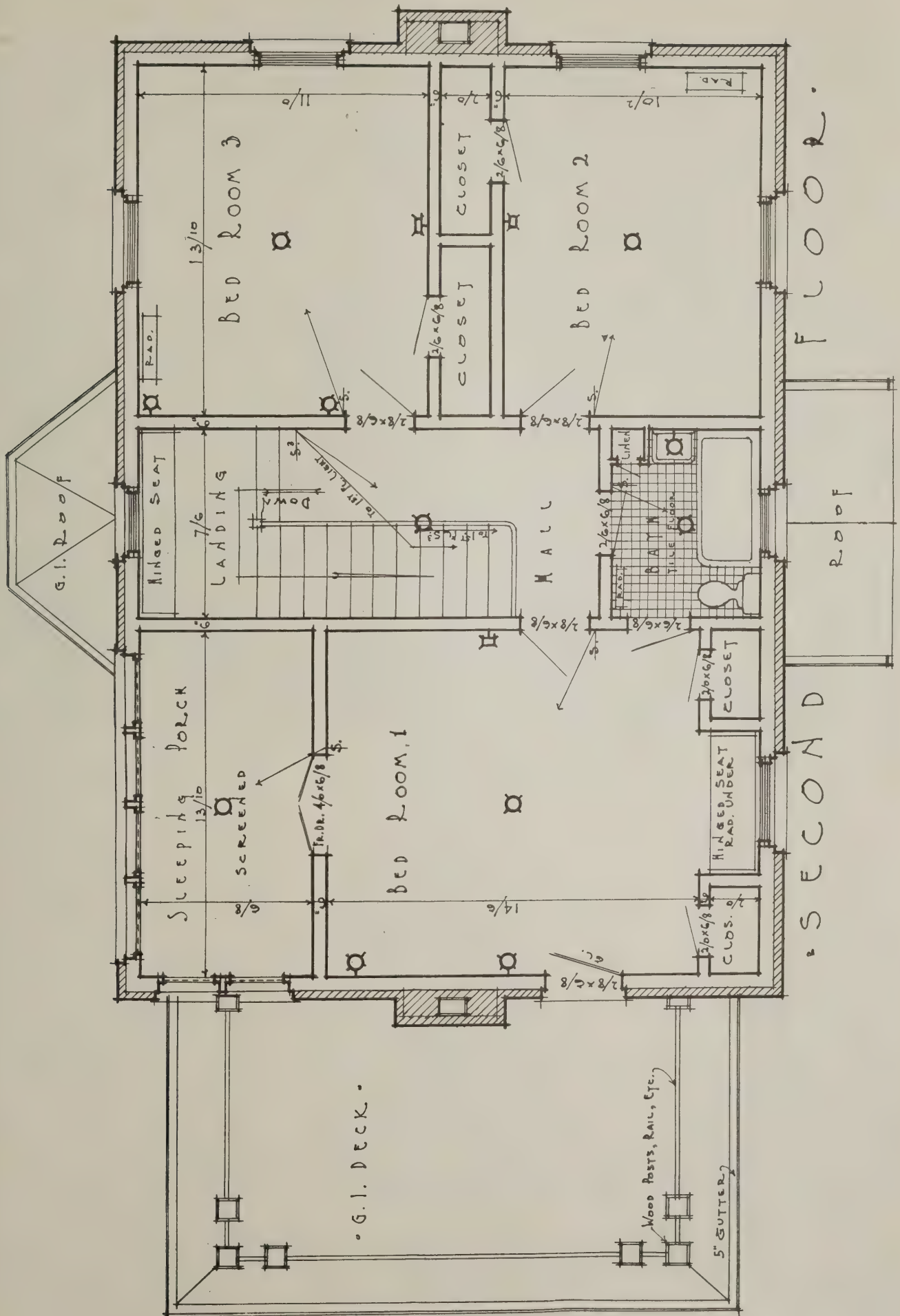


• LEFT SIDE •









Red Hickory as Strong as White Hickory

THE insistence of the public on having only white hickory in tool handles and vehicle parts causes a large part of the hickory grown in this country to be used for fuel or for other purposes where the exceptional strength properties of this wood are not needed. Usually only a small outer portion of a mature hickory tree contains white wood; the inner part, or heartwood, is red. Many people think that this redwood is not so strong or tough as the white wood. This belief, however, is discredited by actual strength tests made at the Forest Products Laboratory upon many specimens of red and white hickory. The tests show conclusively that, weight for weight, sound hickory has the same strength, toughness, and resistance to shock, regardless of whether it is red, white, or mixed red and white.

Sapwood and Heartwood

The belief that white hickory is superior to red probably arose from the observation that young, rapid growing hickory trees, which are nearly all sapwood, or white wood, generally have excellent strength properties. As the tree matures, however, this same sapwood is transformed into reddish heartwood; and a half million tests made at the Forest Products Laboratory have failed to show any change in the strength of wood of any species, due to

this natural change from sapwood into heartwood.

Judging by Weight

A reliable indication of the strength of hickory is its density. That is to say, of two pieces of the same size and dryness, the heavier will be found to have the better strength properties. This fact makes it possible for large manufacturers or purchasers of hickory handles or wheel spokes to inspect the pieces by weight very rapidly and at small expense with automatic machinery.

Summer Wood

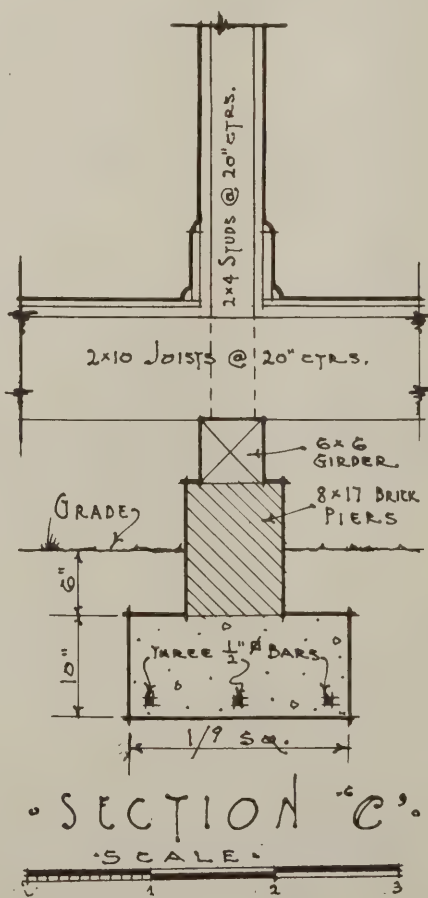
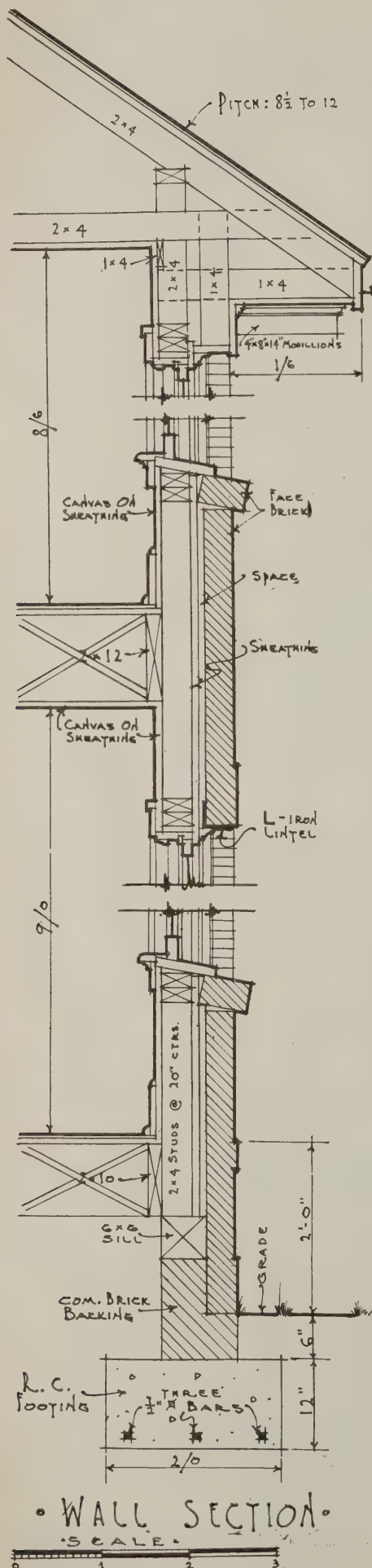
The man who is buying only one handle will usually find a visual method of judging hickory more convenient and practical than weighing. A fairly reliable visual guide to strength is found in the proportion of summer wood appearing on the end of the piece. The summer wood is the solid looking or less porous portion of each yearly growth ring. It is quite easy to distinguish from the springwood portion of the ring, which is full of pores or small holes. The summer wood has much greater strength than the springwood, because it contains more wood substance per unit volume. Wide bands of summer wood and relatively narrow bands of springwood therefore indicate a stronger piece of hickory than bands of summerwood and springwood of nearly the same width. The greater the proportion of summer wood in a tool handle or other piece of hickory, the greater will be its strength.

The number of growth rings per inch also affords some means of grading hickory. Few growth rings per inch, as shown on the end of a handle, indicate a stronger and tougher piece than many rings, provided, of course, that it is straight grained and free from defects at important points. Acceptable handles commonly show not more than 20 rings per inch, although much good hickory will be found with as many as 40 rings per inch. More careful inspection, however, by weight, is recommended for this very slow growth material.

Other Tests

As a further guide in choosing a good tool handle, it is worthy of note that the best hickory shows an oily or glossy side-grain surface when smoothly finished; also, when it is dropped on end on a hard surface, such as a concrete floor, it emits a clear, ringing tone, in comparison with the dull sound produced by hickory of inferior quality.

The adoption by the general public of these methods of grading hickory, in place of the worthless prejudice with respect to color, would put an end to the wasteful practice of culling red hickory stock. When hickory was plentiful, this was a matter of seemingly little importance; but now every means should be taken to conserve the waning supply of an important wood, for which no satisfactory substitute has been found.



Home Building Costs in New York

Building an Ideal Small American Home in the Best Style and
Demonstrating the Accuracy of the Estimate by
the Construction Records

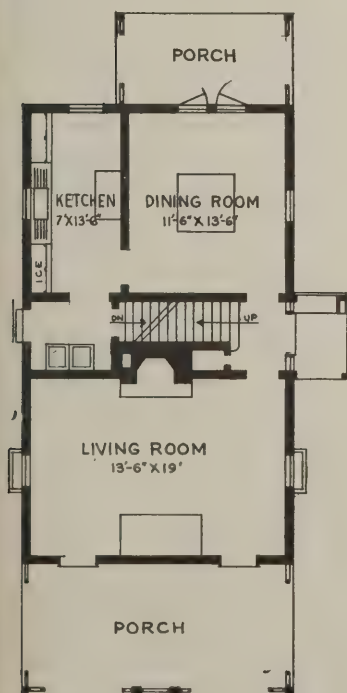
AN educational campaign in home building begun by the Home Owners' Service Institute 37 West 39th Street, New

York City, in co-operation with the New York Tribune, includes practical demonstrations in building ideal homes. The illustrations

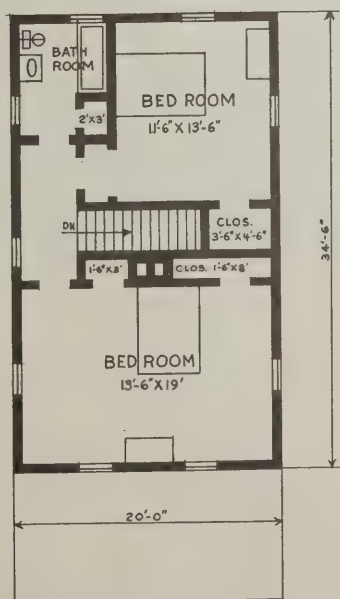
herewith show the first of six small houses to be erected as part of this campaign. This house was opened October 9 at



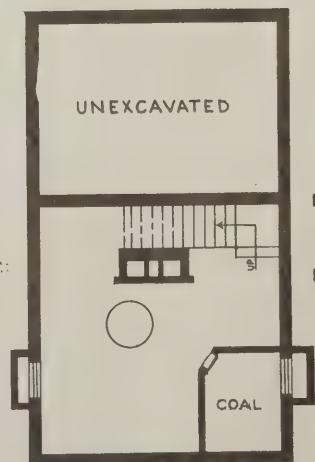
Perspective of small American home. John Floyd Yewell, architect. Copyright 1921 by "Own a Home" Exposition, Inc. See photographic reproduction of this house as modified and built, page 35 of Style Sheet



PLAN OF FIRST FLOOR



PLAN OF SECOND FLOOR



PLAN OF BASEMENT.



Living room of model small American home, built at Larchmont, N. Y.

Larchmont Gardens, Larchmont, N. Y., and was the official demonstration dwelling for the Better Homes Week of New York City. More than 6000 persons visited the house during the 13 days it was open to the public, and upward of 1200 voluntarily signed the guest book.

One of the ideas of the campaign is to determine actual present-day building costs and conditions in and about New York City, and this effort involved obtaining the best material, the best prices, and the whole-hearted co-operation of the building crafts. The construction of the house was begun on August 1 and it was completed in every detail, ready for occupancy, on October 9.

The plan includes living room, dining room and kitchen on the first floor, and two porches. There are two bedrooms and a bath on the second floor. The house is 20 ft. by 34 ft. 6 in., not including three porches. As planned and specified, the cubical contents were 18,673 cu. ft. As built at Larchmont the cubical contents are 20,311 cu. ft. According to specifications prepared by Mr. Yewell and printed in the *Tribune* last spring, the building could be produced as planned for less than \$8000. The test just completed has proved the correctness of this estimate.

Henry Atterbury Smith, prominent architect of New York and designer of model homes for Mrs. Cornelius Vanderbilt and many others, and architectural adviser of the Home Owners' Service Institute, served in this capacity for the building of the Larchmont house. All sub-contracts were let by the Empire Homebuilding Association, and which is prepared at any time to duplicate the construction of the house as specified by Architect Yewell.

The W. & J. Sloane store at Fifth Ave-

nue and Forty-seventh Street, New York, furnished the house completely. All the china and special decorative pieces used throughout the house came from Ovington's. The house contains structural features that include Anaconda copper metal work, "Flexstone," H. W. Johns-Manville



Detail of doorway of model home

Company fireproof asbestos shingle roofing, Curtis mill work throughout, Thatcher furnace, Murphy-In-A-Dor bed, Crane plumbing fixtures, and General Electric wiring. The Amawalk Nurseries, Amawalk, N. Y., did the landscaping. The National Lumber Manufacturers' Association, the Associated Metal Lath Manufacturers, the Copper and Brass Research Association, the Portland Cement Association, Society for Electrical Development and the American

Gas Association collaborated in planning and equipping the house.

The cost was \$8,842.06, including the builder's profit. The cost of the land and the landscaping brought the total cost to \$11,896.32. At this cost, the structure represented the very highest construction standards, and was what its builders intended that it should be—a thing of trimness and stability. Some slight changes from the original plans and specifications were made during the course of construction, but without these changes this Colonial frame house can be erected for \$7,505.07.

Comprehensive Series of Bulletins Planned

THE National Lumber Manufacturers' Association, with the co-operation of the Structural Service Bureau of Philadelphia, is planning a comprehensive series of bulletins dealing with "Lumber and Its Utilization."

The pamphlets will be printed in 8½x11 size, with paper covers, and designed for permanent filing.

Chapter I of Volume I is now being printed. It will be given wide distribution not only to engineers and architects, but to all members of such organizations as the American Society of Testing Materials, the National Fire Protection Association, the chiefs of building inspection departments, colleges maintaining architectural and engineering courses and other technical societies and educational institutions.

The first five chapters of the six volumes into which this series has been divided are outlined below. Chapters will be distributed in serial form.

- VOLUME I—General Information Series**
 Chapter 1. National Lumber Manufacturers' Association, Purposes, Publications and Member Associations.
 Chapter 2. Brief Historical Review of the Lumber Industry.
 Chapter 3. United States Forest Products Laboratory.
 Chapter 4. Research and Developments in the Lumber Industry.
 Chapter 5. Advantageous Uses of Wood.
- VOLUME II—Timber Information Series**
 Chapter 1. Forests of the United States and the United States Forest Service.
 Chapter 2. American Trees—Growth and Structure.
 Chapter 3. Species of Woods—Properties and Publications.
 Chapter 4. Conservation and Reforestation.
 Chapter 5. America's Available Timber Supply.
- VOLUME III—Lumber Information Series**
 Chapter 1. The Manufacture of Lumber.
 Chapter 2. The Characteristics of Lumber.
 Chapter 3. Mechanical Properties of Lumber.
 Chapter 4. Classification and Grading of Lumber.
 Chapter 5. Economical Uses of Lumber.
- VOLUME IV—Construction Information Series**
 Chapter 1. Planning and Designing Small Houses.
 Chapter 2. The Parts of a Building.
 Chapter 3. Dwelling Construction Details.
 Chapter 4. Maximum Spans of Joists and Rafters.
 Chapter 5. Buildings and Building Codes.
- VOLUME V—Fire Prevention Series**
 Chapter 1. Personal Liability for Preventable Fires.
 Chapter 2. Fire Stopping in Dwelling Construction.
 Chapter 3. Chimneys, Flues and Fireplaces.
 Chapter 4. Household Heating and Lighting Hazards.
 Chapter 5. Fire Resistant Frame Construction.
- VOLUME VI—Craft and Carpentry Series**
 Chapter 1. Woodworking and Vocational Guidance.
 Chapter 2. Apprenticeship in Woodworking Crafts.
 Chapter 3. "Plan Reading" or Following the Blue Prints.
 Chapter 4. Carpentry and Joinery.
 Chapter 5. Journeyman, Foreman and Builder.

How to Capitalize Cold Weather High-Priced Coal

Weather-stripping Contracts Help Keep the Live-Wire Operator Busy and Cold Weather Helps to Sell Weather-stripped Houses

EVERYONE is familiar with the proverb, "It's an ill wind that blows nobody some good." And such is the case with the recent coal miners' strike, the transportation jam and the resulting scarcity and high price of fuel. For if ever the necessity of fuel economy and heating efficiency was emphasized it is at this present moment. There are two ways for those interested in building to take advantage of this con-



Coal

(Cartoon by John T. McCutcheon. Copyright, 1922, by Chicago Tribune Company)

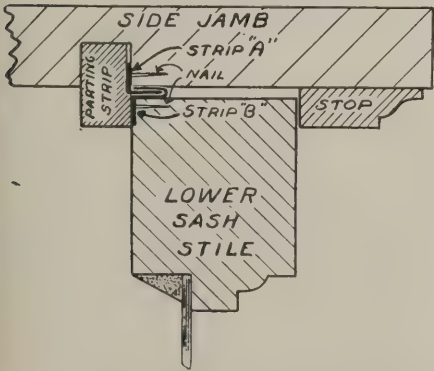


Fig. 1

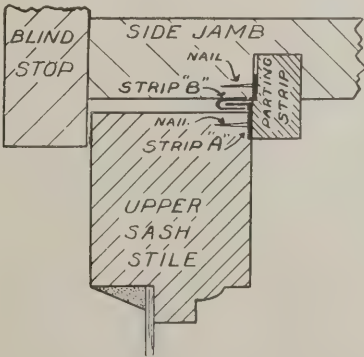


Fig. 2

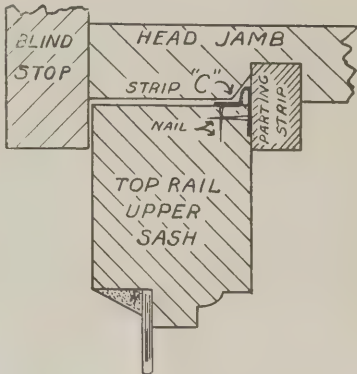


Fig. 3

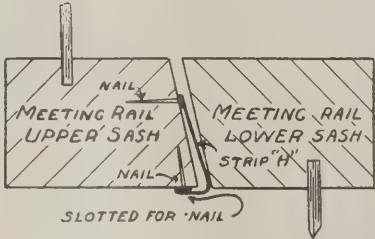


Fig. 4

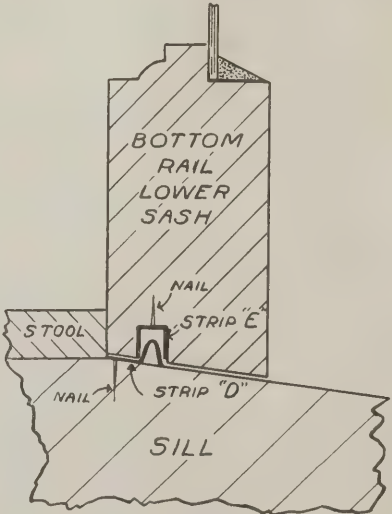


Fig. 5

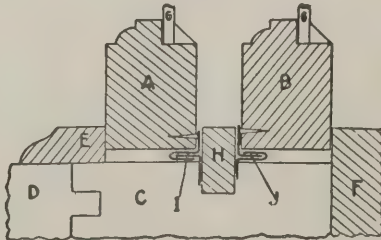


Fig. 6—Patented

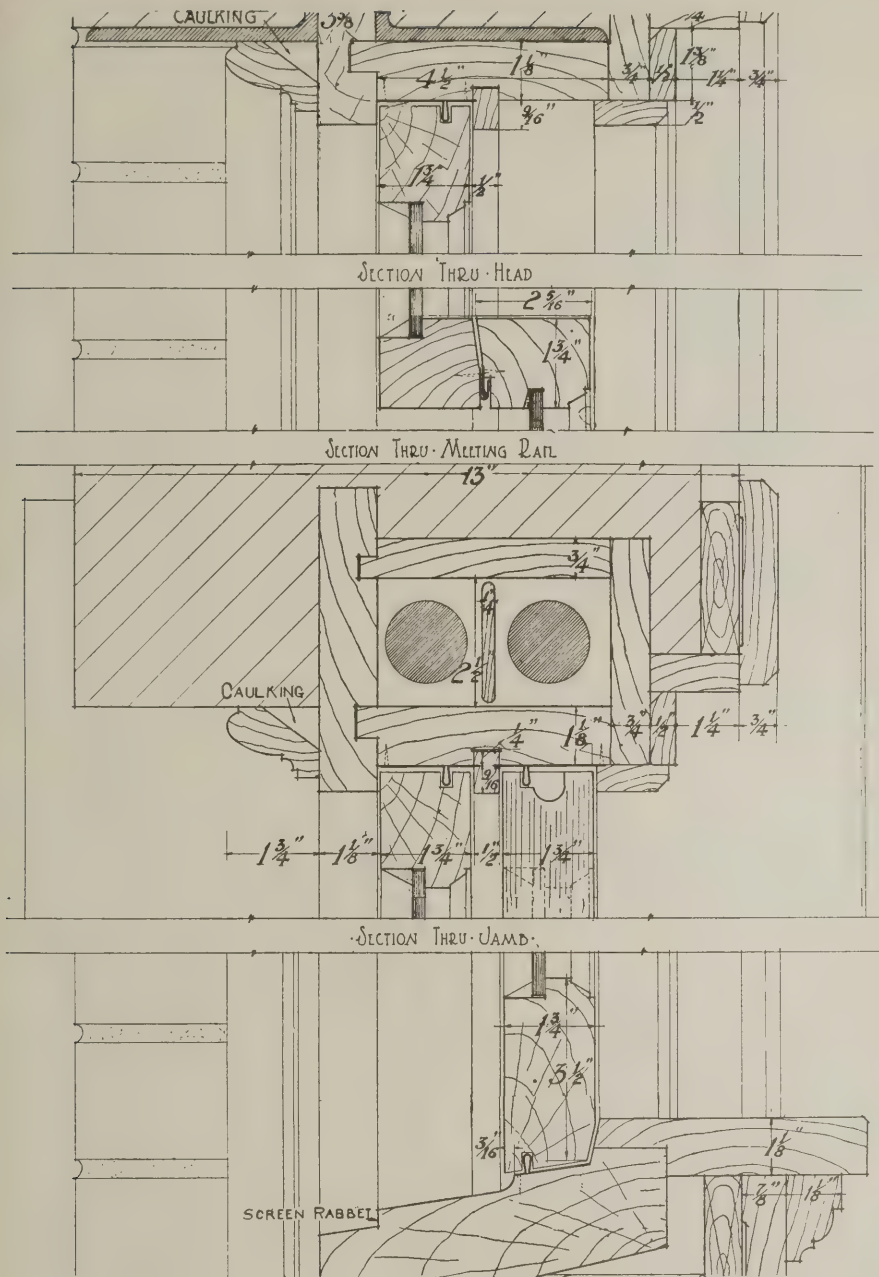


Fig. 9 (Details as Fig. 10)

SPECIFICATIONS

Head—

Strip No. 29, frame

No. 9 Zinc cut across grain

(Same strip and material for sides and sill treatment)

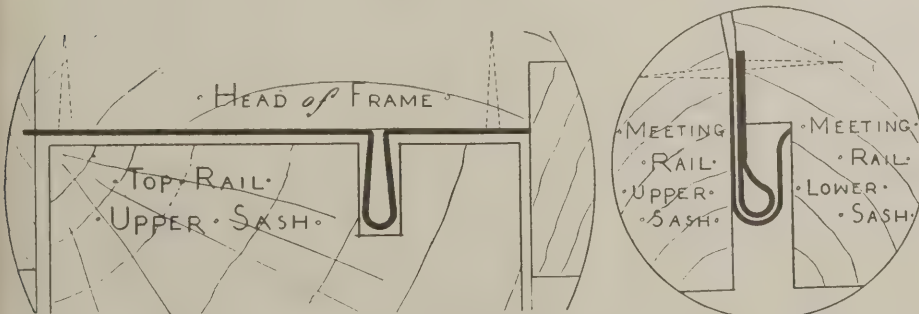
Meeting Rail—

Strip No. 33, on upper sash

No. 9 zinc cut across grain

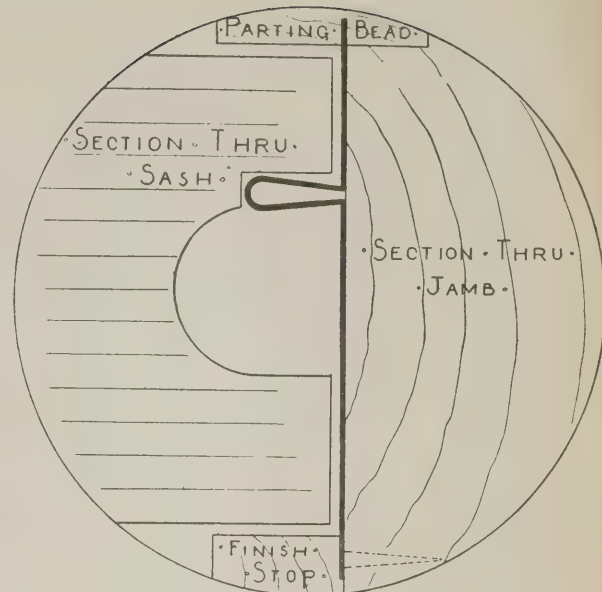
Strip No. 31, on lower sash

No. 12 zinc cut across grain



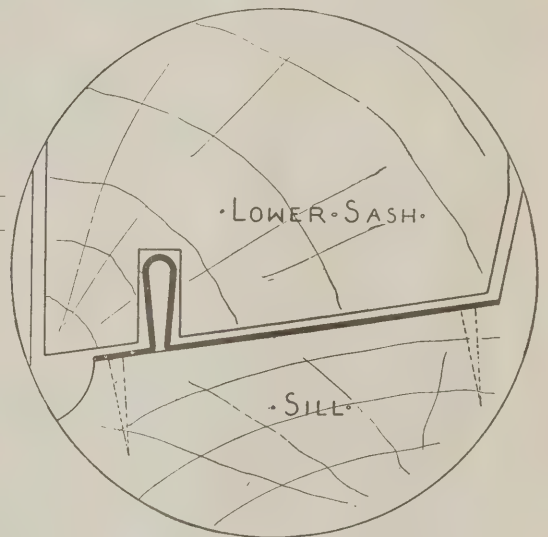
Strip No. 29—Zinc—Head of Frame

Strip No. 29—Zinc—Section Through Jamb



Strip No. 31—Zinc—Meeting Rail Upper Sash

Strip No. 33—Zinc—Meeting Rail Lower Sash



Strip No. 29—Zinc—Sill

be equivalent to a hole in the wall of the house 5x6 in. in size. Probably most windows fit better than this, but with a number of windows in a room the infiltration of cold air is ordinarily equivalent to a hole in the wall big enough for a man to stick his head through. Nobody would stand for such a hole, so why should they stand for it merely because it is distributed over considerable wall area?

Two Methods of Selling Weatherstripping

Weather-strip is sold by some manufacturers only to authorized distributors, who make installations. With some manufacturers all such installations are made by their own employees. With other less complicated kinds of weather-strip, the materials are sold to contractors and builders

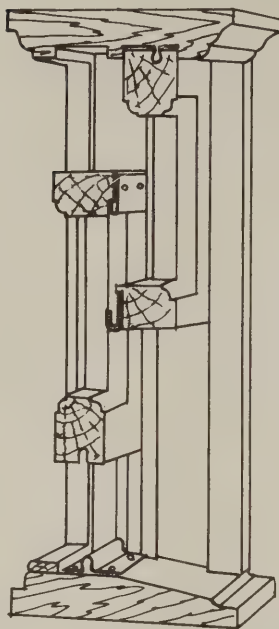
who make their own installations. Professional builders who build houses to sell can, of course, let contracts for the weather-stripping to men who specialize in that field.

Weather-stripping may be roughly divided into four general classes: (1) All metal; (2) all wood; (3) fibre or fabric, and (4) combinations of any two or three of these.

All-Metal Weather-strip

By far the most used weather strip today is of the all-metal type—copper, zinc, brass and bronze, being the best materials to use for this purpose. The arguments used in favor of metal weather-stripping are that the ordinary windows and doors are wood; and wood swells and warps and shrinks; therefore, an all-metal contact between windows and doors and their frames is most desirable.

Nearly all metal weather-strips for windows consist of some type of tongue-and-groove joint. With some the metal tongue slides in a corresponding metal groove; in others, in a groove cut in the wood. With some the groove is in the sash; in others, in the jamb.



SLIDING · WINDOW

Fig. 11

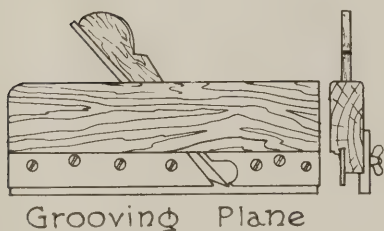
One of the simplest to install of these all-metal weather strips for double-hung windows, is shown in Figs. 1, 2 3, 4, and 5. With this type of weather-strip the entire window sash is made to fit loosely in the jamb in order to provide clearance for the weather strip. The sash must be planed off to be not less than $\frac{1}{4}$ -in. narrower than the window opening. Fig. 6 shows a sash completely equipped.

What is claimed to be a more efficient kind of strip, and a good example of a general type of strip, which the manufacturers allow to be installed only by experts, is shown in Figs. 7 and 8. This same general type of strip is made for a cheaper installation without the metal lining for the grooves in the sash. Figs. 9 and 10 show this commoner type of this weather-stripping, without some of the patented features of that shown in Figs. 7 and 8.

Fig. 11 shows a type of metal weather-strip which the manufacturer sells direct to builders and contractors with directions for installations. Figs. 12 and 13 give the directions for installing this strip and the tools required.

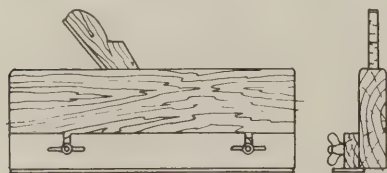
SPECIAL · TOOLS · FOR · INSTALLING · · METAL · WEATHERSTRIPS

To Install Weatherstrips Correctly and with Speed You Must Have These Tools.



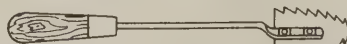
Grooving Plane

This plane is used for cutting a groove in the sash to receive the rib strip. The guide of this plane is removable.



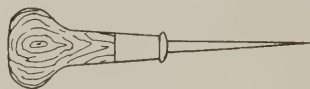
Two in one Meeting Rail Plane.

This plane is used for rabbeting the sash for the interlocking meeting rail strip. By reversing the guide this plane takes the place of two planes formerly used.



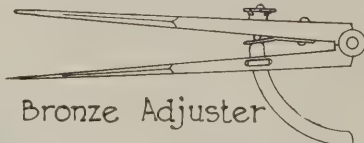
Saw Router

This tool is used for cutting a thin groove in the outside stop and parting bead for rib strip with $\frac{1}{2}$ " flange.



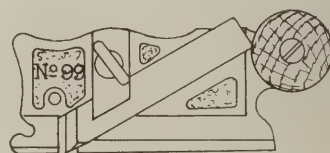
Stretching Awl

This tool is used for stretching the spring bronze lengthwise while nailing. A tool of this kind. MUST be used to prevent the bronze from kinking.



Bronze Adjuster

This tool is used for raising the free edge of the spring bronze after it is nailed in place. The long leg is used as a guide against the door jamb while the short leg is sliding on the bronze.



No 99 Stanley Side Rabbet Plane

This plane is used to straighten the groove cut with grooving plane and removing splinters. This is also a handy tool to meet special conditions with, and no weatherstrip mechanic should be without it.

Special Plane for Automatic Door Bottoms

All of these tools except #99 rabbet plane are especially prepared by us for their proper kind of work. You will therefore not be able to buy any one of them at your hardware store in its proper conditions.

We will refund the full amount paid us for these tools at any time they are returned to us in good conditions

The following standard tools should also be found in a weatherstrip mechanics tool box.

Rabbet and Jack Planes	Hack Saw
Wood Saw	Nail Sets
Tinners Snips	Pliers
Peg Awl	Hammer
Sash Mouse	

Fig. 12

· SKETCHES · SHOWING · HOW · TO INSTALL · METAL · WEATHERSTRIPS ·

See Separate Sheet for Explanations.

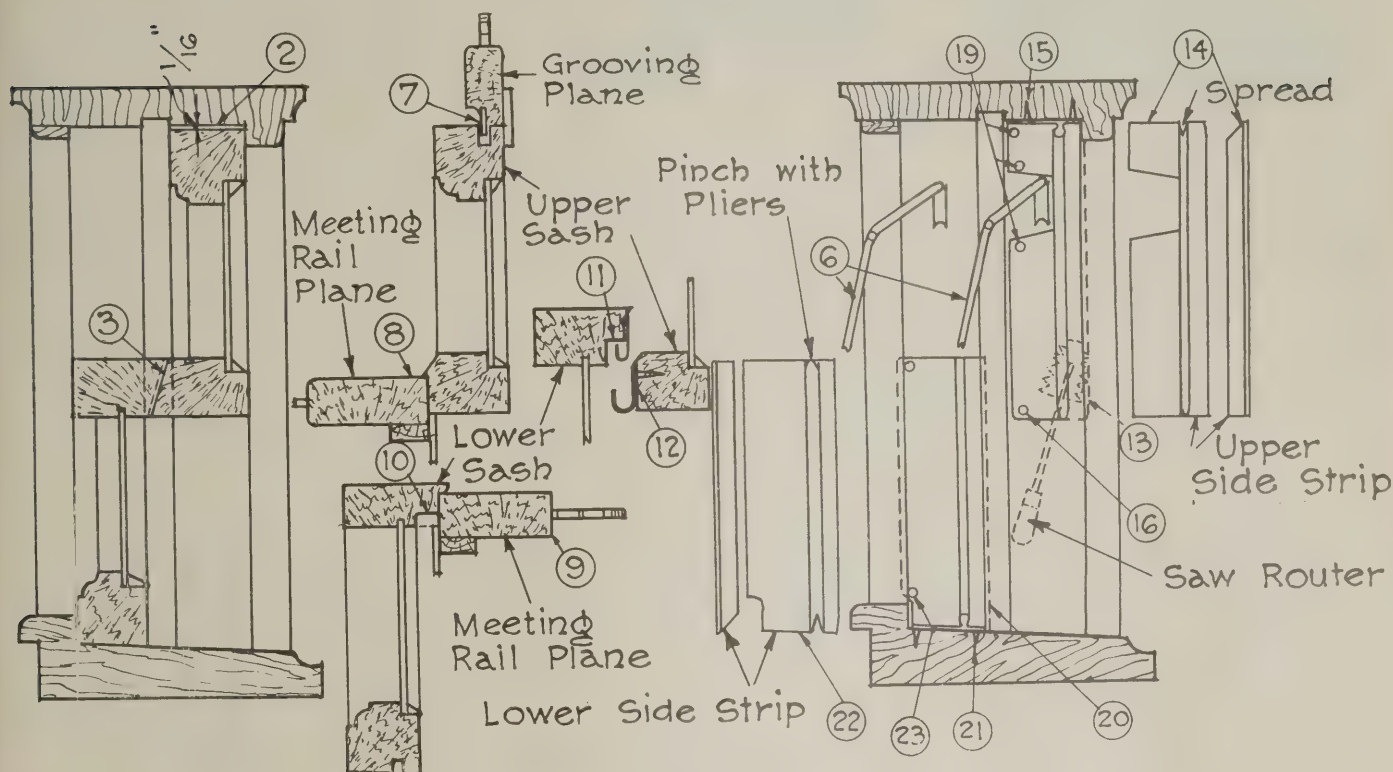


Fig. 13

Directions for Installing Metal Weatherstrips Shown in Figs. 11, 12 and 13

1. Remove inside stops.
2. See that there is $\frac{1}{16}$ -in. clearance in height, if not plane off where marked.
3. If meeting rails are too thick plane off by dotted line.
4. See that there is $\frac{1}{8}$ -in. clearance side-ways between frame and sash.
5. If windows are very loose remember to pack outside strips with cardboard packing before nailing.
6. Remove sash and fasten sash cord as shown.
7. Straighten sash by planing and groove sash using guide on plane as shown.
8. Use meeting rail plane and its guide as shown on the upper sash.
9. Use meeting rail plane and its guide as shown for lower sash.
10. Reverse guide of plane and for cutting out here.
11. Nail on small hook. Should touch at both points.
12. Nail large hook onto upper sash, nail about $\frac{1}{4}$ -in. apart.
13. Router into outside stop on both sides as shown.
14. Cut upper side strips as shown in the two views.
15. Fasten head strip with one nail. After sash is hung put nails 2-in. apart.

16. Fasten left hand side piece with one nail.
17. Hang upper sash, be sure to keep sash cord away from groove and nail if necessary.
18. Place right hand side piece in groove and slide upper sash into place and replace right hand parting bead.
19. When routed in drive nails only where shown so that sash may easily be removed.
20. Router parting beads right and left for lower side stock.
21. Put sill strip in place, after sash is hung drive nails $1\frac{1}{2}$ -in. apart.
22. Cut lower side stock as shown.
23. Place left hand side stock in position as shown, fasten with two nails only.
24. Hang the lower sash, be sure to keep sash cord away from groove and nail if necessary.
25. Place right hand side piece in groove of sash and slide sash into position.
26. Fasten right hand side strip with two nails similarly to the left hand side strip.
27. Replace inside stops and be sure that they do not bind against the sash.
28. To make the sash slide more easily a cake of paraffine may be rubbed on the sliding surfaces.

All-Wood Weather-strip

An all-wood weather-strip is shown in Figs. 14 and 15. This same strip can be applied to either doors or windows. This strip of course, is not intended for the bottoms of doors, but can be used on the sides and top, the same as for a window opening.

Directions for applying it to doors are as follows:

Close the door, fasten corner block to the door jamb in upper corner on hinge side. Cut strips the right length from block to door-sill. Start the nails in both pieces, using bradawl if desirable. Put the tongue and groove together, and place them in the corner, with the groove against the door jamb, and the tongue against the door, and drive the nails. (The tongue should be cut enough shorter than the groove to swing over the threshold when the door is opened.) Do the same at the top and bolt side, mitering the corner, only reverse the strips, fastening the groove to the door, and the tongue to the jamb, care being taken not to crowd the strips against the door enough to spring it. Use $\frac{1}{4}$ -in. wire nails. The strips are preferable to double doors.

For applying this strip to windows the directions are: For the lower sash, cut the groove full length of window frame

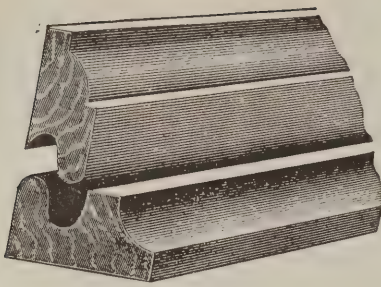


Fig. 14

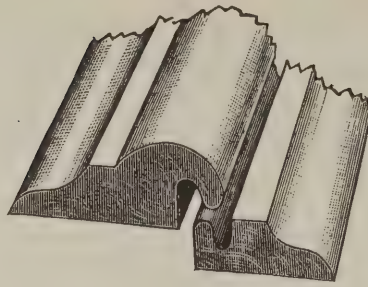


Fig. 15

and tongue to top of sash, and both pieces the length of window-sill, mitering the corners. Fasten groove to, or in place of window strip, and to window sill, and tongue to sash. For the upper sash, place on the outside at top. Your window will slide up and down in the grooved piece freely, will keep out cold and storm, and

cannot rattle. Use 1-in. wire nails. The strips are preferable to double windows. If windows are to be removed use screws instead of wire nails.

Fabric Weather-strip

An example of a new fabric weather-strip and the method of applying it is shown

in detail in Fig. 16. This is the simplest method of rendering doors and windows less leaky. This strip is sold through special agents who make installations, although most any handy man could make the installations.

Cloth-Lined Metal Weather-strip

One of the improved types of weather-stripping has the metal channel lined with a special kind of felt, which renders the joint dust-proof, as well as providing additional insulation against cold air leakage. A standard double-hung window equipped with this weather-strip is illustrated in Fig. 17. It is claimed that when properly installed the felt lining will last for years.

Door and Casement Weather-stripping

Figs. 18 and 19 show the details of weather-stripping of the felt-lined type applied to doors and casements opening in.

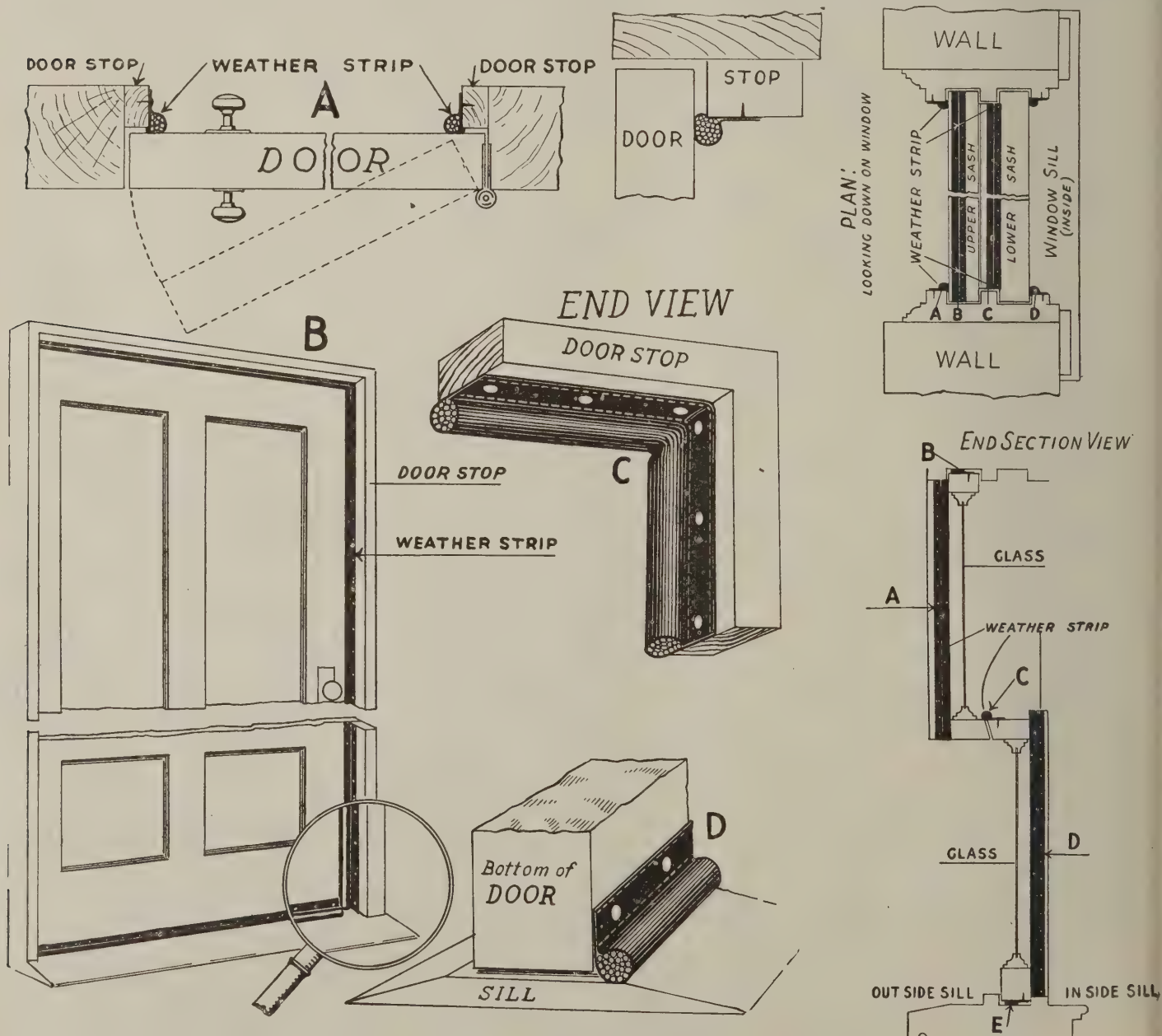


Fig. 16

Fig. 19

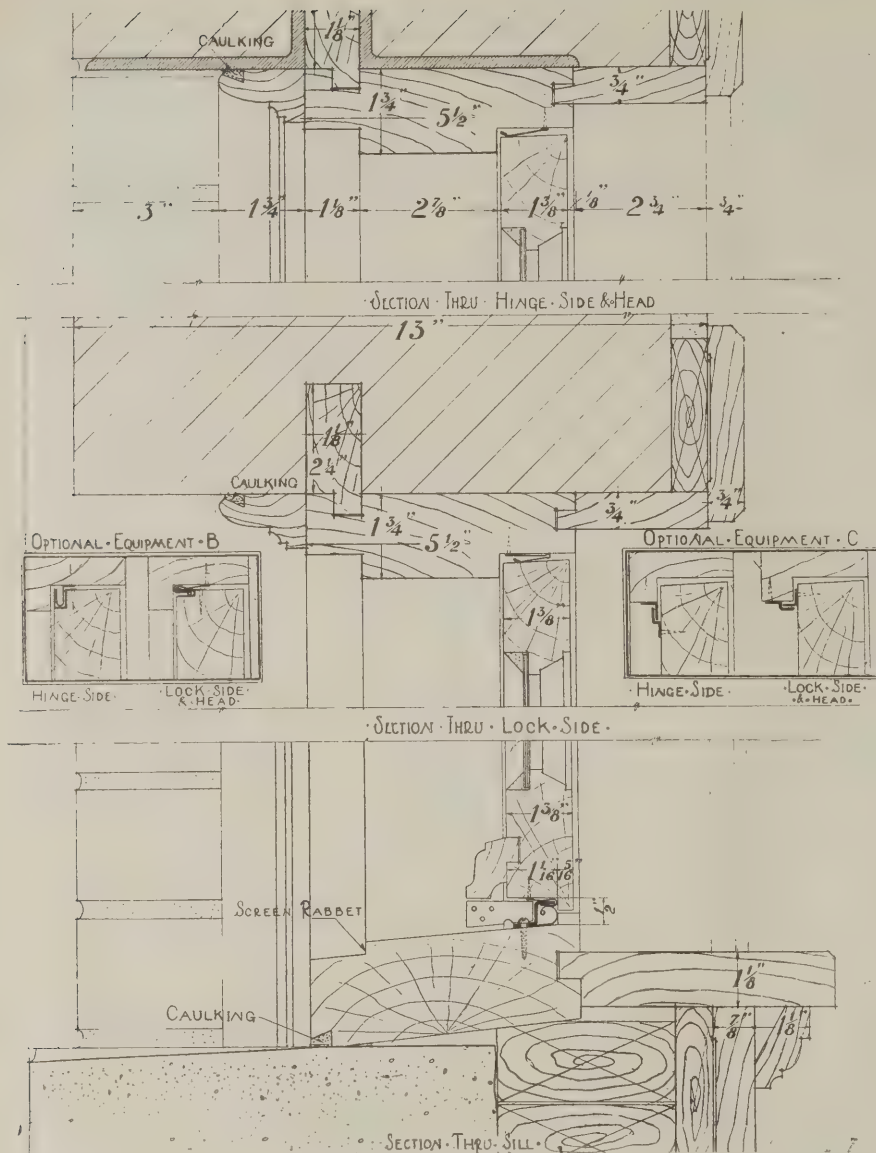
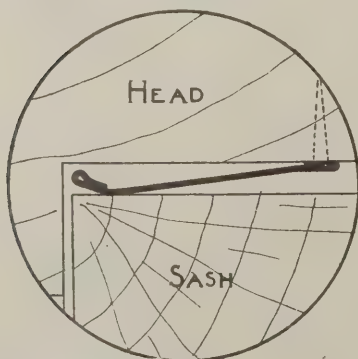


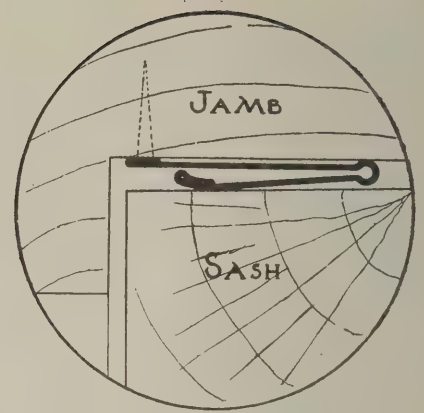
Fig. 20 (Details as Fig. 21)
SPECIFICATIONS

Head—Hinge Side—
Strip No. 57, on frame
Lock Side—
Strip No. 137, on frame
Meeting Rail—
Strip No. 47, female member
Strip No. 35, male member
Bottom—
Strip No. 145, female member
Strip No. 159, male member
Strip No. 167, contact member
Baffle plate, 16 gauge wrought
brass

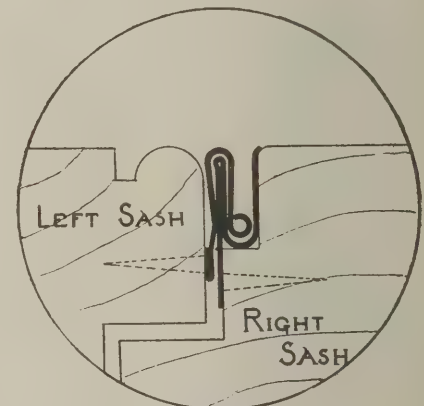
31 gauge spring bronze
34 gauge spring bronze
12 oz. cold rolled patent level copper
31 gauge spring bronze
31 gauge spring bronze
16 gauge spring bronze
34 gauge spring bronze



Head or Hinge Side—
No. 57—Strip—Spring Bronze—Head



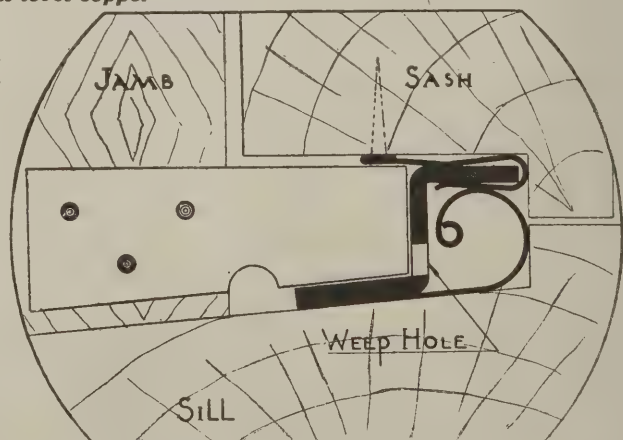
Lock Side—
No. 137—Strip—Spring Bronze—Jamb



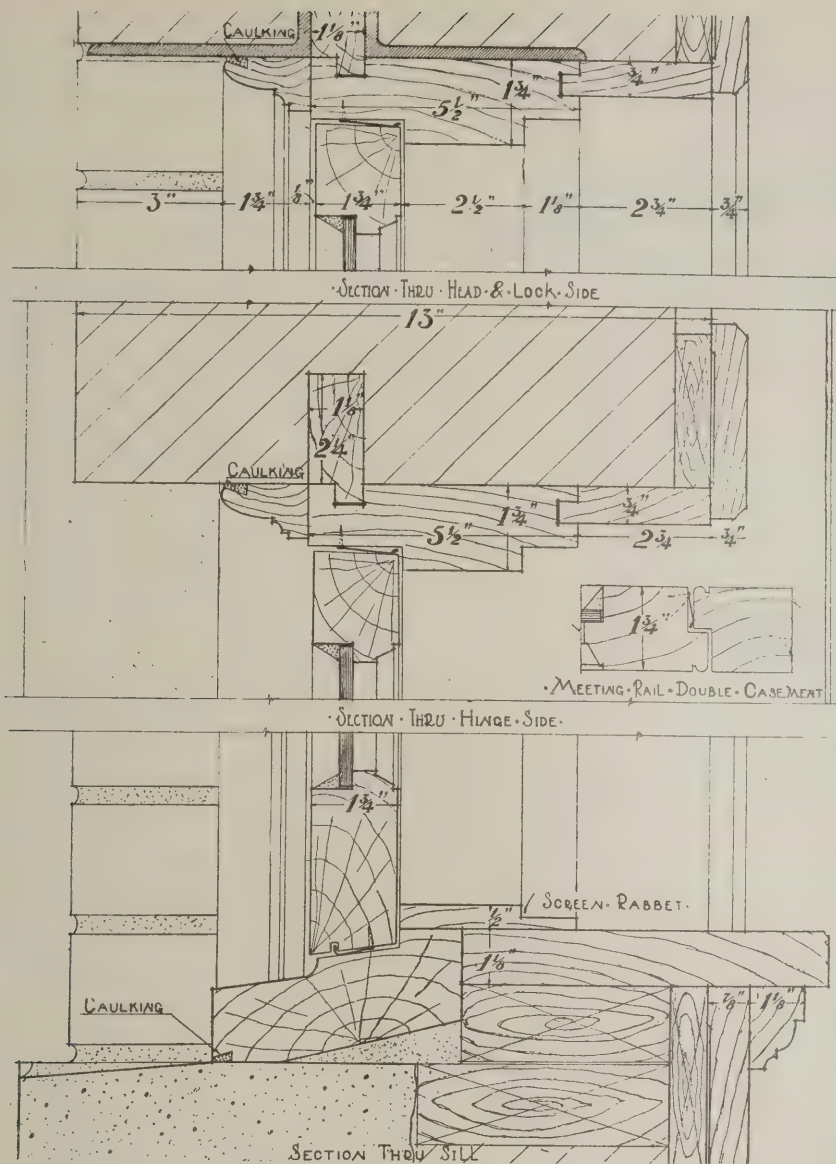
No. 35—Strip—Spring Bronze
Meeting Rail Left Sash—
No. 47—Strip—Copper
Meeting Rail Right Sash—

This is one of the most expensive types of installation, but likewise one of the best.

A much simpler type of casement weatherstripping is shown in Figs. 20 and 21. This equipment is for in-swinging casement windows. In this type the line of contact is established at the head, hinge and lock side by a spring bronze strip, instead of the more usual two-member contact. The manufac-



No. 159—Strip—Rolled Brass—Sill
No. 167—Strip—Spring Bronze—Sill
No. 145—Strip—Spring Bronze—Sash
No. 161—Baffle Plate—Wrought Brass
—Jamb



Head, Lock Side, Hinge Side—	
Strip No. 59, on frame	31 gauge spring bronze
Meeting Rail—	
Strip No. 55, on left sash	31 gauge spring bronze
Bottom—	
Strip No. 107, on sash	31 gauge spring bronze

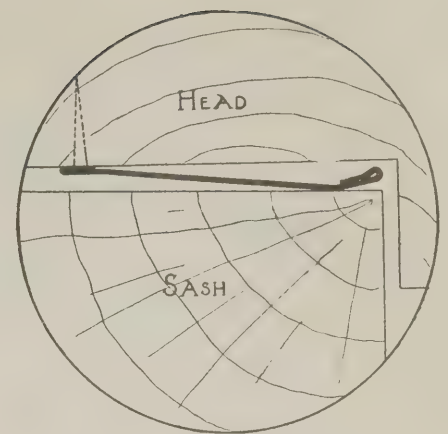
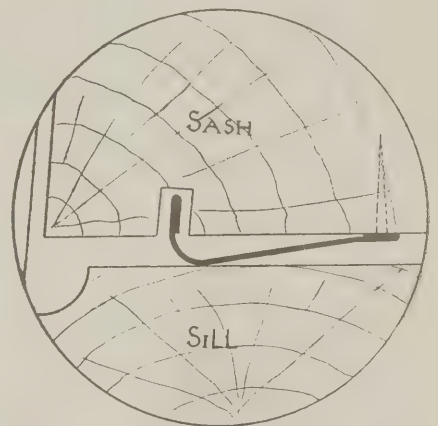
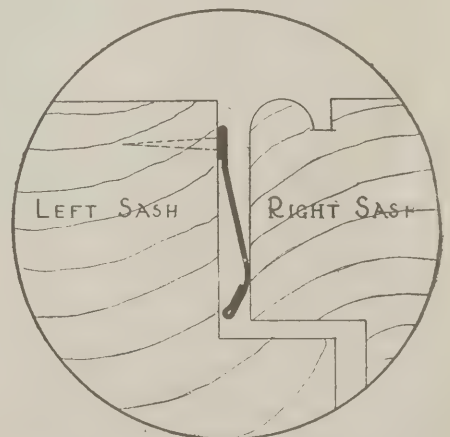


Fig. 23
Head, Lock or Hinge Side—
No. 59—Strip—Spring Bronze—Head



No. 107—Strip—Spring Bronze Sash



*Meeting Rail—Double Casement
No. 55—Strip—Spring Bronze—Left
Sash*

furnished by NATIONAL BUILDER on application.

Department of Commerce Recommends Weatherproofing

The importance of fuel saving and heating efficiency this winter have become so manifest that the Division of Building and Housing of the United States Department of Commerce has just issued a special circular letter to the newspapers and magazines on

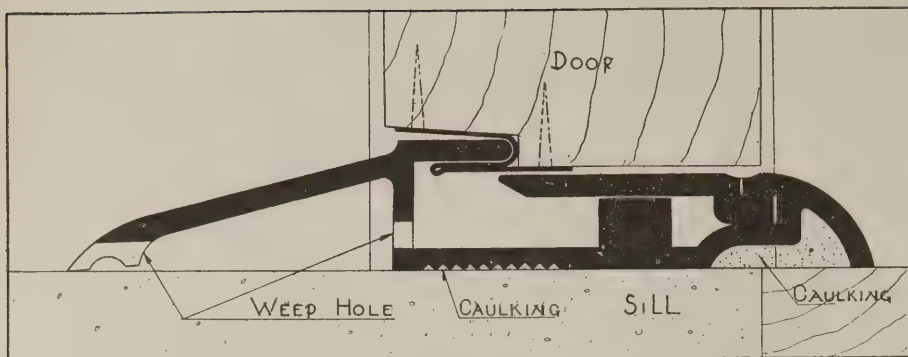


Fig. 24

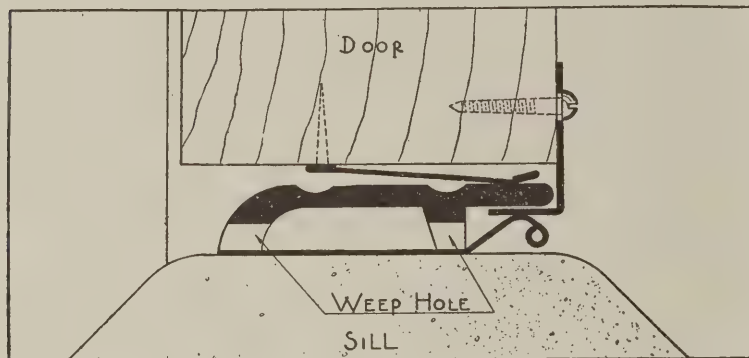


Fig. 25

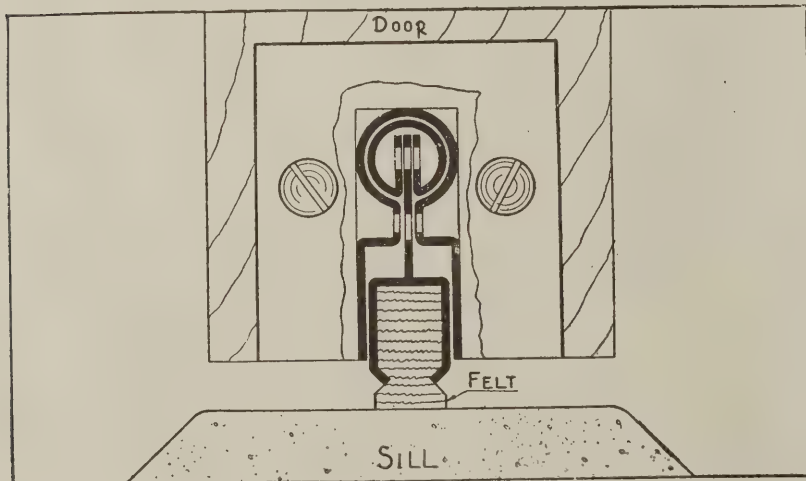


Fig. 26

the subject: "Weatherproof Your House—Prevent Unnecessary Loss of Heat—Save Coal." This circular states:

"The saving of fuel was not seriously considered in the building of most houses. Many were shabbily built, and permit too much cold air to enter the house. Only a few years ago fuel was cheap and few bothered about saving it. While it is true that most attention should be given to the proper building of new houses, much can be done to prevent the loss of heat in poorly built and run-down houses. To save heat now not only helps to meet the present coal shortage, but it will teach those who plan to build new houses the value of weatherproofing and good construction. Our own comfort and that of our neighbors demands that we

obtain the most heat from our coal without waste and that we try to reduce our requirements as much as possible.

"All houses should be well ventilated, but this does not mean that unregulated drafts of cold air should sweep through the house at all times. It should also be remembered that in cold weather the warm air is continually escaping and as it passes through holes and cracks in the walls it is at once replaced by the cold out-of-doors air.

"How much coal can be saved? If every family would save one ton of coal it would mean a saving of millions of dollars. During the present coal shortage the coal thus saved might be distributed among those who otherwise would be unable to obtain sufficient fuel, and perhaps keep many from suffering.

*"Inspect Your House—*Some home owners have a reliable repair man look over their houses in the same way that they have the dentist look over their teeth. The owner can then decide what repairs can be undertaken.

*"Where and What to Look For—*In making an inspection the owner should examine the windows, doors, transoms and floors. He should also inspect the attic and the basement, examine the damper in the fireplace and cracks under the baseboards. It might be well for him to start with the windows.

*"Windows—*Much cold air comes in around the windows or through them. Windows are often poorly fitted into the openings. Occasionally it is possible to see between the brick wall and the window casing. Window sash are rarely fitted snugly, and cold air enters freely around the sash. It is not uncommon to find a wide crack between the upper and lower sash. Such cracks can sometimes be closed by means of the sash lock. The use of weather stripping will take care of most of the cracks around a window, and the saving of coal will be well worth while in a large number of houses.

*"Doors—*Doors are often poorly fitted and air passes freely both above and below them. The crack below the door is often so large that cold air sweeps across the floor, keeping the room cold. A strip of cloth or felt nailed to the floor or to the door will keep out much of the cold. Hinges are not always well fitted into the door and frame, allowing much cold air to enter the house. This can be remedied by resetting the hinges. Transoms over doors should be examined for they are not always snug fitting.

"Storm doors involve some expense, but in many cases it is profitable to install one on the windward side of the house. It will prevent the inrush of cold air. The storm door as well as the storm window is used chiefly in the colder climate."

Reconstructs Wood From Sawdust

FROM shavings and sawdust combined with suitable binders there is now being made a new reconstructed wood material that has many advantages over ordinary wood, and is the result of research made by Prof. George Kemmerer, of the chemistry department of the University of Wisconsin, Madison, Wis.. Professor Kemmerer's new process has been used commercially since last winter, and has proved better than wood for certain purposes.

The sawdust is mixed with a new binding material which Professor Kemmerer discovered and perfected, is put into a mold, and then subjected to pressure, of 50 to 1,000 pounds per square inch. The resulting product is much tougher and harder than ordinary wood, does not split, and is practically impervious to water. The reconstructed wood takes finishes, such as varnish, and enamels well.

Winter Construction Work?

Wisconsin Has as Severe a Winter Climate as Most Parts of the United States, but It Does Not Discourage at Least One National Builder Reader—Prepare in Winter for an Early Spring Start

"THERE is a trite story about a poor white man who lived in an old cabin in a remote part of Georgia (or maybe it was in South Carolina)," says the editor of the *Improvement Bulletin* of Minneapolis, Minn. "The cabin was not weatherproof. In fact, whenever it rained the water poured in through the leaky roof in many places. The family sat huddled in the driest corner they could find—waiting in patient discomfort for the rain to cease.

"A dealer in prepared roofing passed that way one day when a sudden shower drove him to seek shelter at the cabin door. He found that the place offered him very little protection from the rain. Impatiently he cried, 'Why don't you buy a little of our Cantleak roofing and make your cabin rain-proof?'

"The lank mountaineer pondered the remark a moment and replied, 'Stranger, I reckon we-uns don't need sto'-made roofing. We could split out plenty of bo'ds from the trees near the cabin, an' mend the roof, but the trouble is we can't fix the roof when it's rainin', and when it stops rainin' the roof don't need fixing nohow.'

"There is a leaky roof in the construction industry. It is the annual stagnation which afflicts the industry every winter. In the rush and hurry of summer, when contractors generally have all the work they can attend to, there isn't much time to stop and think about the probable lack of work next January or February. And when January comes it is possible to do very little to overcome the prevailing stagnation, and the constructor must patiently wait for the 'spring rush.'"

That the prejudice against winter building is not founded on difficulties that cannot be overcome is proved by many letters NATIONAL BUILDER has received from readers. Here is a good example, from W. H. Marbaker, Delavan, Wis.:

"So far, in my business career, I have never let the elements subdue my efforts in the building game. Cold or rain or heat bore no terrors for me. Of course it is sometimes quite unpleasant to keep going, but if the case is necessary enough, we go ahead.

"Now, as to concrete in winter, I have put in concrete when it was 24 degrees below, using the general precautions to cover up the forms, and by using salt, concrete will seldom freeze in the forms enough to do it much damage. Yet, there are some days when it is not advisable to pour concrete.

"Plastering in winter is not so bad, if you can keep the wind out and a circulation of warm air going about. My system is, if you have a basement, to set up the heating plant and throw open the openings at the highest point, thereby allowing the steam to escape. In that way it does not condense into water globules on the walls. After the patent plasters are once set, freezing will not injure them; at least I have found it so.

"Our carpenter work is another problem. Yet if one has the amount of work to do, it is an easy matter to arrange your work whereby something can be done all the time. It is an impossibility to work outside all the winter days, therefore if you have two or more jobs, there will be some inside work to be done for a day or two, thus holding the men and creating a feeling of satisfaction.

"There is no reason in my judgment why plumbing and electrical work can not be done in winter, as well as summer.

"Heating the composite parts of the concrete mixture, in my mind, is a good thing, except for the added cost of the appliances to heat with. As to unloading frozen aggregate, it has to be unloaded some times or go without! An added cost not estimated at time of signing contract. Painting can be done, but it is better done in a warm place.

"Bricklaying can be done in winter also. A few years ago while working in the north of Michigan, in the vicinity of Ironwood, we laid brick on one end of the building and began placing joists on the other completed end when it registered 24 degrees below. We had salamanders every six feet on the masons' scaffold. The extra cost was not estimated, but the requirements of the case demanded it.

"If it would be possible to keep the brown coat of stucco from freezing no damage would occur in outside stucco work.

"I deem it almost absolutely necessary to keep the building warm enough to keep out the frost at all times. It is not necessary to always burn a heavy fuel, only at night. In the day time light wood or refuse can be used. The added comfort to the artisans employed will offset the extra cost by the more and better work being done.

"As to special winter work, I have always tried to so manage when we have the volume of work to have some inside work for the coldest days. I do not think it advisable to frame anything within shop or shed, except it be absolutely necessary,

as it tends to lessen the confidence of the men on the job who are erecting, as all men are not perfect and mistakes are costly and not always shouldered by the one who makes them. Of course, a shed to frame in bad weather is a good thing, too, but as some must be out in the cold, all should be willing to do their part. The only place or time a shed comes in is when it rains or snows, but allowing that all things are perfect and the same workmen do the framing, there is no objection otherwise to framing in shop or shed.

"Now, I have given you a summary of my working system as I have found it to work advantageously for me, at least. No system is perfect in all cases, and also I have found a vast difference in the capabilities of men. One man will do as much again as some other in the same kind of work, consequently all men are not equal to a large degree. There is always one or more men on every job of any size who have a very pretty watch and they like to look at it. Some have a respect for themselves and do a good honest day's work, thereby securing for themselves a place in the employer's estimation. Others only are on the job for what there is in it for them."

Prepare in Winter for Next Season's Work

There is another method for live-wire builders to use in the northern winter season—sign contracts for early Spring business and employ your men and resources so that they can be used to the best advantage when the season does start. A. Moorman & Co., of St. Paul, known throughout the northwest as bank builders and as a live-wire construction organization, have this to say in regard to the advantages of a Fall contract for Spring construction:

"Every year about this time we begin a campaign for the signing of contracts in the Fall for work to be constructed the following Spring. Primarily, we admit, our motive in doing this is purely selfish, but we feel that our selfishness is excusable when we can make a considerable saving to others because of it.

"The building business and all of its allied lines is a seasonal one and hanging heavily over it, like the sword of Damocles, is that period of winter inactivity that a builder's organization must be carried through. As long as this quiet season prevails in the building business, just so long

will there be an opportunity for the prospective builder to benefit by the conditions prevailing at that time.

"The conditions which create this opportunity for the prospective building owner are familiar to any business man who will take the time to reason out the proposition, and while it is the purpose of this article to present these arguments, we do not ask that our statements be believed literally, but the application of every-day knowledge will be ample proof that they are true.

"We Figure on a Closer Margin"

"If it were possible to spread our building operations evenly over the entire year instead of concentrating them into the Summer months our problems would be simplified considerably. As matters now stand the four months from November to March are considerably lighter than the other eight months of the year, and it is necessary that we carry our organization through the quiet spell in order that we will have an intact personnel ready for the next year's work. Each building contract that we sign in the Fall, for construction the following Spring, does its part toward the more economical carrying on of our business, and because of this we figure this class of jobs on a closer margin than those which are undertaken in the midst of the building season.

"Material Men Figure on a Closer Margin"

"With one or two possible exceptions, the concerns manufacturing building materials are affected in the same manner as the builders, and the problem of Winter employment for their essential employees is a most important one. Orders for materials which can be run through their factories in the slack Winter months are especially desirable and quotations made in the Fall for this class of production are often as much as 20 per cent lower than similar quotations in the midst of the building season. In many cases the quality is markedly superior to that which is turned out in the rushed season, and the entire benefit, both in quality and saving, is accrued to the wise builder who lets his contract in the Fall.

"Material is All on the Ground"

"The value both to the builder and the owner of having the materials all on the ground when the operations are commenced is very great. If the element of delays is shipment or deliveries were eliminated from the building business today any given type of building could be constructed in from 20 to 30 per cent less time.

"Under the 'Fall contract for Spring construction' method of building, this element of lost time is practically eliminated, and again the owner gains the benefit.

"Labor is Plentiful and Anxious to Work"

"In the Spring, after the four-month lay-off which comes to almost all building trades workmen, a job looks mighty good, and in those buildings which we start in the early Spring after a Winter of preparation we never encounter the labor shortages which are bound to occur later in the year. The item of the willingness of labor to work is a considerable one, as a man will never give the same effort to a job when he can quit any time and get another at once, as he will when jobs are scarce.

"Building is Always Completed Before Winter"

"Since the building shortage has become so acute we have found it to be very hard for a bank to find temporary quarters in which to carry on their business while their new building is being constructed. In many cases it is necessary to build temporary quarters in the street while the building is in progress and if the bank is forced to stay in this temporary building through the Fall and Winter it causes them considerable inconvenience.

"When an early start is made, either in March or April, all risk of the work being carried into the Winter months is eliminated and the bank can rest assured that they will not have a month or two of huddling around a stove in a temporary building.

"Remarkable as it may seem, we have been able by getting a running start, as it were, to complete many one-story bank buildings in 80 to 90 working days from the start of operations. When materials are piled up behind the workmen all ready for fabrication, remarkable speed can usually be depended upon, while, on the other hand, if materials are slow in delivery that essential element of speed can not be instilled into the workmen on the ground.

"Actual Saving is Ten to Fifteen Per Cent"

"The most important question in connection with this whole matter is, of course, just what actual saving will accrue to the owner who will let his building contract in the Fall. After carefully checking over our records we can safely say that there is an actual saving of from 10 to 15 per cent in the cost of a given operation. In addition to this sum there is, of course, a saving made because of the shorter construction period, as in a building operation no return is realized on the invested money until the building is completed and occupied.

"It is sometimes hard to break away from the stereotyped manner of doing things, and usually, probably since the very first building operations, the average builder waits until Spring gets in his blood before he seriously considers his building problem, but that is all the more reason why the opportunity awaits those who can break

away from the old manner of doing things and let their contract in the Fall."

The foregoing are the "sales arguments" Mr. Moorman uses on prospective clients. In a similar manner every contractor and builder who wants to build up and maintain an efficient organization must *sell Fall and Winter Contract lettings* to his prospective clients. It is not enough to know that Winter work can be done, even if that Winter work is only assembling materials and laying plans for Spring. The Portland Cement Association, the Common Brick Manufacturers' Association, the National Lime Association, and in fact all the material manufacturers' associations will supply contractors and builders with reams of "literature" and advice on how to use and apply their materials in Winter weather, for the mere asking. But that is not enough. The contractor and builder must *sell* the prospective owner on the proposition just as Mr. Moorman does.

The Shop as Winter Help

C. S. Stolp, contractor and builder of Ellendale, N. D., writes NATIONAL BUILDER as follows: "I decided that if I were to meet all the requirements of the trade, especially during the winter months, it was necessary to have a shop, so I built one in 1913. I see today that it is the best move I ever made, as I am always busy.

"As this is an agricultural district, the farmer is in need of stock tanks, water troughs, hog feeders, colony hog houses and other necessities that can be made in a shop. I have filled all these wants in the past 10 years besides cabinet and repair work and making up frames, etc., for the building trade. Fly screens is another big item, as custom-made screens give better satisfaction and you can demand a higher price.

"For power I am using a gas engine. The equipment comprises a Parks combination wood worker, lathe, sand drum and a few minor tools, which is sufficient for small shop. I have a floor space of 30x40 ft., which gives me ample room to work.

"I find in having a shop there is always work coming to you, and it gives you a chance to get in touch with the public and the bigger job. They know you are in the game and they know where to find you."

"The Shop a Splendid Investment"

Hillenbrand and Norris, builders, of Jamaica, N. Y., write NATIONAL BUILDER that while they are not worrying about winter work this year they have found a shop a splendid investment. Mr. Hillenbrand writes: "Last winter I went after work to keep the shop busy and in four weeks' time we had so much that we had to work overtime to get it out. It was mostly interior woodwork and fixtures for stores and glass-enclosed porches."

All of the preceding indicates in no uncertain way a growing trend to distribute building activity more equally throughout the year.

Popular House Types in Cleveland

Colonial Design and Thatched-Roof Effects Get Many Customers

TWO most conspicuous features of the thousands of new houses built in Cleveland, Ohio, and its suburbs this year by so-called speculative builders are the prevalence of the plain rectangular colonial type and the popularity of colored wood-shingled roofs with thatched effect.

In going through new suburban sections like Shaker Heights a mere critical observer must be struck by the fact that however well any one type of house may look by itself, street after street of similar designs, all placed the same way on the street, and the same distance back, and each crowding the lot it is on, do not produce a particularly pleasing effect. While unquestionably these Cleveland houses are much better in design than houses similarly erected a few years ago, the fact remains that too much of one thing is monotony.

The same criticism might be made of the popularity of thatched-roof effects. Thatched roofs look best on low-set cottages or houses of the cottage type, but the taller a house is, the less becoming is a thatched roof to it. Builders should not thus allow themselves to be carried away by a wave of popular enthusiasm based on appropriate designs with thatched roof, but too often expected to be applied by the untrained public to any old roof at all.

A mere guess at Cleveland conditions would place new houses of colonial or near colonial design at somewhere near 75 per cent of all the houses of the better class built during the last year. Good examples of these are shown herewith. These houses were built by the Fairfax Construction Co. for the Tramer Realty Co., Cleveland

Heights, of both of which B. D. Roseman is president. The designs were made by Henry W. Grieme, architect, of Cleveland, whose work for builders was described in detail in NATIONAL BUILDER for September, 1922.

Mr. Roseman has used a great many of



B. D. Roseman, president, Fairfax Construction Co., Cleveland, Ohio

Mr. Grieme's designs in his building work and has found them very popular. The economy of space inside is undoubtedly one of the reasons for this popularity, for Mr. Grieme has made this a special study. Working, as he does, almost exclusively on houses for professional builders, this problem of the elimination of waste space has received most thorough study. Undoubtedly it is because this rectangular type of colonial design lends itself particularly well to space economy, or to the maximum use of all the interior, that it is so popular with educated and discriminating buyers.

Operating Methods of Fairfax Construction Co.

The Fairfax Construction Co. purchases all of the material used in the construction of its houses. It buys these in large quantities direct from manufacturers and owns and operates lumber yards. The construction company also has a complete labor organization which does all the work in connection with the erection of new houses. In this way Mr. Roseman is able to build with the utmost possible economy.

The realty company has sections which it develops as a unit, but in the case of the Shaker Heights houses, shown herewith, the company merely purchased available detached lots and built upon these. In a large development there would have been a greater variety of designs used. About 50 houses are under construction at one time.

The method of financing the operation is for the company to borrow a reasonable first mortgage to run from three to five years on each house, and to take back from



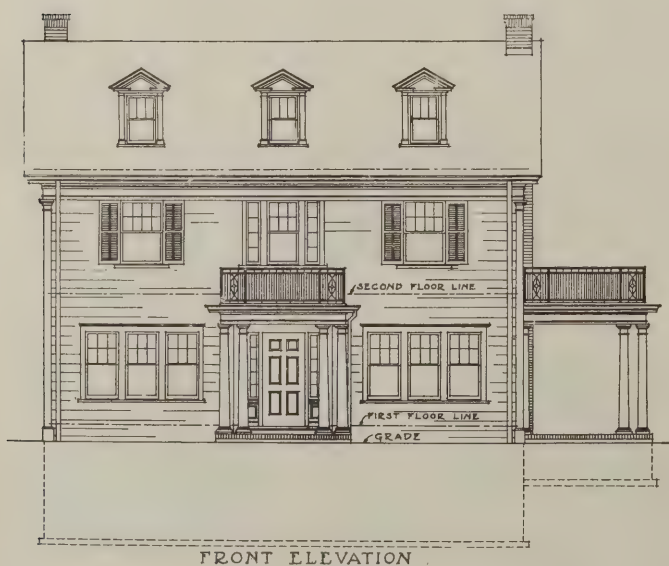
Photographs of houses 1319 and 1324, Fairfax Construction Co., Cleveland, Ohio



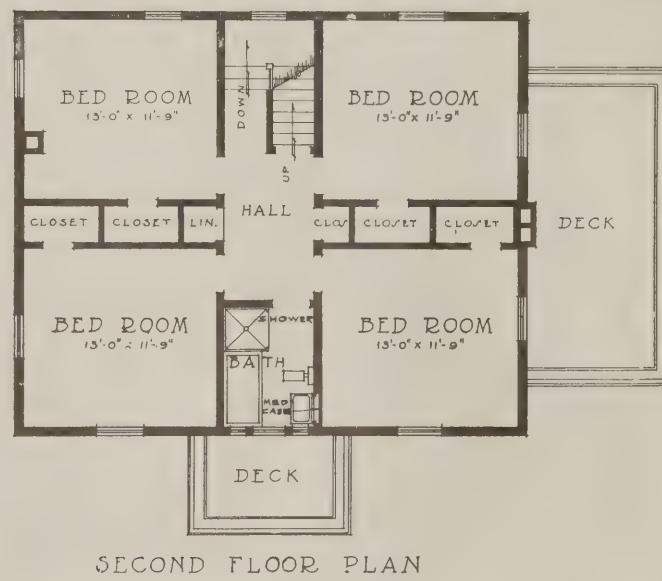
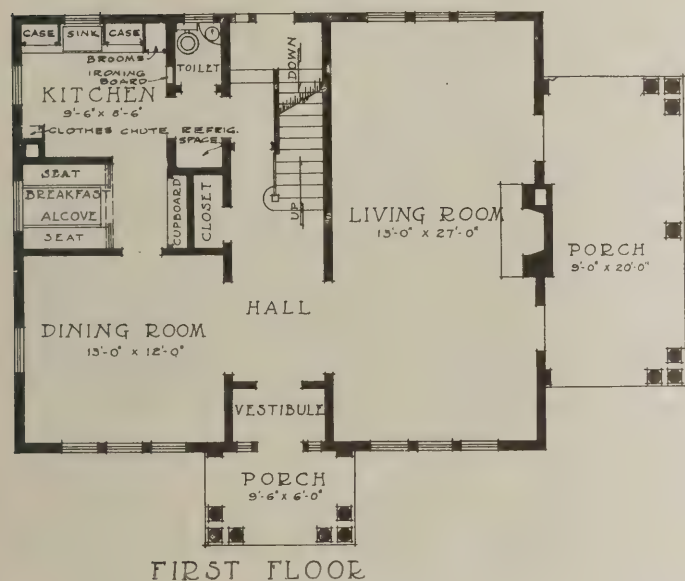
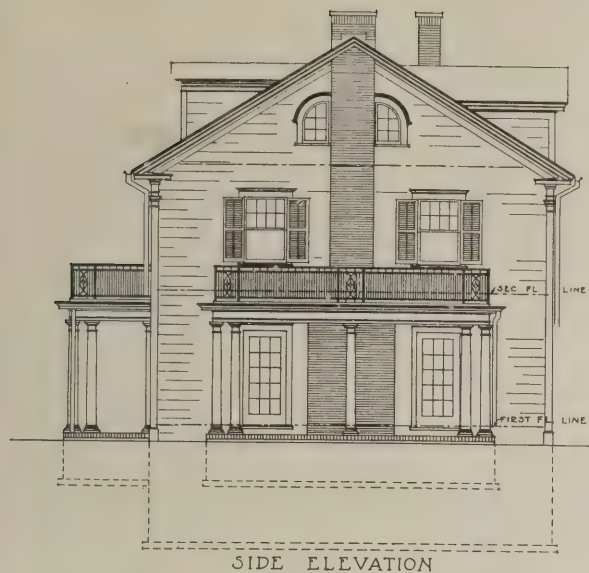
Photographs of houses 1324½ and 1325, Fairfax Construction Co., Cleveland, Ohio



Photographs of houses 1326 and 1327, Fairfax Construction Co., Cleveland, Ohio



Elevations of house 1323, Fairfax Construction Co., Cleveland, Ohio



Elevations and plans of house 1323, Fairfax Construction Co., Cleveland, Ohio



Elevations of house 1324, Fairfax Construction Co., Cleveland, Ohio

the purchaser a second mortgage payable in monthly installments in addition to a moderate cash payment. The second mortgages are held by the realty company.

What Is Gypsum?

GYPSUM is one of the most ancient of building materials. The Greeks used gypsum in Pliny's time. The writings of this naturalist of ancient history (23-79 A. D.) are included in 36 books, Book XXXVI dealing with the different kinds of stones and marble, including lime, sand and gypsum. He also minutely describes the removal of a beautiful gypsum plaster frieze from Lacedaemon to adorn a public building in Rome. Going further back the Temple of Apollo at Bassae, built 470 years before Christ, affords an excellent example of the use of and permanent structural qualities of gypsum. The great pyramids of Egypt contain plaster work of gypsum executed at least 4000 years ago.

The common name, plaster of paris, is often applied to all calcined gypsum because of the large quantities of gypsum rock beds found near Paris, France. In France and Germany gypsum is used for many building purposes, including inside and outside plastering, walls, floors and roofs. In the United States and Canada gypsum has for years been the predominating interior plastering material. In proper form gypsum is also used structurally for floors, roofs and outside walls. The United States government, in its war-building operations, used manysum plasters and other gypsum products

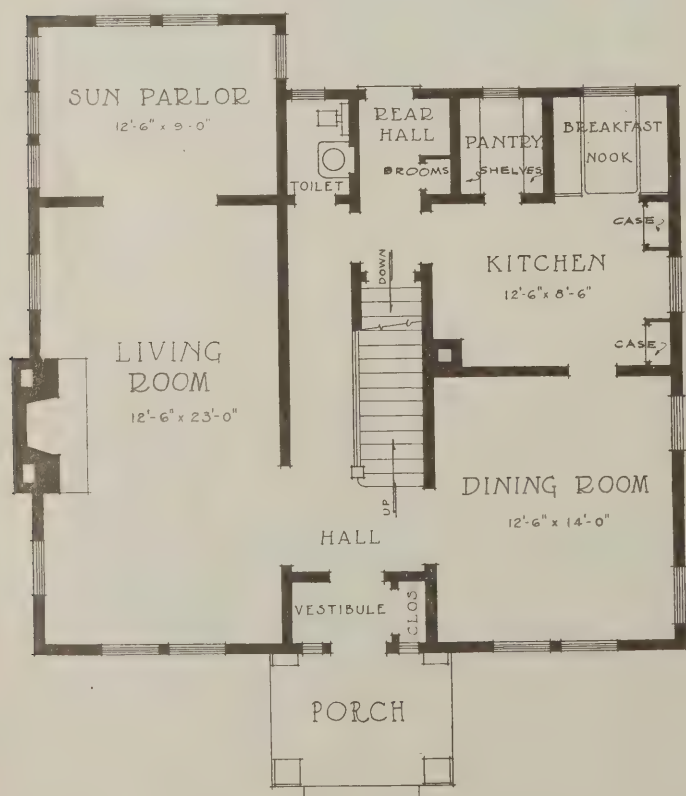
million square feet of reinforced gypsum roofs.

Gypsum is hydrous calcium sulphate (the sulphate of calcium with water of crystallization in chemical combination) and is expressed chemically as CaSO_4 plus H_2O . It contains when pure 79.1 per cent of calcium sulphate (CaSO_4) and 20.9 per cent of water (H_2O). The dehydration of ground gypsum rock by physical process yields calcined gypsum, and this is the base from which gypsum products

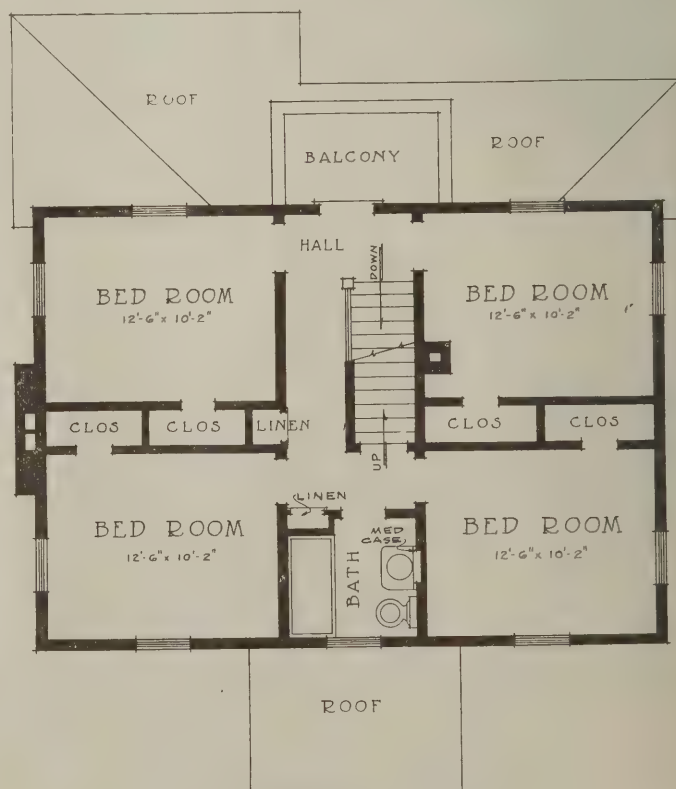
used in building construction are made.

It is the method of calcination employed and the degree to which such calcination is carried forward that determines the possibilities and uses to which the calcined product may be applied in the fields of building construction.

Gypsum usually occurs in beds of considerable area from 4 to 30 ft. in thickness. It is quarried or mined in 18 states and Alaska and is also imported from Nova Scotia, New Brunswick and Ontario, Canada.



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Side elevation and plans of house 1324, Fairfax Construction Co., Cleveland, Ohio



SIDE ELEVATION

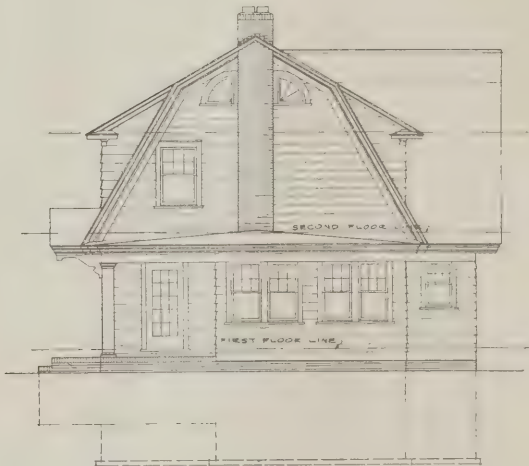


SECTION

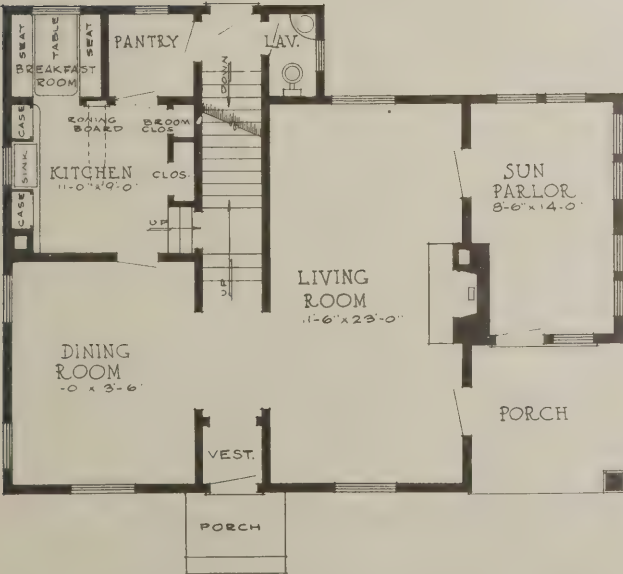
FRONT ELEVATION



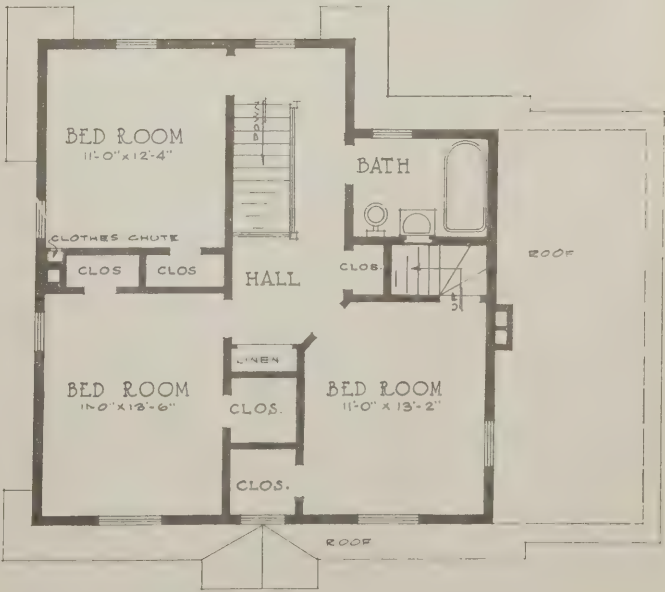
REAR ELEVATION



SIDE ELEVATION



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Elevations and plans of house 1328, Fairfax Construction Co., Cleveland, Ohio

Questions, Answers, Kinks and Discussions

Edited by V. L. Sherman

Herein is a Department of Mutual Help for the Exchange of Experiences and Ideas. It is Not Only Well Worth Your While to Give Your Experiences for What You Get Back from Others, but National Builder Pays You for Doing So in Good Hard Cash

Not Knocking South Dakota

THE "Beg Your Pardon" heading is requisitioned on the part of sectional pride in the form of a protest from a South Dakota subscriber who accuses us of "knocking" his state. The "knocking" consists of statements in the center column of page 69 of the October issue in which the need of windbreaks and of adequate bracing of houses is discussed. Incidentally, to emphasize the need of adequate bracing the words of someone who experienced a blizzard in South Dakota is quoted. It might just as well have been Chicago, "The Windy City." Someone says, "I wouldn't live in that town if you gave it to me. It rained and blew all the time I was there." "How long were you there?" "Oh, from 7:30 to 4 in the evening." Or, "I have suffered more from the cold in Asheville than in Quebec." "When were you in Quebec?" "Why, I never was there, I am just making a comparison," and so on. Comparisons are odious, on Shakespeare's authority, as well as our own, particularly when they tend to queer us with loyal sons of South Dakota.

In comparing the figures on wind data obtaining in Pierre, S. D., and Chicago, between October 1, 1921, and October 1, 1922, we find the average monthly wind movement for Pierre to be 6,460 miles; for Chicago, 8,673. For average mean monthly velocity for Pierre, 8.84 miles per hour; for Chicago, 11.88 miles per hour. The average monthly maximum for Pierre was 43.8 miles per hour, with a high maximum of 56 miles per hour. For Chicago the average maximum was 43.6 miles per hour, with a high maximum of 60 miles. These figures are, of course, too general to be of any real value except to prove what our South Dakota subscriber has probably suspected, that Chicago is a "windy" city.

Anchoring Sills to Foundations

What results have been experienced in various methods of anchoring sills to foundations

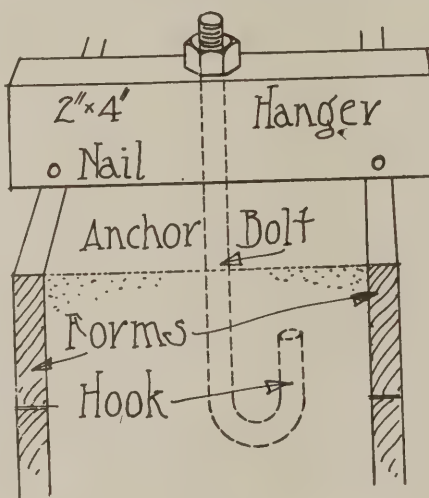


Fig. 1

or in the neglect of anchoring it would be valuable to record in this department. When is it an unnecessary expense and precaution? We reprint a method of anchoring wooden sills to concrete foundations described in our March, 1920, issue:

"For this purpose $\frac{5}{8}$ or $\frac{3}{4}$ -inch bolts are used. See Fig. 1. They should be about 2 feet long, threaded at one end, and have the lower end bent into a 4 or 5-inch hook. The hook will be found amply secure in concrete work and takes the place of the flat anchor plate used at the bottom of anchors in brickwork or other masonry. The anchor bolts should be embedded in the concrete about 4 or 5 feet apart, and for doubled or 4-inch sills, the threaded end of the anchor should project about $5\frac{1}{2}$ or 6 inches above the concrete. In setting the sills the top of the foundation should be cleaned off and thoroughly wet down. Then it should be leveled off with a thick coat of cement mortar. The sill should also be drenched with water before setting. This prevents too rapid drying of the mortar, which causes it to become crumbly. One and one-half inch washers should be used between the nut and the sill. Care should be taken that the anchors are set true so that they will register with the holes bored

in the sill to receive them, otherwise considerable time will be spent in making the bolts fit the holes. The holes in the sill should be amply large, say one inch in diameter. Sills should always be securely anchored to foundations, as the frame is stiffened thereby, and less rocking will occur during high winds. Comparatively moderate winds have been known to shift an unanchored frame building on its foundation."

The last paragraph seems a trifle strong unless, of course, the house is "balloon" frame. Or it might be the cellar windows were open.

Corner Construction

The sketch, Fig. 2, is submitted by E. R. S., Bayard, Iowa, to show the construction at the house corner which he has

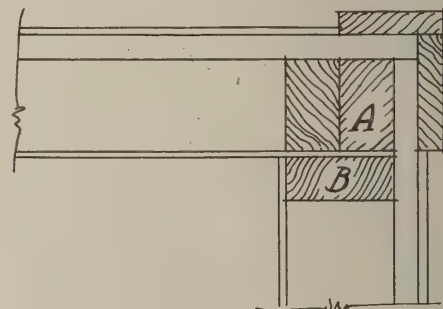


Fig. 2

found a time saver. He says: "A represents a double stud. B is an extra stud that is cut and left for the lather to nail in. This does away with about half the cutting of lath in the corners. One lather who has lathed for forty years told me it was the best method he had ever struck and that there was less cutting of lath than in any house he ever lathed."

Kerfing

W. T. C., Excelsior Springs, Mo., writes: "One rule I have used with good success is: Take a strip the thickness of the stock to be kerfed, measure off the radius, or one-half the diameter of the circle, make

a kerf at this point, lay it on a bench or any straight surface with kerf up. Then hold it firmly and bend the radius end up until the kerf closes. The distance as shown at A-B, Fig. 3, will be the distance apart to space the kerfs. Always use the same saw for the whole operation.

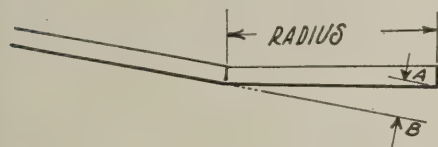


Fig. 3

"In this connection I will give a simple rule for obtaining the stretch-out or circumference of a circle, as this is con-

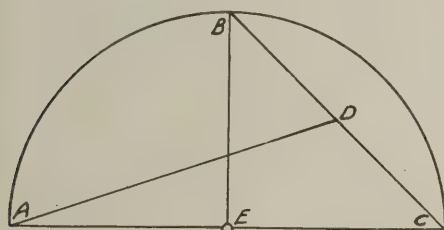


Fig. 4

nected with the kerfing job. Let A B C, Fig. 4, represent one-half the circle. Square up from center E to B. Draw chord B C. Bisect B C at D. Connect D A, which is equal to one-quarter of the circle or ninety degrees, which may be divided into any part of the circle desired.

"Always use vertical grained stock for kerfing and you will never have a break."

(The line A D in Fig. 4 is 1.581 times the radius. The quarter circle is 1.5708 times the radius.)

More About Kerfing

In connection with kerfing problems in general, B. R. M., Linton, Ind., writes that he does not think it can be made a nice problem in mathematics owing to the number of things which you cannot control. For instance, if you have mistaken the width of the cut by one one-hundredth part of an inch, the error would be one inch in one hundred cuts. What is termed an accumulation of error.

The first kerfing rule corresponds to that of W. T. C., which is given above.

"In Fig. 5 is a sample of something that can be used where the face only on either side is used and the edges do not count. First make a form to bend it on, and in this manner the outside one will support the inner one, which otherwise would break. By nailing as you bend it on the form, and using short nails which do not go through the two pieces, it will retain its shape and you have a very substantial piece of work suitable for coarse work.

"In Fig. 6 we have a different piece of work on the same principle. As to the

drum or form this is dadoed. Leave about one inch of wood standing and one-eighth on with fine brads. If the brads are too or three-sixteenths thickness as the case may be, larger circle more, smaller circle the other off a little you get a very good

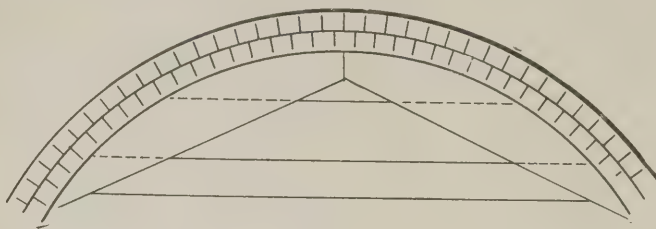


Fig. 5

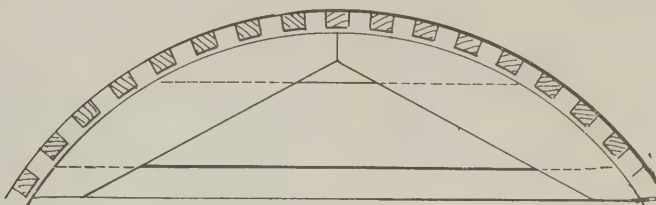


Fig. 6

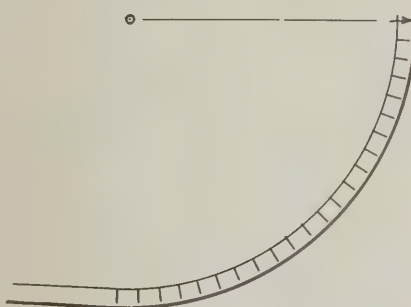


Fig. 7

large the mould will split. Ripping reduces less. Now bend it on your form and work out keys and glue them in the gains. Now by glueing a thin piece on the back of this you have a good piece of work. This, if properly laid out, can be used in winding stairs for strings and skirting and be housed for the steps and risers.

"In Fig. 7 we have a design where you want to extend the bent piece beyond the spring line. Find the kerfs the same as in Fig. 3 and always leave a foot or more of straight wood beyond the spring line, for it is impossible to make a joint at the spring line and not show a kink on the face.

"Fig. 8 is the best way I have found to spring the crown mould around a circle cornice. Rip the mould in two or three pieces, as the case seems to require, and kerf (as in Fig. 3). Then bend the sev-

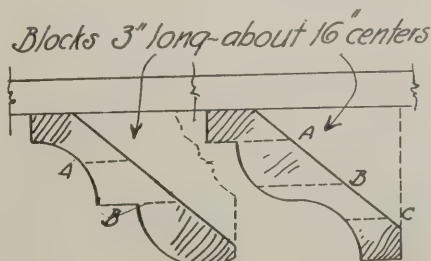


Fig. 8

job for painted work as a cornice is some distance from the eye."

Dividing the Circle

W. K. E., Indianapolis, Ind., writes, in connection with the circle problem, that the construction is "in error by seven-tenths of one per cent, as the following demonstration will show (Fig. 9).

"Indicate the center of the circle by the letter O and draw lines connecting B-C, A-C and O-D. Then we have the following known quantities:

"By the conditions of the drawing B-A equals B-C equals A-C, making the equilateral triangle B-C-A. Hence all the angles are equal. And their sum being 180 degrees angle B-A-C equals 60 degrees. Since C-O bisects A-B angle O-C-A equals 30 degrees. Angle C-O-A is, of course, 90 degrees. Also O-A is known and O-D is equal to it. E-A is also known.

"In triangle C-E-A, E-A, A-C, and angle E-A-C are known, from which angle E-A-C is found to be 12 degrees and 13 minutes. Angle O-C-E equals 30 degrees minus angle E-C-A or 17 degrees and 47 minutes. In triangle O-C-A side O-C equals .866 times A-C.

"So that in triangle C-O-D we have, known, C-O, O-D, and angle O-C-E from which angle O-D-E is found to be 31 degrees and 56 minutes.

"Angle C-O-D equals 180 degrees minus the sum of angles O-C-E and O-D-E, or 130 degrees and 17 minutes. Angle E-O-D equals 130 degrees and 17 minutes minus 90 degrees or 40 degrees and 17 minutes. But as there are 360 degrees in a circle, angle E-O-D for a regular nine-sided polygon must be 40 degrees. Thus the solution submitted by 'W. I.' shows an error of seven-tenths of one per cent. In other words, continuing his chord A-D nine times

What Do You Know About These?

Here are a number of things some subscribers are asking for. If there is anything in the idea of mutual help and co-operation in the building arts here is a chance to put it in practice. Some of the things wanted should be paid for, but there is a whole lot of information that can be supplied by those who have gone through the mill, and their compensation must lie in the consciousness of having helped a fellow builder out of a difficulty or in the idea that they will get help from the same general source when stating their needs in this column. Questions received after the 20th of the month will have to hold over one issue. Get them in early. Answers the same.

Broadcasting the requests of inquirers for information has the advantage of gathering practical experiences and of showing what attempts are being made to promote, improve or simplify construction or the business of construction. Who has suggestions to offer to the following:

109. A Swing-Up Vice for Sash or Screen Frames.—J. A., Madison, N. J., wants to locate the maker of a vice for sash or screen frames. The vice is adjustable to any position and is hung on the under side of the bench. It is controlled by two handles, one to swing it up and the other to turn it around.

110. Window Jack for Moving Pianos or Other Furniture in at Windows.—A. F. M., Corry, Pa., wants to know of a window jack for furniture movers. The address of a piano derrick manufacturer has been supplied, but A. F. M. wants to hear from brother contractors.

111. Costs on Cabinet Work, Panel Making, Screens, Etc.—A. H. P., Huron, S. D., wants an estimating book on the above subjects.

112. Black Mortar Color That Will Hold Its Color.—L. L. A., Lake Charles, La., has been unable to get a black mortar color that will hold its color. He wants a jet black that will stand. The names of manufacturers have been supplied but L. L. A. wants the experience of brother contractors.

Answers

100. Weatherstripping for Bottom of Garage Doors.—Answering No. 100 in the October issue, Victor J. Smith, Chicago, writes: "A small hinged strip may be used on the inside of the door as shown in Fig. 1. When not in use the strip is hooked up with a large screen hook. In order to make better contact with the floor, a strip or rubber leaf. In laying the cement floor a rain catch was grooved into the fresh cement as shown. Leaders from this depression run at right angles about every foot. Another scheme which I have used is shown in Fig.

2. This is essentially the same except that a different device is used to hold the weatherstrip out of place while the door is open. It is clear, of course, that these devices must be used on doors which allow clearance for the strip when the door is open. The weight shown in the second drawing is a strip of iron set into the wood. This keeps the contact with the floor

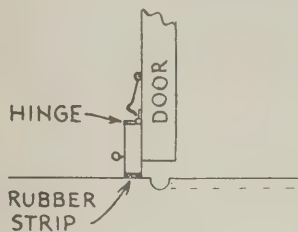


FIG. 1.

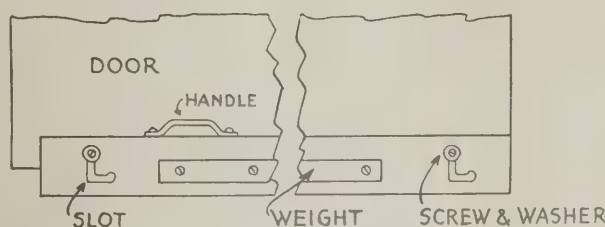


FIG. 2.

tight. This type of strip allows better for unevenness in the floor than does the first. These devices have been used in the South with good results. I do not believe that any simple or inexpensive device could meet the requirements of 'keeping the rain and snow out.'"

105. Back Numbers of National Builder and Supplement Plans.—"I have four yearly volumes of NATIONAL BUILDER I can spare to 105 if he writes to me personally."—Anthony J. Ligienza, Goetzville, Mich.

101. Resurfacing a Large Brick Church.—Answering E. D. G., on this subject, Amerigo De Chiara, Port Chester, N. Y., writes: "I would advise you to hire some good men who can handle a hammer and chisel to get a very rough surface on your bricks, and then get plasterers to stucco the church which I am sure will make a good job."

However, E. D. G., who is the pastor of the church, is not interested in stucco. He wants the brick itself refinished, or restored. The means to be employed must be determined by inspection of the present condition. Scrubbing with dilute acid, and thereafter washing down thoroughly is one way. If the brick is badly stained in spots resort is had to stronger acids, like fluoric acid. It may be that in order to obtain an even tone on what may be the irregularly stained or discolored or faded brick surface that brick stain will be the best treatment.

To Confine Constructoin Work to the Legally Qualified

THE news letter of the National Fire Protection Association of November 1, announces that the Building Officials' Conference, a section of the Building Code

Committee of the United States Department of Commerce, and of which conference Rudolph P. Miller, vice-president of the N. F. P. A., is chairman, officially favors the enactment of legislation by which building operations shall be restricted to architects, engineers, builders, superintendents of construction, or others who have by proper evidence shown their ability or capacity for undertaking such building operation and on whom individual responsibility for the safe prosecution of the work and a compliance with the laws relating to buildings can be placed. This action was taken in view of the late serious loss of life in the collapse of a completed theater building in Washington, D. C. and of a theater in course of construction in Brooklyn, N. Y., both of which cases were in part if not wholly, due to irresponsible, incompetent or careless design and supervision.

tion time to 15 years was recently put through, compares with the cost and building material requirement of the Panama Canal. If the recommendations made by Richard E. Enright, Commissioner of Police, for a system of elevated streets are put through, the two projects will actually surpass the Canal in cost.

In addition to all this only a meagre start has so far been made in the Metropolitan Life Insurance Co.'s hundred million dollar housing enterprise. The city is already talking about additional subways and an extended water supply system, so that with the improvements contemplated by the new state and the present city administrations

The Situation—Review of the Year 1922 and Forecast for 1923

Rising Prices in Latter Part of 1922 Have not Retarded Residential Construction—Prices Likely to Remain High During 1923—Labor and Wages the Biggest Element of Uncertainty and the Most Fluctuating

BEFORE essaying to review conditions in the year just drawing to a close or to attempt making a forecast of conditions next year, the writer read over his article in the annual review number of NATIONAL BUILDER a year ago. It was then noted that building costs were falling and the prediction was made that the fall would be continuous in the long run but gradual, and with possible short spurts upward due to unforeseen contingencies.

Prices of materials—and in many instances, wages also—did fall steadily in 1922, until about April or May, when they started to take an upward trend; and the upward trend has continued right up to the time of this writing. It is quite generally estimated that building costs are now 25 to 30 per cent higher than they were in February and March of this year, although they are only slightly higher than they were in the fall of 1921. The U. S. Department of Labor statistics show an increase in the price of building materials as a whole, from March to September of 16 per cent. Wages are generally believed to have increased in a greater ratio, but few present statistics are reliable, because they give wage scales only and not the actual earnings of building trades labor.

Capital, Labor, Materials

The three big factors that affect the relative activity of the building industry are the current prices of capital, labor and materials. At the beginning of 1922 the highest priced, or at least, the most difficult to obtain, of these factors, was capital. Capitalists believed the prices of labor and materials would come down, and there was much reluctance on the part of those who furnish capital to finance building opera-

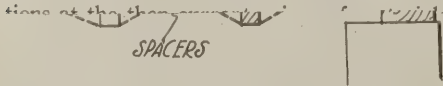


Fig. 10

will cut time and cost more than can be appreciated. With this method a whole house can be bridged in about the same time that one line of bridging can be placed under the old method.

"Fig. 10 is almost self-explanatory but I desire to emphasize the fact that no scaf-

industry much more freely, and the reports of building permits began to show increasing amounts of commercial and general building—particularly public-works building. And, as is always the case, activity begets activity, prosperity begets prosperity and the use of capital begets more capital.

Tremendous Volume of Building in Spite of Handicaps

In 1922 estimates place the value of buildings completed or under way at the stupendous figure of \$5,000,000,000. And of this huge total, returns of questionnaires from NATIONAL BUILDER's readers show that they had a very considerable part. Not less than a third of this \$5,000,000,000 was spent in residential building—setting a record for all past time. Probably in the neighborhood of 250,000 dwelling houses were constructed or begun. Returns for the last two months make it appear that residential work forms nearly 50 per cent of all reported for these months; or in other words, a good share of the seasonal falling off in building has been commercial work rather than residential.

If this is a correct conclusion it is of extraordinary interest to builders. Because, as capital for commercial work is slower than capital for residential work in accepting new conditions, so is it also quicker to sense a change in conditions and to proceed in new investments with more caution. Government statistics show that during the last month or two there has been a rise in interest rates and a fall in food values.

Factors That Caused Building Costs to Rise

The increase in the costs of building as the season of 1922 advanced was caused approximately half and half by increased prices of materials and increased wages. The increase in prices of materials itself was, of course, caused partly by increases in wages, but largely by increased cost of fuel, shortage of transportation and the hazards of operation introduced by these last two factors.

The increases in wages of both building trades labor and labor at building-material producing plants may be traced back to the present restrictive immigration laws. This country has always depended for common labor on fresh supplies of immigrants.

Every year large numbers of these immigrants graduate from the common labor group to skilled labor and tradesmen groups. Our present immigration laws, with educational tests and limited numbers are excluding the modest common laborer in favor of the presumptuous tradesman type, who has learned to live by his wits rather than his brawn.

There is no prospect of early relief from the present labor shortage. Other industries are increasing production and are bidding against the construction industry for a very limited supply of common labor. According to Secretary of Commerce Hoover's forthcoming annual report the railway situation is also very serious and there is no immediate prospect that the railways will be able to furnish adequate transportation service to our growing industries. The coal situation is being studied by a high commission appointed by the President, but it will be a long time before its findings can be put into operation. In the meantime coal will be high-priced, and the union miners' agreement with the coal operators expires on the first of April next year. The factors, therefore, that have been responsible for the increase in prices in 1922 will be with us in 1923, at least for the first half of the year and if the present rate of construction keeps up, wages and prices will keep up.

Bright Prospect for Building

There is nothing to indicate that there will be any less construction in 1923 than in 1922. NATIONAL BUILDER subscribers in New England are almost unanimous in believing that they will have more business next year. In the Middle Atlantic states the majority is greatly of the same opinion, and this holds true of all the other sections of the country as well. In the Middle West opinion is nearly unanimous that there will be more building in 1923 than in this year. In the South and on the West Coast, where the building season is now beginning, there is every local evidence of at least as great activity as a year ago.

All Business on Upswing

As to other lines of business, and business in general, a recent statement (November 24) of the Department of Commerce at Washington, D. C., says:

BUILDING MATERIAL PRICES

Average prices paid October 1, 1922 by contractors for building materials delivered on the job, as collected by the United States Division of Building and Housing, Bureau of Standards. These prices are intended to be those paid by contractors in the course of their ordinary small and medium sized operations.

CITY	COMMON BRICK 1,000	PORTLAND CEMENT, bbl. Excl. of containers	DIMENSION LUMBER, M. 2x4-16' SISE	COMMON BOARDS, M. No. 1 1x6	FLOORING, M. 1x4, 10'-16'	SHINGLES, WOOD, 100sq. ft. Extra clear, 16' 8x12	SHINGLES, COMPO, 100sq. ft. Crushed slate surfaced	GYPSUM PLASTER BOARD 5/8" 100sq. ft.	LIME, HYDRATED Common, ton	BUILDING SAND Cu. yd.	CRUSHED STONE 3/4" cu. yd.	WIRE NAILS Eg.	WINDOW GLASS, 50sq. ft. Single A 10'x12'	HOLLOW TILE 8"x12"x12", each	CAST IRON PIPE 4" 5 ft. 13 lbs. per ft.	STEEL PIPE 1" galv. 100 ft.	REINFORCING BARS. 3/4" sq. 100 lbs.	GYPSUM PLASTER Heat-ton	ZINC OXIDE, 100 lbs. Amr. process lead free	WHITE LEAD Dry, 100 lbs.	STRUCTURAL STEEL Flat, 6" I beam, 100 lbs.	LIBERED OIL Raw in bbl. gal.	ROOFING SLATE No. 1 Ribbon, 100sq. ft.	TAR PAPER ROOFING, 100 sq. ft. 2 ply, 75 lbs. per roll	ROBIN SIZED SHEATHING, 500sq. ft. 3 ply, 30 lbs. per roll
Aris. Tucson	12.00	4.40	60.00f	55.00	97.50f	7.00r	—	55.00	—	1.15	3.00	6.00	5.40	18	76.00	11.70	4.00	—	14.00	—	23.00	1.21	—	3.25	1.75
Calif. Sacramento	—	3.30	41.50f	43.00	81.50f	—	—	—	—	1.50	2.75	—	—	—	—	—	3.65	—	—	—	—	—	—	—	—
Calif. San Jose	—	2.91	38.00f	—	90.00f	—	—	50.00	26.00	2.50	—	5.50	—	—	—	—	3.50	—	—	—	20.00	1.15	—	—	—
Conn. New London	—	7.68	65.00f	40.00	85.00f	5.04r	—	7.50	—	1.50	2.80	4.50	—	25	—	—	4.25	—	—	—	20.00	—	—	—	—
D.C. Washington	—	3.20	—	—	—	—	—	30.00	16.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fla. St. Petersburg	19.00	4.00	31.00r	31.00	—	8.64r	8.00	—	—	2.50	6.25	—	—	23	—	—	—	—	—	—	23.00	1.30	—	2.25	1.50
Ge. Savannah	15.00	4.00	20.00r	—	—	—	6.50	40.00	—	2.00	5.50	3.70	4.25	—	—	—	3.50	—	—	—	23.00	.99	—	2.15	—
Ia. Council Bluffs	16.50	2.62	45.00f	48.00	100.00f	7.00r	8.00	—	—	3.50	5.25	—	—	13	—	—	3.15	—	—	—	18.00	1.10	—	—	—
Ia. Waterloo	18.00	2.80	45.00f	45.00	80.00f	6.50r	7.50	32.00	25.00	1.75	3.50	5.00	—	14	50.00	12.00	3.35	4.80	—	—	17.00	1.12	—	—	—
La. New Orleans	15.75	3.60	—	—	85.00f	4.50r	—	—	—	2.00	—	3.60	—	23	—	—	4.25	—	—	—	18.00	1.15	—	2.00	—
La. Shreveport	13.50	3.20	44.00f	50.00	—	7.50r	7.00	45.00	25.00	1.50	3.60	4.00	4.50	23	—	10.37	3.75	3.50	12.50	—	24.00	.98	12.00	—	1.25
Md. Baltimore	20.00	3.20	39.00f	—	—	—	—	45.00	15.00	2.00	—	3.40	4.20	21	—	9.00	3.25	—	—	11.25	22.50	.91	—	—	—
Mass. Fall River	24.00	2.94	55.00f	—	—	—	—	—	20.00	2.50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mass. Fitchburg	21.00	3.02	70.00f	57.00	110.00f	5.95r	7.75	—	18.00	1.80	3.00	4.00	—	27	—	—	3.00	—	—	—	1.00	—	—	—	—
Mass. Haverhill	25.00	2.90	63.00f	48.00	7.00r	7.50r	7.00	45.00	—	2.50	2.75	3.90	—	26	—	—	—	—	—	—	.98	—	3.00	1.75	1.60
Mich. Bay City	12.50	3.10	40.00f	39.00	—	6.50r	6.90	40.00	—	2.00	2.35	3.25	5.20	16	51.00	9.00	—	3.20	12.00	16.50	—	.98	16.00	2.65	1.00
Mich. Benton Harbor	18.00	3.25	40.00f	—	—	—	—	—	18.00	2.00	—	—	—	—	—	—	—	—	—	18.00	—	—	—	—	—
Mich. Detroit	16.50	2.77	50.00f	—	7.25r	7.25r	7.25	—	18.00	2.50	2.50	3.53	—	21	—	8.93	—	4.50	14.00	20.00	19.00	1.15	—	1.95	.80
Mich. Lansing	14.50	3.40	47.00f	45.00	75.00f	6.50r	7.50	35.00	24.00	1.90	2.10	3.75	—	—	—	—	3.50	4.00	—	17.50	—	—	3.00	1.75	1.00
Mich. Pontiac	14.40	—	45.00f	48.00	—	6.50r	6.90	40.00	15.00	1.50	—	—	—	17	52.00	8.50	—	—	—	—	1.00	17.10	2.75	1.00	—
Mich. Saginaw	18.00	3.25	53.00f	—	100.00f	7.50r	6.50	—	16.00	2.50	3.60	3.10	—	18	51.00	9.50	3.50	5.00	13.00	18.00	17.00	1.05	17.50	3.25	—
Mo. Kansas City	16.50	2.80	46.00f	51.00	72.50f	6.50r	5.80	45.00	24.00	2.35	3.00	4.60	4.50	22	—	—	2.00	4.50	12.37	—	15.50	—	—	1.20	—
Mo. St. Louis	14.50	2.85	44.50f	51.00	74.00f	6.53r	6.38	43.00	20.00	2.50	—	3.50	3.90	—	—	—	—	4.00	12.75	—	18.50	1.06	—	—	.94
N.J. Camden	20.00	3.05	45.00f	40.00	85.00f	—	—	—	1.05	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
N.J. Newark	24.00	3.20	45.00r	40.00	—	—	—	—	2.00	3.00	3.75	—	—	—	—	—	3.04	—	—	—	—	—	—	—	—
N.Y. Albany	22.50	3.79	—	—	—	—	—	31.50	19.80	—	—	—	—	—	—	—	—	—	—	—	20.00	—	—	—	—
N.Y. Buffalo	20.12	2.78	—	—	6.00r	—	—	45.00	16.00	1.28	1.30	3.85	3.90	—	58.80	10.00	—	—	—	—	—	—	—	—	—
N.Y. Niagara Falls	24.00	3.05	—	—	—	—	—	—	19.50	3.25	—	—	—	18	—	—	4.50	—	—	—	19.50	—	—	2.00	1.55
N.Y. Poughkeepsie	18.00	2.90	45.00r	36.00	—	—	—	—	21.00	2.50	2.40	4.05	—	—	—	—	—	—	—	—	20.00	—	—	—	—
N.Y. Rochester	16.25	4.00	45.00r	42.00	100.00f	6.00r	—	31.00	19.00	2.25	—	3.95	4.20	21	—	10.07	3.30	4.00	—	20.00	18.00	1.03	—	—	—
N.Y. Syracuse	18.00	2.91	—	—	—	—	—	31.25	24.00	1.80	2.00	—	—	20	—	—	3.50	—	—	—	17.55	—	—	2.85	1.50
N.D. Grand Forks	15.00	4.00	50.00f	46.00	96.00f	7.50r	8.00	60.00	—	3.00	—	5.00	4.80	—	—	12.86	—	—	—	—	28.00	—	—	2.50	.75
N.D. Akron	12.50	3.25	50.00f	50.00	95.00f	7.00r	—	32.50	17.60	1.75	3.25	3.30	4.50	17	87.40	8.56	3.25	3.25	12.75	12.25	14.00	.98	—	2.50	.90
N.D. Cleveland	18.00	3.20	57.00f	50.00	92.00f	5.76r	6.00	—	15.60	2.50	3.50	3.30	—	—	—	—	—	—	—	—	1.01	—	—	2.50	.90
N.D. Dayton	17.00	3.52	45.00f	55.00	90.00f	—	6.00	32.50	14.00	1.80	2.50	3.90	4.50	18	—	8.57	3.00	3.25	15.00	12.00	19.00	1.20	16.50	2.25	1.15
O. Hamilton	23.00	3.50	47.00f	55.00	80.00f	6.40r	6.50	—	18.00	2.00	1.50	—	7.20	18	89.32	8.94	3.20	4.00	12.75	—	17.50	2.10	13.50	—	1.00
O. Lorain	14.25	3.35	52.00f	49.00	90.00f	6.00r	—	—	16.00	3.10	2.75	3.10	—	18	—	—	2.95	3.15	13.00	—	17.50	1.15	—	—	—
O. Newark	19.00	3.00	47.50f	46.00	90.00f	7.50r	7.50	45.00	18.00	3.00	—	3.25	4.25	18	76.00	8.50	3.25	—	14.00	—	18.00	1.00	13.00	2.75	1.50
O. Toledo	—	49.00f	—	—	80.00f	6.40r	6.75	40.00	18.00	3.00	3.00	3.45	—	—	—	—	—	—	12.75	—	—	.97	—	2.50	.80
Ore. Portland	21.00	3.15	18.00f	21.00	56.00f	5.00r	14.00	—	28.00	1.60	—	4.25	—	15	—	12.00	3.85	—	12.00	19.00	24.00	1.05	—	—	1.60
Pa. Erie	15.75	3.20	49.00f	50.00	—	6.50r	5.50	45.00	20.00	3.00	3.00	3.00	—	20	—	—	—	—	—	—	24.00	—	—	2.00	1.00
Pa. Pittsburg	14.25	3.35	52.00f	49.00	77.00f	7.50r	6.25	37.50	20.00	2.50	5.50	5.15	5.58	—	21	80.00	—	3.25	—	12.75	14.40	.92	13.50	1.95	1.20
Pa. Soranton	25.00	3.40	—	—	—	—	—	32.50	—	—	—	—	—	—	—	—	—	—	—	—	18.00	—	—	—	—
S.C. Columbia	12.50	3.50	21.50r	30.00	90.00f	6.00r	6.25	35.00	20.00	1.00	3.00	3.70	—	20	—	10.44	4.00	4.50	13.50	—	20.00	1.25	—	2.25	—
S.D. Sioux Falls	—	3.00	30.50f	44.00	—	5.50r	7.50	35.00	22.50	1.50	1.60	5.50	—	—	—	—	—	—	—	—	—	—	3.00	1.40	—
Tenn. Nashville	15.00	2.85	—	—	—	—	—	—	—	3.00	—	3.80	—	—	—	—	—	—	—	—	19.50	—	—	—	—
Tenn. San Antonio	14.25	2.80	48.00f	48.00	75.00f	7.50r	—	—	20.00	1.90	2.75	4.40	5.40	—	75.00	—	3.60	4.40	13.00	—	20.00	.96	—	2.75	—
Tex. Richmond	18.00	3.60	30.00r	33.00	—	—	6.00	40.00	20.00	2.97	—	3.50	4.50	25	—	9.25	3.35	4.10	12.50	15.50	22.00	.92	13.00	2.00	.75
Wash. Spokane	—	3.00	25.00f	—	70.00f	—	—	55.00	27.50	—	—	4.80	—	—	—	—	—	—	—	—	18.75	1.05	—	2.50	1.00
W.Va. Fairmont	24.00	3.10	45.00f	55.00	115.00f	—	—	32.00	15.00	3.75	4.50	3.50	4.40	23	—	11.00	3.00	—	12.00	—	16.00	1.05	12.00	—	.90
Wis. Milwaukee	13.00	2.65	40.00f	37.00	75.00f	—	7.00	32.00	—	2.00	2.10	3.25	4.50	14	—	11.50	—	—	12.25	18.00	—	1.00	21.00	—	1.00

Note - Yellow pine flooring is E.G.O., Douglas fir flooring is V.G. No. 2. o.Cypress; r.Red cedar; n.North Carolina pine; f.Douglas fir; y.Yellow pine.

The outstanding feature of October business conditions, according to figures compiled by the Department of Commerce in its "Survey of Current Business," was the large increase in production in the basic commodities. The output of pig iron and steel ingots, the consumption of cotton and silk and the output of cement all exceeded in October any previous month since 1920.

The clearing up of the bituminous-coal situation has enabled the steel mills to increase their operations, but unfilled steel orders continued to gain. Production of both bituminous and anthracite coal show further increases, but the transportation situation, with a record post-war shortage of cars is still a limiting factor, not only for coal, but steel, building materials and other products for which the demand has increased.

Dwindling stocks, delays in transportation and increased wages, due to labor shortage, have combined to raise prices to a marked degree. The volume of business, as reflected in sales of mail-order houses

and chain stores and in bank clearings and debits, continues to increase, and credit has expanded to meet these conditions. This has resulted in a rise in interest rates and a fall in bond prices.

Taken all together, the statistical indicators reflect conditions decidedly in the upswing of the business cycle.

Trend of Prices in 1923

Opinion among NATIONAL BUILDER's own readers regarding prices next year is fairly evenly divided. This applies to wage tendencies as well. From the foregoing it will be seen there is little prospect of any material decrease in present prices and wages, and such is the conclusion of various authorities based on other analyses. For example, a recent analysis of conditions in New York City and the East by the Dow Service states:

Present day tendencies to defer contem-

plated building investment projects anywhere in the East in anticipation of a general turn downward in construction costs are not supported by current trade trends.

The magnitude of New York's construction requirements in the next decade is appalling. One project alone, the North River Bridge for which an extension of completion time to 15 years was recently put through, compares with the cost and building material requirement of the Panama Canal. If the recommendations made by Richard E. Enright, Commissioner of Police, for a system of elevated streets are put through, the two projects will actually surpass the Canal in cost.

In addition to all this only a meagre start has so far been made in the Metropolitan Life Insurance Co.'s hundred million dollar housing enterprise. The city is already talking about additional subways and an extended water supply system, so that with the improvements contemplated by the new state

the estimated outlay for engineering construction purposes exclusive of the \$300,000,000 normally represented by building construction in New York City annually, will exceed \$700,000,000 during the best part of the forthcoming decade.

The magnitude of pending construction projects, of which the Hudson River bridge is only one, is stirring to thought those who plan ordinary building construction operations, yet are waiting for lower construction costs to come.

First, the labor supply is one of growing seriousness. The lack of apprentices is already commanding the attention of active builders. Present building material supply capacity will not be capable by 66 per cent of taking care of such monumental needs as the present situation in certain masons' material supply centers already prove with one year of building prosperity warped by coal and rail strikes and embargoes.

In 1921 when great pressure was being applied to building costs a "walk-up" type of non-fireproof tenement house cost 40 cents a cubic foot, net as against 45 cents in 1919, and 28 cents in 1912. For a six-story elevator apartment the cost was 50 cents as against 55 cents in 1919, and 32 cents in 1912. For a ten-story high class (Park Avenue) type of elevator apartment house the cost in the middle of 1921 was approximately 80 cents as against 82 in 1919 and 55 cents in 1921. According to the Russel B. Smith Engineers the costs for 1923 construction projects show no important difference over the costs observed for 1921, indicating that the construction cost trend is stabilized.

The reason that costs are stabilized is held to be that the savings recently effected by lower costs of materials have been absorbed by the higher cost of labor which, according to contractors, will not seriously change as long as building demand continues to absorb all the available supply of labor and apprentices cannot be recruited faster and, also, because the demands for basic building materials are rapidly outgrowing the capacity of present plants to supply it. In the light of the huge volume of building material consumption to develop in the next few years, a prolonged price reaction seems improbable.

From the other extreme of the country, Portland, Ore., comes the report:

Increasing activity in the nation-wide building construction campaign of the past year, accompanied by wage advances in the steel industry and other basic industries, has given a decided upward trend to the price of building materials and the general level is now approximately 17 per cent higher than in March, 1922. Metal roofing has increased 40 per cent in cost during the past 90 days. Electrical fixtures have taken a sharp rise during the same period and many other materials have been similarly affected.

The building program of Portland and the northwest will not suffer a setback on account of higher price levels, according to representative heads of the construction industry. On the contrary those in close touch with the situation are decidedly optimistic as to the future, and Harrison A. Whitney predicted last week that 1923 and 1924 would equal or surpass the current year in the volume of new construction. The new upward trend of construction costs would probably continue for several months and take a drop to lower levels in 1924, Mr. Whitney stated.

From St. Louis, Mo., comes the report:

Builders estimate that the cost of construction in St. Louis now is about 15 per cent higher than it was last spring. They attribute the increase largely to increased cost of some materials. The wage cuts accepted during 1922 by 11 of 24 important building crafts, they say, have been virtually defeated in their purpose—reduction of total costs—by the material price increases.

In addition, it has been found necessary to pay bonuses to get artisans of several of the crafts which have not receded from peak scales of pay, so scarce has labor become because of the lean years the industry has experienced and the present rush of home building.

The explanation is made that material prices are higher now than they were last spring, because the price pendulum had swung too low under the propulsion of public opinion and natural reaction from its after-the-war zenith. Some materials had been reduced to below cost it is explained, especially lumber, in which considerable increases this year have been noticed.

The Associated General Contractors of America have issued the following statement:

The behavior of all these prices in increasing during a time of recovery from business depression is entirely normal. It is a phenomenon which always occurs during like periods. We believe it is a very strong indication that prices in general have been stabilized for the present on a new price level in the neighborhood of 70 per cent higher than that which prevailed in 1913. This means that prices will continue to go up until the present period of prosperity is fully established and will not go down again until the beginning of the next business depression. The next depression will probably be only a moderate one—such as we were familiar with before the war—and will be accompanied by only moderate decreases in prices.

Instead of expecting that building costs will be materially lower 18 months from now, we anticipate that they will continue to increase during the greater part of that period, and that they will be at that time, perhaps, at about the beginning of a decrease but at a point higher than the present. We believe further that the decrease which may be expected to begin at about that time will not go to a point very much below the figures reached during the past winter.

One important aspect of this phenomenon is the shortage of common labor, which is due, in large measure, to the almost complete extinction of immigration for the past nine years, caused first by the great war and latterly by our present restrictive immigration act. That this shortage of common labor in fields other than the building trades is a very real one is proved by the recent action of the United States Steel Corporation and a number of the other important steel companies, in making large voluntary increases in their wage scales.

It may be that some believe the present building boom has about run its course, and that, for that reason, building activity will soon diminish and building costs go down. We believe the outlook to be far otherwise. The boom shows no signs of abating. For six successive months the figures for contracts let have been record breaking. The slight recession of August is less than the usual seasonal recession. As a result of very painstaking investigations it has been estimated that the deficit in building, the country over, is so great that building could continue for ten successive years, beginning

with this year, at 25 per cent above normal, before catching up with that deficit. We do not predict any such sustained activity, but we do point to the figures as proof that there is no possibility of the present building boom coming to an end within the next few months, because of having completely filled the demand for new construction.

NATIONAL BUILDER's own conclusions are that prices will show some tendency to recede during the winter months, the same as they did last year. The fact that there is at present a decrease in business building but an increase in house building, coupled with increased interest rates and lower prices of bonds, shows that the price of capital is rising and that to loosen it up again for general construction work will require some concession in prices and wages, the same as last year. In February and March prices will probably be the lowest, and as the construction season opens prices will probably take a slight upward trend again. Such variations will not be as much as they were this year because the volume of construction to be carried through the coming winter is considerably in excess of the volume of construction a year ago, and this, with present shortage of materials and lack of transportation will probably keep prices at a fairly high level until another construction season is in full swing.

What Has and is Being Done to Advance Home Building

THE forthcoming annual report of the Secretary of Commerce for the fiscal year, 1921-22, regarding the conferences of housing expresses the progress made in the following succinct extract therefrom:

Conditions Investigated

"The shortage of some 1,000,000 dwellings as a result of suspended construction during the war led to widespread demand for federal legislation and assistance. Under an appropriation from Congress an investigation of the situation and possible remedies was made by this department. During the process of the inquiry numerous conferences were held with the various branches of the building industry and with representatives of municipal and civic bodies. It appeared that the retardation was due to (a) the acute credit situation; (b) high prices of material and labor; (c) unsavory business ethics in certain localities; (d) wasteful practices in their contribution to costs.

Remedies Applied

"It was concluded that the first two causes would in the main cure themselves by the general fall in prices then in progress. The third could only be cured by vigorous action of the federal and state authorities, a large measure of which has been accomplished. It was concluded that emergency legislation or government finance was not desirable and that except for a vigorous support of the purely co-operative service



How to Make Soft Woods Beautiful as Hardwood

It is generally admitted that wood finished in its natural shade cannot be worked as successfully into color schemes of decoration as stained wood. It is also true that color brings out the grain and enhances the natural beauty of most woods. For these reasons we manufacture a line of wood colors known as Johnson's Wood Dye.

Johnson's Wood Dye is for the artistic coloring of wood. With it inexpensive soft woods such as pine, cypress, fir, etc., may be finished so they are as beautiful as hardwood. Johnson's Wood Dye is very easy to apply—it goes on easily and quickly without a lap or a streak.

Johnson's Wood Dye is a *dye* in every sense of the word. It penetrates so deeply that the natural color is not disclosed if the wood becomes scratched or marred—it brings out the beauty of the grain without raising it in the slightest—it dries in four hours and does not rub off or smudge.

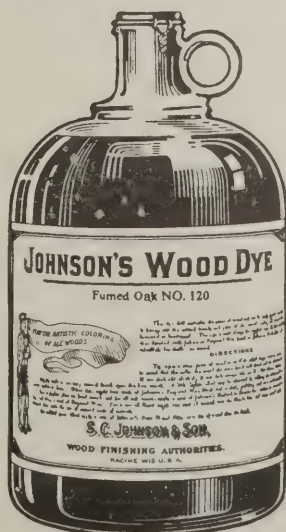
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New Devices, Methods and Improvements in the Building Industry

Concrete Stave Silos

CHICAGO, ILL., Nov. 14, 1922.

To the Editor:

We have read with interest the quotation on page 54 of the November issue of the NATIONAL BUILDER from A. H. DeGraff's views on types of silos, and we wish to add a little further information regarding a type of silo which Mr. DeGraff does not mention, but which is rapidly coming to the forefront as one of the most satisfactory types of silos now available.

The concrete stave silo is a silo that combines the solid, permanent, ratproof, stormproof and fireproof qualities of concrete with the simplicity of erection usually ascribed to the ordinary wood stave silo. The superior method of manufacturing the concrete staves results in a very high quality product which when built up into a silo makes a structure that is economical, handsome and thoroughly satisfactory as a silo from every possible viewpoint.

Manufacturers of concrete staves are located in practically every section of the country so that the staves are readily available. It is not unusual for a concrete stave silo manufacturer to erect a complete silo 40 to 50 ft. high in a single day.

The cost of a concrete stave silo compares favorably with that of other types, and in fact is often less than that of perishable types of the same capacity. A prominent contractor in Illinois who handles both concrete stave and wood stave silos offers them for sale at the same price for the same sizes.

K. J. T. EKBLAW,

Agricultural Engineer, Cement Products Bureau.

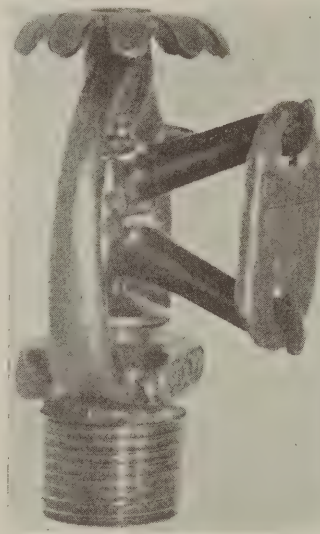
Danger of Corrosion With Magnesite Stucco Overcome

METAL lath, corner beads and flashing for use in the application of magnesite stucco and elsewhere is now supplied in zinc and copper, metals immune against corrosion in magnesite stuccos. The announcement is made in a special circular issued by the Milwaukee Corrugating Company, 36th Avenue and Burnham Street, Milwaukee, Wis. The company cautions users to fasten copper materials with copper nails and zinc materials with zinc nails. Furthermore, caution is given that zinc or galvanized iron must not impinge on or permanently touch copper in construction. Where these cau-

tions are disregarded electrolytic corrosion is likely to ensue.

Sprinkler Heads for Residences

THE installation of sprinkler systems in commercial buildings is a preventive of fire-spreading and a direct economy through lowering insurance rates. Hitherto for various reasons, it has not been the practice to sell sprinkler devices except as part of a complete installation, at a cost prohibitive to the average citizen. Upon these

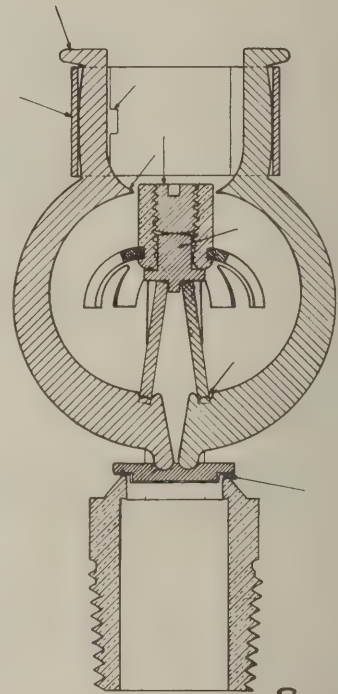


Typical sprinkler head

claims the Sprinkler Manufacturing and Development Company, 2701 Fulton Street, Chicago, Ill., presents a new design in sprinkler heads and other devices calculated to extend sprinkler security against fire at minimum cost to residences of all kinds. The company states that a sprinkler system is far easier to lay out and install than the smallest kind of a plumbing job would be and any plumber or steamfitter, capable of laying out plumbing and steamfitting work, can have no difficulty in constructing a sprinkler system, strictly in accordance with insurance requirements, after he has once read the instructions published by the insurance bureaus.

The use of sprinklers has been more or less restricted to large industrial plants where great volumes of insurance have been carried because in the smaller risks the saving on insurance premiums, brought about by the installation of the sprinkler

(Continued on page 82)



Section of Assembled Sprinkler.

Diagram of improved sprinkler head

system, would not warrant the price asked for the work by the large sprinkler companies. However, if these devices were obtainable by the small plumber and contractor, these most effective means of fire protection could be had by not only wealthy industrial plants but by the home owner.

The Sprinkler Manufacturing and Development Company is organized to sell various automatic sprinkler fire protection devices to whoever cares to purchase them at a just price so that they may become more generally used. In addition to selling the sprinkler device, the company has established a plan service so that any contractor submitting his building plans will be provided with the layout of a sprinkler system at a very nominal charge.

The sprinkler is set in operation by the fusing of the soldered shim, usually termed a link, the solder being a special alloy that will fuse at 160 degrees Fahrenheit. A small fire will raise the temperature to this point and melt the link. This allows the two levers to separate, releasing a cap member, then water rushes out, strikes a deflector and distributes the water on a restricted area of approximately 15 to 20 feet in diameter. Under other conditions, when

There is a factor of satisfaction—as well as a factor of safety—important alike to him who builds and him who buys



G-E Wiring Devices forestall excuses

AN OWNER or a tenant, pleased with the conveniences which have been given him, is a great factor in building a reputation for the engineer or contractor.

Remember this factor of satisfaction. Build with an eye to the future. Incorporate in your plans all the little conveniences which are so easy to install but which mean so much to the man who uses them.

G-E Wiring Devices are the last word in convenience. They include every device necessary for completely wiring a building. They are good-looking, easy to install, and last as long as the structure itself.

*For information address Merchandise Department,
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G-E national advertising is creating a demand for the comforts and conveniences of completely wired homes. Builders can profitably capitalize this demand.

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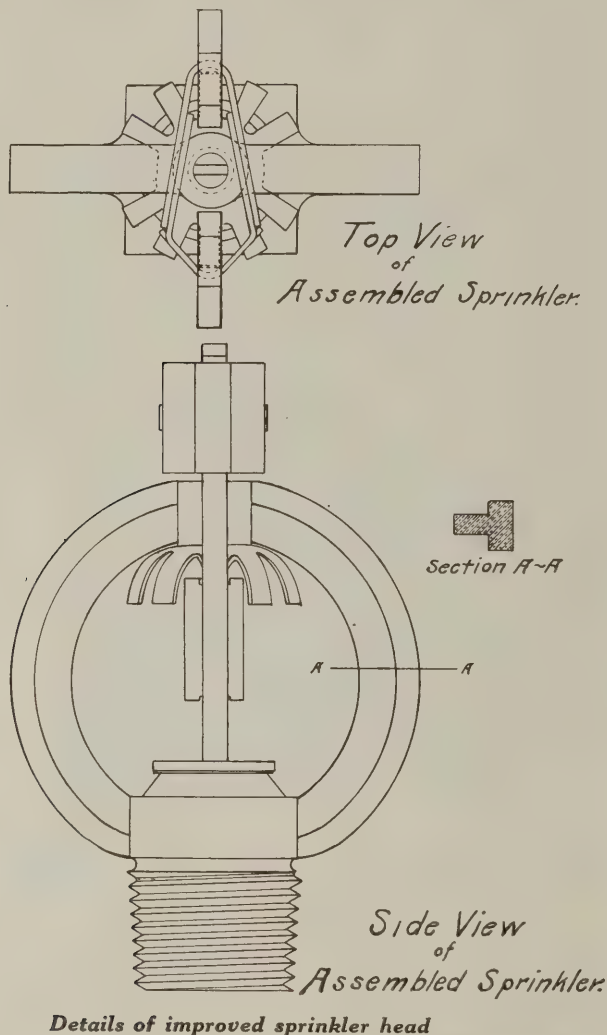
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the fire department comes into the house, they turn a hose stream which will destroy furnishings and flood the place, but in the case of a fire where there is a sprinkler, the only area to receive water is that in the immediate vicinity of the fire. It is

tration Plant, Cleveland, Ohio. The west wall was 23 ft. long, 20 ft. deep, and 24 in. thick, concrete reinforced with $\frac{1}{2}$ to $\frac{3}{4}$ -in. rod spaced on 8 in. centers. Chas. H. McAllister, general manager of the Lake Erie Construction Co., the contractors, completely

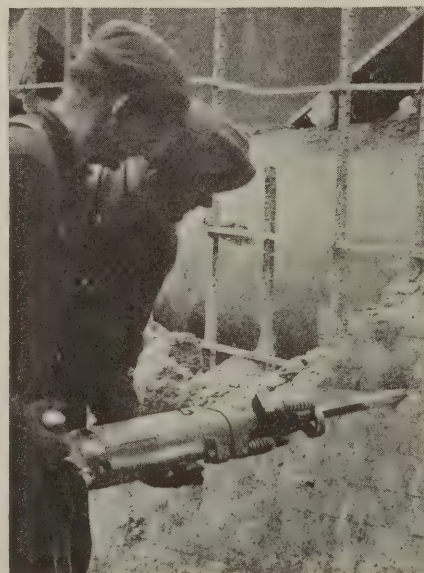


very seldom that more than one sprinkler is opened up at a time to extinguish a small fire such as is common in a residence.

A number of defects in sprinkler heads have been provided against by the company in a design which insures the sealing parts of the sprinkler being thrown clear of the water flow when the link melts. Any residue or broken parts deflecting the water from being distributed over a designed area gives opportunity for fire to gain headway. The new design illustrated amply provides against this defect.

Wrecking Reinforced Concrete Walls

A CONTRACT was let recently to remove the side walls and top of a large venturi vault and a section of the west wall of the filter building of the Cleveland Fil-



A "paving breaker" demolishing reinforced concrete walls

(Continued on page 84)



The "paving breaker" can be operated by one man but two men and other aids, such as the improvised chain support, expedite the work



Half to three-quarter inch reinforcing rods on 8 in. centers were rapidly cut with the concave chisels on the paving breaker

demolished this wall in three days by using "paving breakers," a pneumatic pick and chiseling machine manufactured by the Ingersoll-Rand Company, 11 Broadway, New York City, N. Y. These breakers have been used principally for breaking up pavements of all kinds. Held vertically they are light enough to be operated by one man, but in the work described two men were used to each machine to expedite the work. The cutting chisels used to cut the reinforcing bars had a concave edge to prevent slipping from the bar. Seven days were required to complete the work, making a considerable saving over hand methods.

THE WINDERMERE
C. W. & GEO. L. RAPP, ARCHITECTS—CHICAGO
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Schoop Process of Metal Spraying

THE problem of corrosion is met by a process of metal spraying described and illustrated in literature issued by the Metals Coating Company of America, 495-497 North Third Street, Philadelphia, Pa., manufacturers and distributors of the process which

wire is pulled from a reel into one side of a cylindrical case continuously and uniformly, at the rate of about 12 ft. a minute, while at the mouth of a short muzzle at the opposite side of the case there issues a continuous hot blast, with a velocity of about 3000 ft. a second. This carries entrained in it a very fine spray of molten metal. The mechanism within the case consists of an air-

uses either acetylene, blaugas, or hydrogen and oxygen in combination with compressed air. The Schoop pistol operates on an air pressure of 50 lb. and the "Gravitas" on 15 lb. An 8x8-in. single-cylinder compressor or its equivalent furnishes ample capacity for operating one pistol or "Gravitas" and at the same time supplies sufficient air for sand blasting.

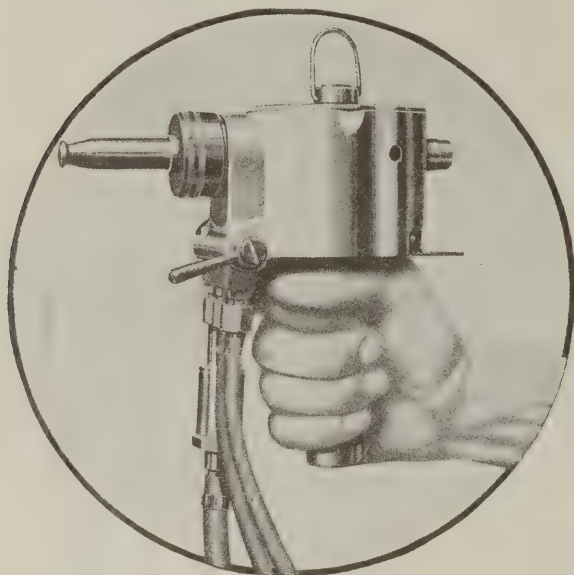


Fig. 1—Metal spraying pistol, operating from cold wire feed

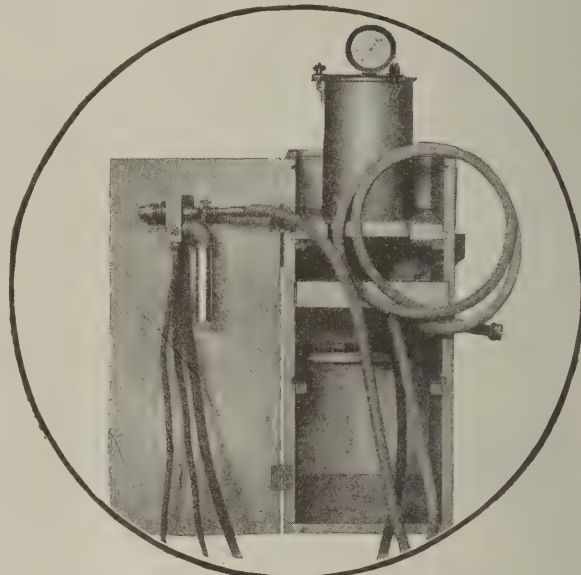


Fig. 2—Gravitas metal spray, operating from powdered metal feed

has applications of varied promise to contractors. This consists of "a machine gun making its ammunition from reeled wire and coating objects by bombarding with minute plastic particles of metal." Instead of a gun, however, the device is more in the form of a pistol (see Fig. 1). To meet the requirements for a larger flow of metal than is possible from the reeled wire, powdered metal is substituted for the wire, and delivered from a tank supply in a "Gravitas" apparatus consisting of a cylinder container holding about 20 lb. of powdered metal (see Fig. 2). The range of application may be divided into five groups: Protective coating, bonding or junction coating, electrical coating, decorative coating and detachable coating. Steel or iron objects may be coated in whole or in part to repair damage or wear of a coating made by another process. For steel and iron tanks, girders and machinery of all kinds, subject to corrosion from liquids and chemicals, a metal which will resist the corroding agent is selected and sprayed on all seams and joints, these having previously been cleaned by a sand-blast. Bonding or junction coatings can be freely applied to brick, metal, glass or porcelain connections with the suitable metal spray. These merely indicate the versatility of the metal spraying system, which has been reduced to remarkable simplicity and speed. The present perfected pistol weighs 3½ lb. In the use of the wire supply cold

driven feeding and wire-straightening device which leads the metal into the barrel bore. The wire remains cold and unaltered until within 1/32 in. of the muzzle, at which point it undergoes the transformation into spray. The muzzle is directed at the surface to be covered and is held 5 to 6 in. distant from it. The temperature of the molten metal spray varies according to the melting point of the wire used, yet at the trivial distance of 6 in. none of the materials that have been mentioned are injured or altered in the act of being metalized. Matches held in the zinc spray are immediately coated over without ignition, and the thinnest paper and wood receive the impacting particles into their pores without charring.

Where large areas of comparatively flat surfaces are to be coated the "Gravitas" apparatus is required. This deposits metallic coating suited to protection from atmospheric corrosion or from acid, gas or saline solutions, and using zinc, lead, aluminum or tin. These do not cost any more disintegrated than they do in wire form. Zinc costs less. On account of the metals being already atomized a greater quantity can be heated to a plastic state by the flame in a given time, and less gas and a lower air pressure are required to impact them. The possibility of carrying the metallic dust from the container to the muzzle of the torch by air pressure allows the elimination of all moving parts from the "Gravitas" gun, which

Tensil-ite a New Lumber

AN improvement in many respects upon lumber is claimed for a comparatively new material announced under the trade name of "Tensil-ite," the material for a thousand uses. It is claimed that it can be worked in every way that wood is worked with all its advantages and none of its disadvantages. Samples will be supplied on request by the manufacturers. The J. P. Lewis Company, 366 Madison avenue, New York City, N. Y.

Portland Cement Stucco

A MONOGRAPH on portland cement stucco issued by the Portland Cement Association and just off the press is, as usual with this promotional organization in its publication work, an admirable presentation of the subject. The various steps for different kinds of work are taken up in compact, succinct statements with indicative heads. The various surfaces and finishes are shown by halftone reproductions from photographs of sections actual size, clear and fully illustrative. Notes on the coloring pigments, what they are and how to use them, and a fine presentation of various types of houses stuccoed with portland cement are shown. The typical construction details reproduced on the following pages are taken from this work by special permission.

(Continued on page 86)

Servicised Contractors and Builders

AT a time when purchasers of every kind of commodity are deliberately and thoughtfully seeking out the greatest value for their money, take justifiable pride in the fact that they use a roofing material which renders more complete satisfaction than has ever been known before, and at a price which is lower than any other roofing material with which Servicised Products can be compared.

The Mammoth—a shingle 10x14 in. in size—is effective, economical and durable. *The Giant* is 50% heavier and thicker, and 100% stiffer than any other standard shingle. It is adapted to lay 5 in. to weather over open sheathing.

Individual Interlock Shingles cannot blow up in wind—they are self spacing, and can be laid a greater length to the weather.

The Servicised Shingle Span

This simple and effective method of laying a roof saves better than \$3.00 per square, gives a more dependable roof with less warping than by any other method. Slate and Asbestos Shingles can be applied at surprisingly low cost.

Try them out on your next job and note the appreciable saving

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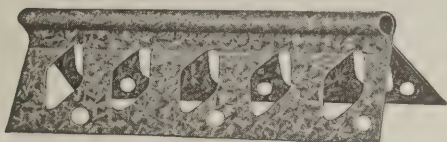
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These Specialties EVERY CONTRACTOR Needs and EVERY DEALER Can Sell

Sykes Economy Corner Bead



Sykes Economy Base Bead



Corner and base beads are now considered absolute necessities for the protection of plastered corners.

Sykes Cold Rolled Channel



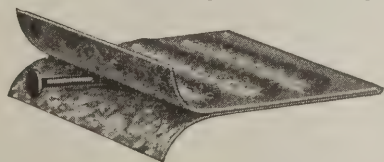
Cold rolled channel is used extensively in fireproof construction and has many other uses.

Sykes Economy Wall Ties



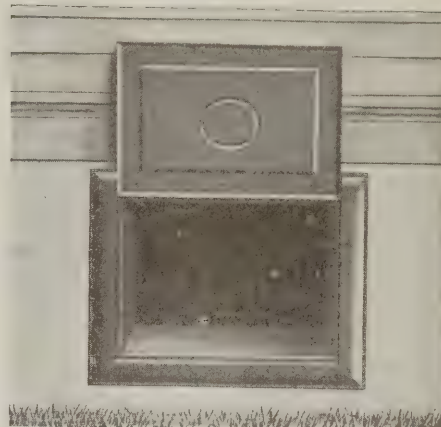
These ties are made to use for either solid brick or brick veneer. You don't have to carry two stocks.

Sykes Economy Wall Plugs

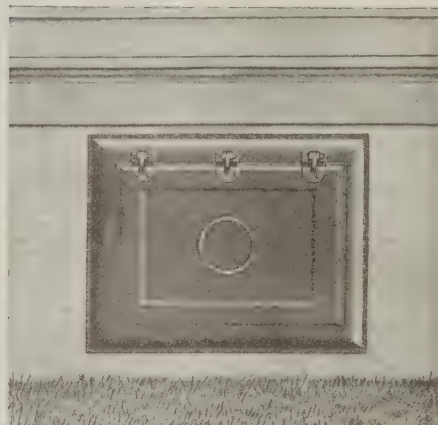


Wherever trim or furring has to be nailed to brick or masonry walls, galvanized plugs not only make the most permanent attachment but they are an economy.

Sykes Economy Coal Chute Door

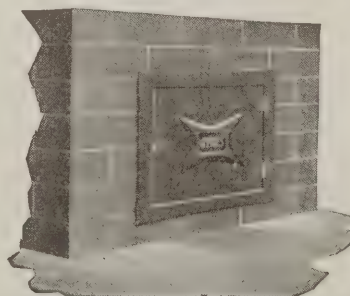


Open View



Closed View

Sykes Economy Ash Pit and Clean Out Doors



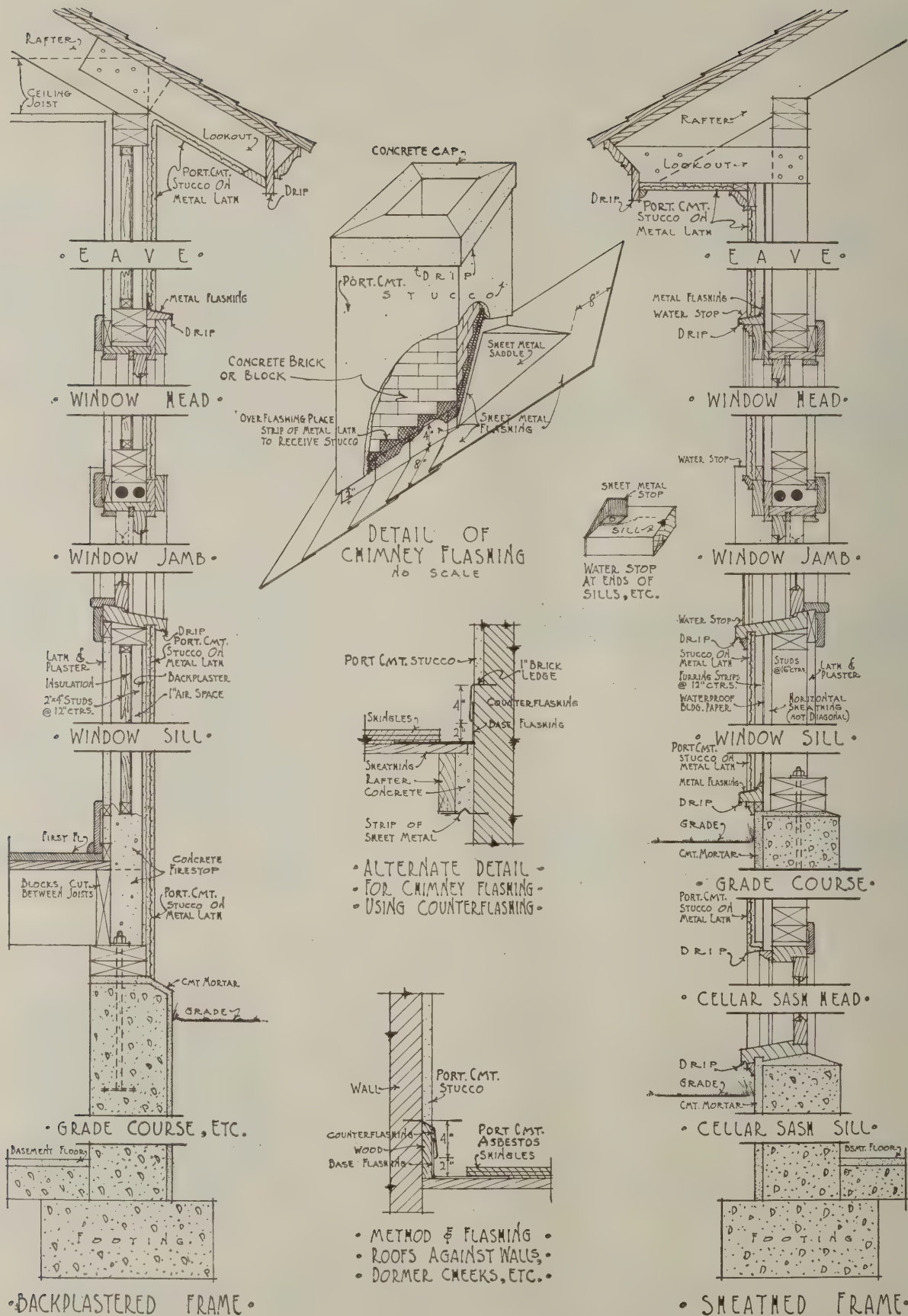
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Typical construction details from "Portland Cement Stucco," issued by Portland Cement Association

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National Builder

ESTABLISHED 1864

Volume 65

December, 1922

Number 12



B E R M I C O

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for Constant Reference

Manual of Face Brick Construction

The Home of Beauty

Face Brick Bungalow and Small House Plans

CONTRACTORS, builders, material dealers and others interested in the building industry, will have many occasions to refer to the above three books of house designs and construction data. These booklets, together with "The Story of Brick," will be a great help to you in selling more homes. They are chock-full of authoritative information on Face Brick construction. They present nearly two hundred artistic and practical designs for homes for which full size working drawings and masonry material surveys may be obtained at nominal prices.

The Trend of Construction is Toward FACE BRICK

Face Brick endows the home with qualities which home builders covet, not obtainable with any other material — and the building public is fast realizing this fact. The unmatched beauty of the everlasting colors, the infinite possibilities for individualism from bonds, joints, and mortar colors, the great economies effected by the permanence, the fire-safety, the practical wiping-out of repair costs — all are factors being told about in national advertising and editorial articles which are creating a broader demand for Face Brick homes.

To assure every reader of this magazine having these books on hand for constant reference, we will send all the above books at the Special Group Price of \$2.00. A copy of "The Story of Brick" will also be included. Address Dept. N. 12

THE AMERICAN FACE BRICK ASSOCIATION

130 North Wells Street, Chicago

(Please fill in blanks below and mail to the Andersen Lumber Co., South Stillwater, Minnesota. We wish to know what our customers think of ANDERSEN WHITE PINE FRAMES)

Date Sept 12th 1921

Dear Sirs:—

My answers to your questions are as follows:

Are the frames satisfactory? yes

What do you think of Genuine White Pine which is used for all exposed parts of these frames? Can't be beat - Put together in seven minutes

Could you suggest any improvements in these frames? No

Name Donald MacKinnon Street or R.F.D. 91 Adelaide St.

Town Belleville State New Jersey

A Frame Up in 10 Minutes

IT TAKES just 10 minutes for an average carpenter to nail up an Andersen Standard Window Frame. Many men can do it in seven minutes. We've heard of some that have done it in three.

An ordinary frame is made up of 57 separate parts. Andersen Frames combine these 57 parts into seven units. These seven units are then shipped in two compact plainly marked bundles, each weighing less than 20 pounds.

The elimination of 50 parts in an Andersen Frame is a direct saving of time, labor and money in the assembling of the complete frame. Using only a hammer, these 7 units can now be nailed up in 10 minutes or less forming a frame complete with pockets and pulleys in place.

Any dealer in Andersen Standard White

Pine Frames can supply immediately any one of 121 different sizes from a small stock of only 11 standard sizes. This is done by simply interchanging heights and widths.

All exposed portions of Andersen Standard Frames are of genuine White Pine. White Pine has demonstrated its ability to endure for centuries without changing with time or weather. Windows slide easily because Andersen Standard Frames are accurately made; the use of White Pine keeps them smooth running for all time.

Write for This Book

We have prepared an interesting book on the qualities and economies of Andersen Frames. Upon request, we will gladly send you a copy without charge.

Andersen Lumber Company
Department D-12 - South Stillwater, Minn.



Andersen FRAMES

When writing advertisers please mention National Builder

A Built-In Convenience that Builds Sales



BECAUSE it provides for immediate and sanitary disposal of all household waste in a simple and efficient manner—

Because it does this with a minimum of effort and expense—

Because it tallies so well with the modern home-maker's idea of housekeeping—

The contractor has found that as an advantage in selling a house, the KERNERATOR has assumed an importance out of all proportion to its cost.

The Kernerator consists of a brick incinerator, built into the base of the chimney when the house is erected, and a hopper door located in the flue on the first floor. It takes care of all household refuse—rags, sweepings, wilted flowers, broken crockery, tin cans, garbage—*without cost*, as the waste itself is the only fuel required. Unsightly garbage cans are entirely eliminated.

The Kernerator should be specified in the plans before construction begins. After a house is erected it is almost impossible to make a satisfactory installation, because in most cases the chimney flues are not large enough or are not properly located.

Let us send you an interesting folder describing the Kernerator in detail. Also see Page 2124, Sweet's 1922 Catalog

KERNER INCINERATOR CO.
1005 Chestnut Street Milwaukee, Wis.

KERNERATOR

Built-in-the-Chimney

Reg. U. S. Patent Office

ROCBOND

Exterior Stucco

The best selling argument

A home built of Rocbond Exterior Stucco is an unanswerable, clinching sales argument. The beauty and the manifest sturdiness of each Rocbond home or building are outward signs of the remarkable **bonding strength** and of the non-cracking, non-sagging, weather-resisting qualities of this more carefully prepared stucco.

To get the facts about this easy-selling, proved-by-use stucco, and the intelligent dealer service back of it should result in permanent profit to you. Write today, addressing nearest plant.

□ □

THE ROCBOND CO.

Plants

Van Wert, Ohio—Harrisburg, Pa.—Cedar Rapids, Ia.



Home of Mrs. E. Mitchell,
Cedar Rapids, Iowa.
ED. C. ZBANEK—Architect, Contractor and Builder.

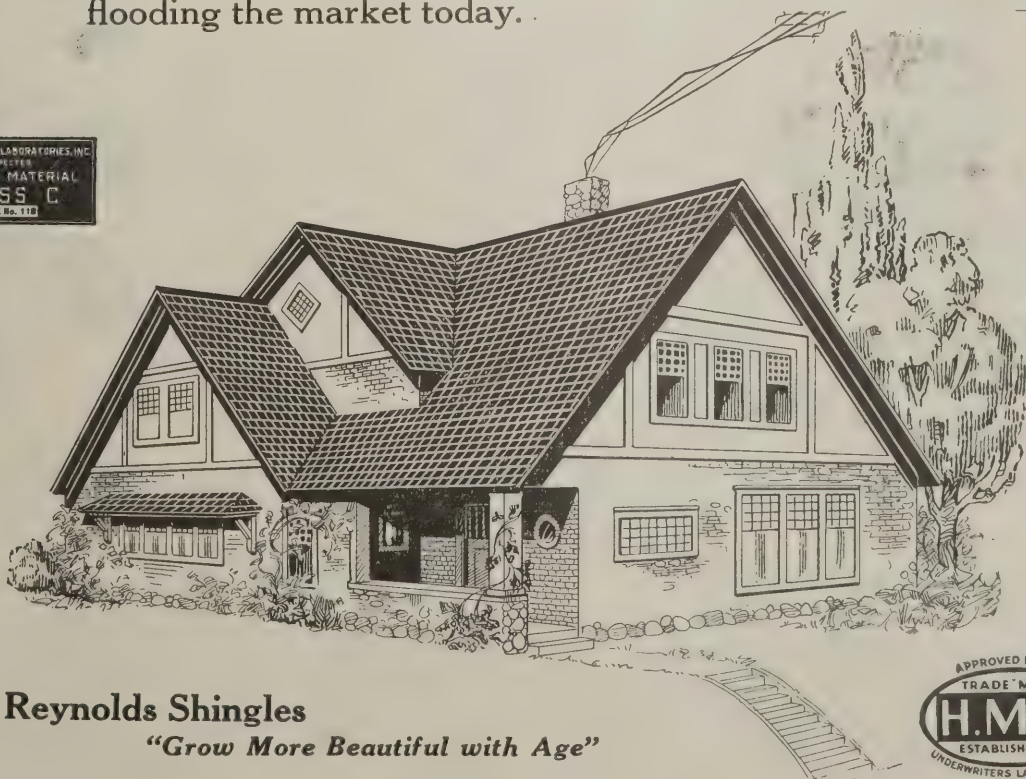
When writing advertisers please mention National Builder

A PLAIN STATEMENT OF FACTS ABOUT REYNOLDS SHINGLES

There is a decided distinction between Reynolds Shingles and the so-called asphalt shingles being offered to the trade today.

This distinction is gained for Reynolds Shingles by the fact of their having, for over twenty years, given the highest grade service on roofs of all kinds. This satisfactory record made by Reynolds shingles is due to trade secrets in possession of the H. M. Reynolds Shingle Company gained from many years of manufacturing asphalt shingles and roofing exclusively. The H. M. Reynolds Shingle Co. was the originator of the asphalt shingle—and has been the leader always.

Reynolds Shingles must not be connected—should be completely divorced—from the poor shingles flooding the market today.



Reynolds Shingles
"Grow More Beautiful with Age"



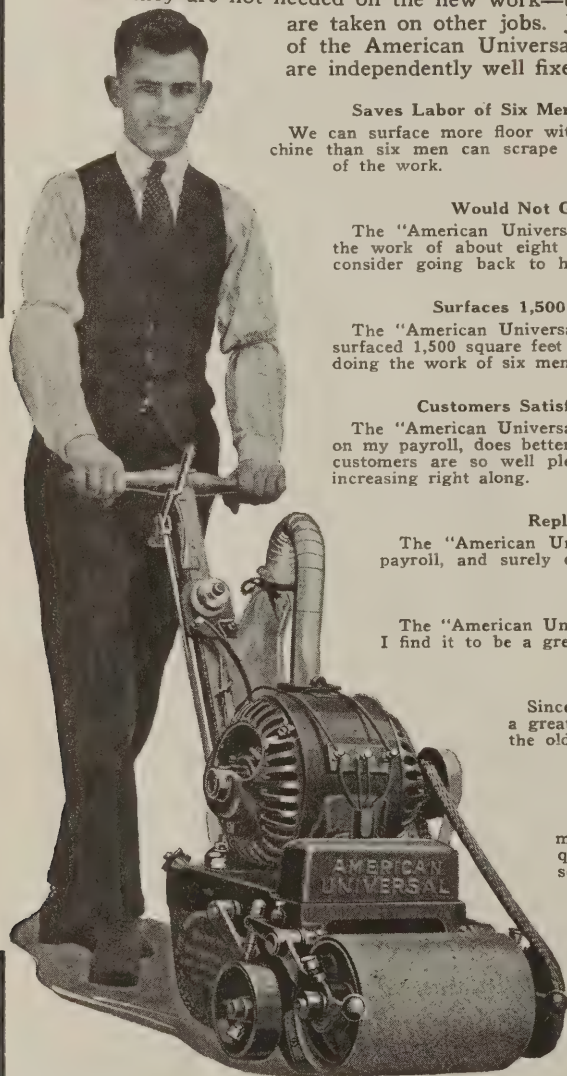
Be a Floor Surfacing Contractor

MAKE \$5,000 to \$15,000 OR MORE YEARLY

The American Universal Floor Surfacing Machine is the best money maker the contractor can own. It is practically "fool proof" and can be operated by any man of ordinary ability and do only the best grade of work, for its operation is automatic. When your building is about ready to turn over to the owner, it does the last big job, the floors, when every one is anxious, quickly and perfectly, leaving every one feeling satisfied. One man and one American Universal does the work of six men and does it perfectly.

Old Floors Made Like New—New Floors Made Perfect

Contractors owning American Floor Surfacing Machines keep them going all the time at big profits on old floors when they are not needed on the new work—this is an excellent source of profits. Often, too, floor surfacing contracts are taken on other jobs. Just read what users say about the labor-saving, money-making ability of the American Universal. Hundreds of others have gone into the floor surfacing business and are independently well fixed.



Saves Labor of Six Men and Does Better Work

We can surface more floor with our "American Universal" machine than six men can scrape by hand, considering the quality of the work.

Schneider & Hein, Nebr.

Would Not Go Back to Old Way

The "American Universal" is a great labor saver, doing the work of about eight men so naturally I would never consider going back to hand scraping again.

M. R. Warner, Colo.

Surfaces 1,500 Square Feet Per Day

The "American Universal" does all you claim, for it has surfaced 1,500 square feet of flooring per day for me and is doing the work of six men.

L. F. Walla, Va.

Customers Satisfied—Business Increases

The "American Universal" has replaced five men at least on my payroll, does better work than before, and so as my customers are so well pleased, I have found my business increasing right along.

A. G. Thompson, Ark.

Replaces 10 Men

The "American Universal" replaces 10 men on my payroll, and surely does excellent work.

I. O. Fetter, Pa.

Saves Six Men

The "American Universal" replaces six men on my payroll and I find it to be a great labor saver.

E. A. Bittner, Pa.

Afraid to Go Back to Hand Work

Since the "American Universal" has proven such a great labor saver, would not dare to go back to the old method of hand scraping.

C. E. Andrews, Pa.

Machine Does Better Work Than Hand-Scraping

The "American Universal" has replaced five men on my payroll, and I can do a better quality of work with my machine than by hand scraping.

L. L. Howard, Kans.

Quality of Work Only Advertisement Necessary to Secure More Work

I want to tell you that the "American Universal" is some labor saver—it replaces at least five men on my payroll, and the quality of work it turns out is all the advertisement I need for my business.

Hugh A. Cox, Fla.

Light and Easy to Handle

In the first place the "American Universal" machine is light and easy to handle and does lots more work than the other sander of a different make which I have.

Kroffganz & Frank, Mont.

No Kicks—Replaces Six Men

Want to tell you that I've never had a kick about unsatisfactory work from any of my customers ever since I bought the "American Universal," and it replaces six men on my payroll, too.

A. F. Grow Bros., Nebr.

Saves 10 Men

Your "American Universal" floor surfacing machine is a labor saver. It will do the work of 10 men in much better shape.

M. B. Battien, S. D.

1 Man with an American Universal—BIG PROFIT.

Six Men Surfacing by Hand—SMALL PROFIT.

How are you running YOUR business?



THE AMERICAN FLOOR SURFACING MACHINE COMPANY

519 South St. Clair Street

Originators of Floor Surfacing Machines

Toledo, Ohio

The American Floor Surfacing Machine Co.
519 So. St. Clair St., Toledo, Ohio

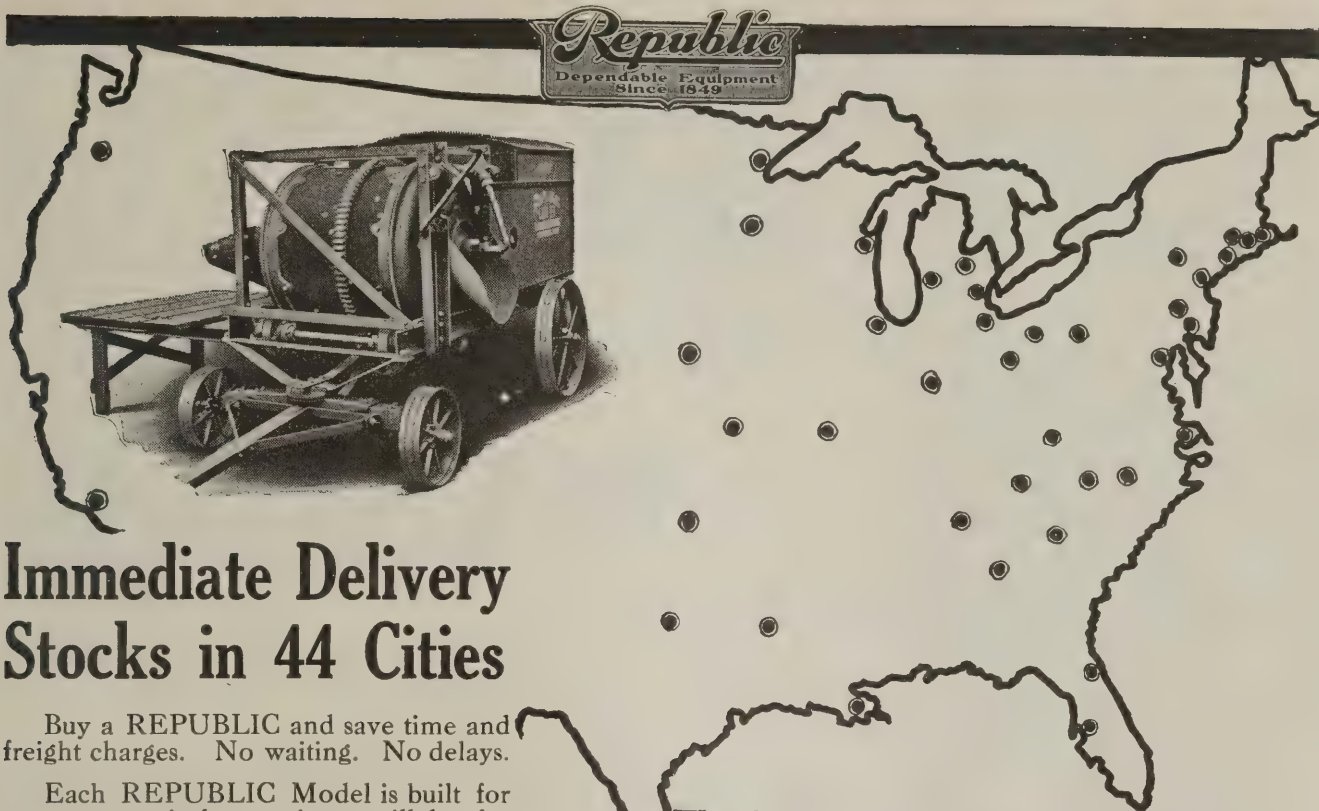
Gentlemen: Please send me without obligation to me complete information and literature on your proposition. The following information will no doubt assist you in advising me:

- () I want to become a Floor Surfacing Contractor.
() I am not now a contractor of any kind, but was in the following business
() I am a Building Contractor and want to use it on my own contracts.

Name Street

City State

When writing advertisers please mention National Builder



Immediate Delivery Stocks in 44 Cities

Buy a REPUBLIC and save time and freight charges. No waiting. No delays.

Each REPUBLIC Model is built for easy, economical operation -- will last for years -- and possesses features and advantages not found in any other make.

Fully investigate the REPUBLIC line before replacing or adding to your concrete mixing equipment. It will pay you to send for our catalog and name of our nearest distributor.

Full REPUBLIC stocks carried in the following cities:

Allentown, Pa.
Atlanta, Ga.
Baltimore, Md.
Bluefield, W. Va.
Boston, Mass.
Buffalo, N. Y.
Canton, O.
Chatanooga, Tenn.
Chicago, Ill.
Columbus, O.
Dallas, Tex.
Detroit, Mich.
Duluth, Minn.
Grand Rapids, Mich.
Green Bay, Wis.
Holyoke, Mass.
Horseheads, N. Y.
Indianapolis, Ind.
Jacksonville, Fla.
Kansas City, Mo.
Knoxville, Tenn.
Los Angeles, Cal.

Nashville, Tenn.
New Haven, Conn.
New Orleans, La.
New York City
Norfolk, Va.
Omaha, Neb.
Okmulgee, Okla.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Raleigh, N. C.
Richmond, Va.
Saginaw, Mich.
St. Louis, Mo.
St. Paul, Minn.
Shreveport, La.
Spartanburg, S. C.
Springfield, Mass.
Tampa, Fla.
Toledo, O.
Wilmington, N. C.
Winston-Salem, N. C.

Equipment Dealers We want representation in several other cities. Write for our attractive proposition. Address communications direct to

Republic Iron Works

Evans St.

Tecumseh, Mich.

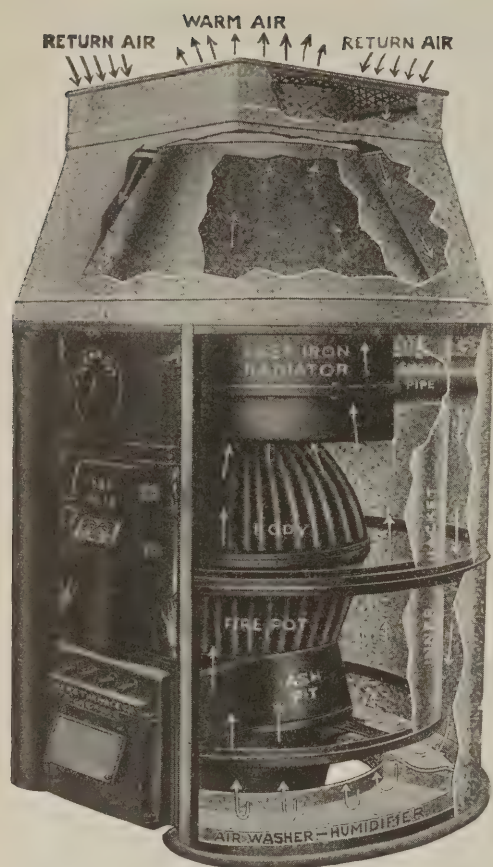


The REPUBLIC Line

The complete REPUBLIC line comprises three sizes — three, six and ten foot outfits. By concentrating all our manufacturing facilities on but three sizes, we are enabled to produce the greatest mixer values ever offered for the money. The cut below shows the REPUBLIC "Ten" sack size model. Before buying be sure to fully investigate the REPUBLIC line of mixers.

REPUBLIC

When writing advertisers please mention National Builder



HERO

AIR WASHER

*Pipe or
Pipeless*

Washes, moistens and purifies the air in the home. Dr. Herman Briggs, State Health Commissioner of New York, has said that "moist air at 68 degrees feels warmer than dry air at 72." The Hero Air Washer therefore serves the double purpose of insuring health and reducing coal bills.

Are you the Man?

Are you the man we need to expand our selling force?

Are you willing to join our army of busy selling representatives?—you will receive co-operation. We will give you leads from inquiries, exclusive territory, advertising for newspapers and expert help to close sales.

You can make money selling Hero Air-Washer Heating Systems. Write for our special plan; it will pay you well.

HERO FURNACE COMPANY

Formerly of Chicago

501-525 De Kalb Avenue

Sycamore, Illinois



"Are You the Man Who Installed Smiths Store Front?"

Even the greatest among us have an impulse to "follow the leader." Contractors who install one front in a neighborhood find that invariably one installation brings another, even to the point of a hurry-up phone call.

The contractor who installs a satisfactory store front—a front that has a clear appeal to the sense of beauty and a definite display value—will soon acquire a reputation as a store-front specialist, and orders will flow uninterruptedly to his door.

That this is a fact has been amply proven by hundreds and hundreds of contractors who are now confining all their efforts to the selling and installing of

Brasco Facts

Brasco utilizes the merit of wood setting, determined by every insurance company as being safest for glass. We do not know of a single case of glass breakage due to Brasco construction.

Brasco

COPPER STORE FRONTS

And wherever you find a contractor who is making a specialty of installing Brasco Fronts, there you will find a contractor who has made a positive financial success in his business.

Brasco Copper Store Fronts have won the greatest store-front preference in the world by virtue of their design, construction features, durability and strength of material used, plus the fact that they are low in price.

Write for our book of designs today—it will give you a better idea of our patented improved construction features.

BRASCO MANUFACTURING CO.
5035 South Wabash Avenue, Chicago, Ill.



"Will Outlast Them All"

Mail This Coupon Today

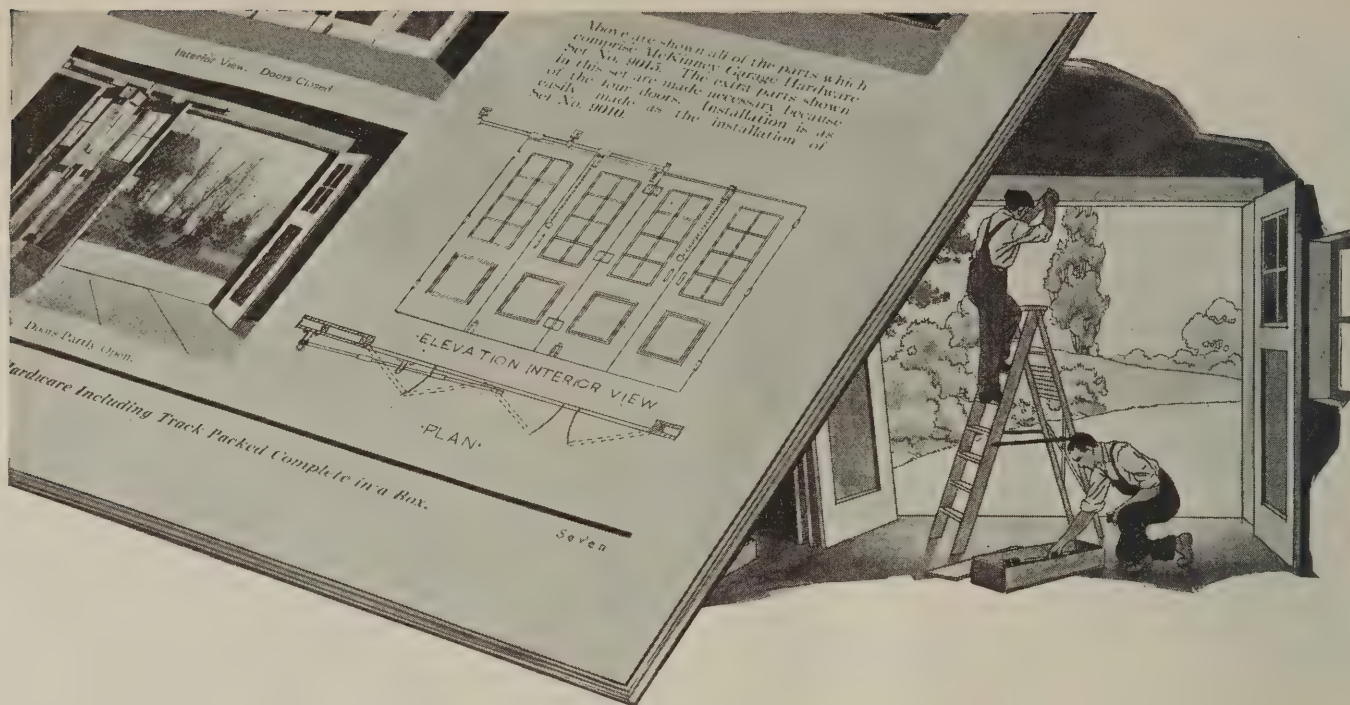
Brasco Manufacturing Company
5035 South Wabash Avenue, Chicago

Send me your catalog on Store Front Construction.

Name.....

City.....

12-22 State.....



Who Purchases Hardware for the Garage You Plan?



McKINNEY Hinges and Butts and Hardware

Also door hangers and track, door bolts and latches, shelf brackets, window and screen hardware, cabinet hardware, steel door mats and wrought specialties.

THE selection of the hardware for erecting garage doors should not be left to a guessing contest between the man who will own the garage and a hardware dealer. This important item in garage construction should be clearly specified on the plan.

If you have that interesting little book, "McKinney Complete Garage Sets," on your desk you can easily control the selection of the right kind of hardware.

This booklet is filled with illustrations and descriptions of various types of entrances, swinging, sliding-folding and around-the-corner doors for every entrance width and space allowance. It will help you in choosing a good, serviceable entrance. Beside each door illus-

trated is shown a complete set of hardware needed for its erection. Simple working plans for the use of the hardware are shown also.

Each set is packed complete in a single box. Builders as well as architects will be glad to know that garage door hardware may be purchased this way. There is nothing missing when the time comes to hang the door. And the hardware is always good—McKinney made. The McKinney Complete Set for any type of entrance should be purchased by the number shown in the booklet.

Send for this booklet. It will interest builders, too, who are often confronted with problems of garage building and hardware selection.

McKINNEY MANUFACTURING COMPANY, PITTSBURGH
Western Office, Wrigley Bldg., Chicago

Export Representation

McKINNEY

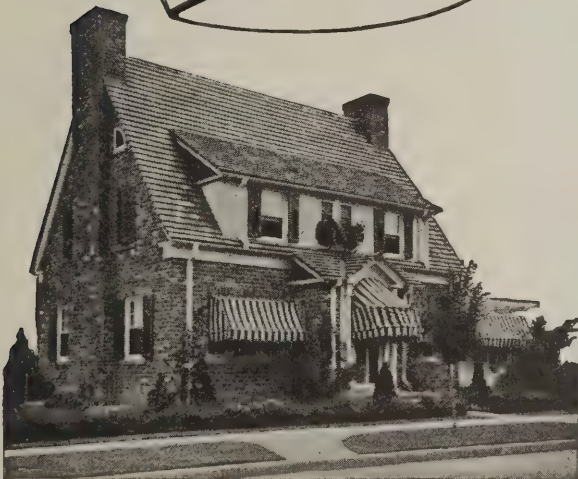
Complete Garage Door Sets



60 Selected Brick House Designs —All for 10c



Photographs and floor plans of 60 beautiful brick homes—of wide range in type and price. Also valuable information as to modern money saving uses of common brick.



Modest bungalows to five and six room homes and pretentious dwellings—a wide range of carefully selected designs. Every plan a masterpiece—drawn by a competent architect.

These houses are attractive in appearance and in the details that make sales. They are thoroughly practical from both builder's and owner's standpoint, for

*Every house has been
actually built and lived in*

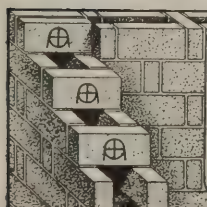
They sell for more because they are worth more. The value of good design is apparent in these dwellings. Yet with all their advantages over ordinary houses these fine brick homes are simple and economical to build. They offer a wonderful opportunity to builders.

Just 10c brings you this book—"Your Next Home"—an offer never equalled before. And specifications, working drawings and complete information for every one of these 60 homes are available at nominal price.

The Common Brick Industry of America
2132 CLEVELAND DISCOUNT BLDG.

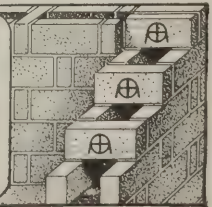
Cleveland, Ohio

The Ideal Brick Hollow Wall is made of standard brick obtainable everywhere



Ideal Brick Hollow Wall

"Brick Homes at the Cost of Frame"



FUEL COSTS CUT

In the Face of an Imminent Coal Shortage

**Average Consumption to
Be Much Lower**

The threatening aspect of a general coal shortage brings the announcement that—

Public Buildings—Schools—Hospitals—and Residences in all parts of this country and Canada will meet the problem of getting more heat from less coal by supplementing their otherwise sound building construction with a time proven fuel saver—the weatherstrip.

A history of the development will demonstrate the wisdom of this method of construction.

DATES FAR BACK

The memory of this generation can recall, no doubt, grandmother's early efforts to combat the nuisance of drafts with rags—papers and what-not. Her admonitions—"You'll catch your death of cold over at that window" and, "Come away from that door" were well meant but it remained to the inventor of the wood and felt door strip to give at least temporary relief. Soon these crude forerunners of the modern weatherstrip became worn and frayed, often outliving their usefulness in less than a single winter season. Frequent replacements, unsightly appearance and short lived usefulness brought into being the metal weatherstrip. Kansas was well pleased with this brain child of a native son, but more general adaptation brought to light some disagreeable facts in the service to be had with this Kansas metal weatherstrip. It seems there was no allowance made for shrinking—swelling or warping of the window frame—nor could the strip be easily removed for repairing the windows—sash cord, etc.

LIKE ALL GOOD STORIES

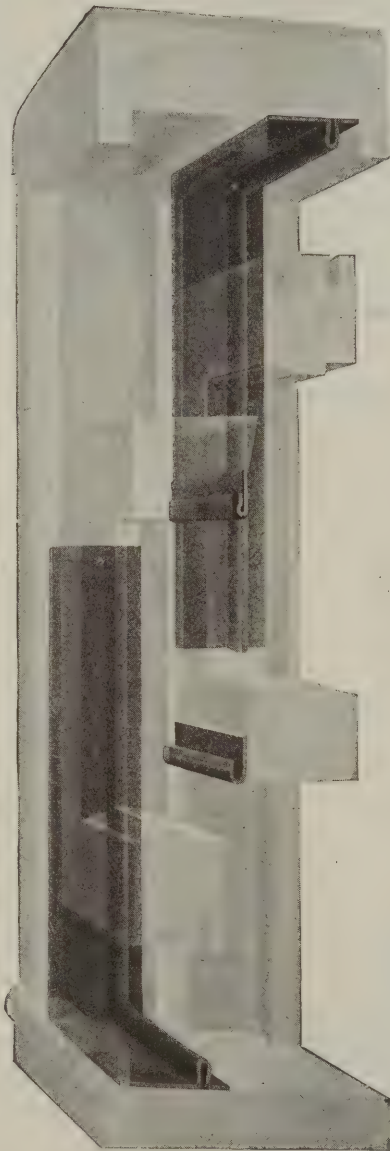
Ours has a happy conclusion in the development of the DIAMOND FLEXIBLE METAL WEATHER-STRIP so constructed that it will slide easily—allow for shrinking, warping, swelling, and at the same time allow quick removal for repairs without damage to sash, frame or strip.

Strongly constructed of pure commercial zinc, it is rust-proof and durable.

It has been estimated that a saving in general of from 20 to 40% of the fuel costs will be affected by the installation of DIAMOND FLEXIBLE METAL WEATHERSTRIPS.

Carpenters and Builders Profit

**BETTER HEALTH
IS ASSURED**



The above illustration is a phantom view of a window equipped with DIAMOND FLEXIBLE METAL WEATHERSTRIP.

By eliminating drafts, soot, dirt, and rain, this device performs the double service of conserving heat and preserving the general health of the building owners so equipped.

**General Adoption of
Diamond Flexible
Metal Weatherstrip**

BRINGS GOOD NEWS

**Alike to Home Owner,
Carpenter and Builder**

The fact that the building owner who installs a complete equipment of

**Diamond Flexible
Metal Weatherstrip**

is prepared to keep on saving from 20 to 40% of his fuel bills long after he has saved the original installation cost and the fact that that first cost is last and is low makes a leader of—

**Practical Metal Weatherstripping
The DIAMOND Way**

There is still some very desirable territory open for real go-getters. There are also some mighty good profits to be made in these territories. The pressing need for quick action in installing the strips makes it imperative that you get in touch with us as soon as possible.

If we have no agency in your vicinity we want you to represent us.

**DIAMOND
Metal Weatherstrip Co.**

**632 Kerr Street
COLUMBUS, OHIO**

What Stands Between You and More Money?

Is It Lack of Expert Training?

EVERY man whose eyes are open realizes that there are bigger opportunities for building experts today than ever before. Everywhere we see construction of all kinds going on and are told of more to be done—houses, office buildings, mills, factories, stores, warehouses—all needing men with the training to plan the work and to direct those who do the manual labor. It is these men, trained to carry the responsibilities, who make the most money in the building business. And everywhere we hear the call for them.



Ability to Read Plans, Estimate Costs and Superintend Work Is What Puts a Man Ahead Today

As long as a man is willing to drive nails, plane boards, mix mortar, lay brick, chisel stone, string wires, wipe joints or do other manual work he will be limited to the prevailing scale of wages.

As long as a contractor is satisfied with taking on small jobs, he will see the large profits go to men who know how to handle the big jobs. That is why ambitious men are training—getting the knowledge which makes their services worth more. They know that brains always command more money than muscle or skill of hand.

For over twenty years, Chicago Technical College has been helping this kind of men to advance—to get where they draw the high salaries or make the big profits that are paid to experts.

Hundreds of these ambitious men have stepped into the big pay class

while fellow workmen remained at the bench.

Albert S. Ross of Oklahoma is one of the men who have made big money as a result of this training. Mr. Ross writes: "After taking the course my salary was increased \$225 a month. Am now in business for myself (Contracting) and my prospect file shows \$220,000 worth of work."

R. T. Henderson of West Virginia says: "Since I enrolled my income has been increased more than 300 per cent."

Oscar Rosin of Minnesota also took Chicago Tech Training, became a contractor and writes: "Work in our office has opened up good. Am drawing plans for a \$70,000 school building and have others in view. Some of our large work last year was an \$80,000 church, \$60,000 armory, \$30,000 store

Every hour you put in learning more about your trade or business is going to pay you back in real money

and a large number of residences."

Hundreds of other men could tell you experiences similar to these of success following the instruction they received under the Chicago "Tech" experts. The same training they were given is open to you.

Train by Mail

Chicago "Tech" is ready to give you the same training in Plan Reading, Estimating, Superintending. Our Builder's Course makes building experts—men who know every practical point about planning, figuring costs and directing all classes of construction.

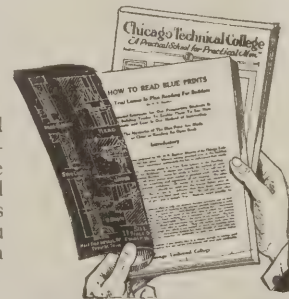
No need to leave your present job to get this training. We will teach you by mail and you can use your spare time for study under the direction of our experts. No special education required.

FREE 2 Books and Blue Prints

Your request brings our two books, one on "How to Read Blue Prints," containing a lesson in Plan Reading and with it we send blue prints, drawings, etc. With this lesson you can test yourself. See how easily you can learn by our method before you decide about enrolling. The other explains the Chicago "Tech" Method of training by mail.

Send the Coupon

Just sign and mail the coupon and these books and blue prints will go to you by return mail.



Chicago Technical College 1237 Chicago Tech. Bldg., Chicago, Ill.

Please send me your Free Books and Blue Prints for men in the Building Trades. Send postpaid to my address below.

Name.....

Address.....

Post Office.....State.....

Occupation.....

When writing advertisers please mention National Builder



*Residence of S. S. Beman,
Winnetka, Ill. Celotex used for in-
sulation on all walls, under ex-
terior finish and under roof rafters.*

Save 25% to 35%
in fuel costs

A
WOOLEN BLANKET
or
A COTTON QUILT—
WHICH ?

Wisely we sleep beneath a woolen blanket in preference to a cotton quilt in the cold winter months because it retains the heat of the body and makes for comfort and sound sleep.

When Celotex Insulating Lumber is applied in the construction of the walls and roof of a home it blankets the interior so that cold will not penetrate it, assuring a more even temperature throughout, stopping heat losses, and saving 25% to 35% in fuel costs.

Insulation to a building is what a woolen blanket is to the body. It keeps the heat where you need it.

Celotex Insulating Lumber made from cane fibre is the strongest board form insulation on earth. You can use it for sheathing, replacing lumber, as a plaster base, eliminating lath or for sound-deadening purposes.

Insulation principles and its functions in building construction is rapidly gaining recognition as a fundamental factor by architectural and contracting authorities throughout the United States.

There is a use for Celotex in every building.

Write for detailed information to Dept. 12-D

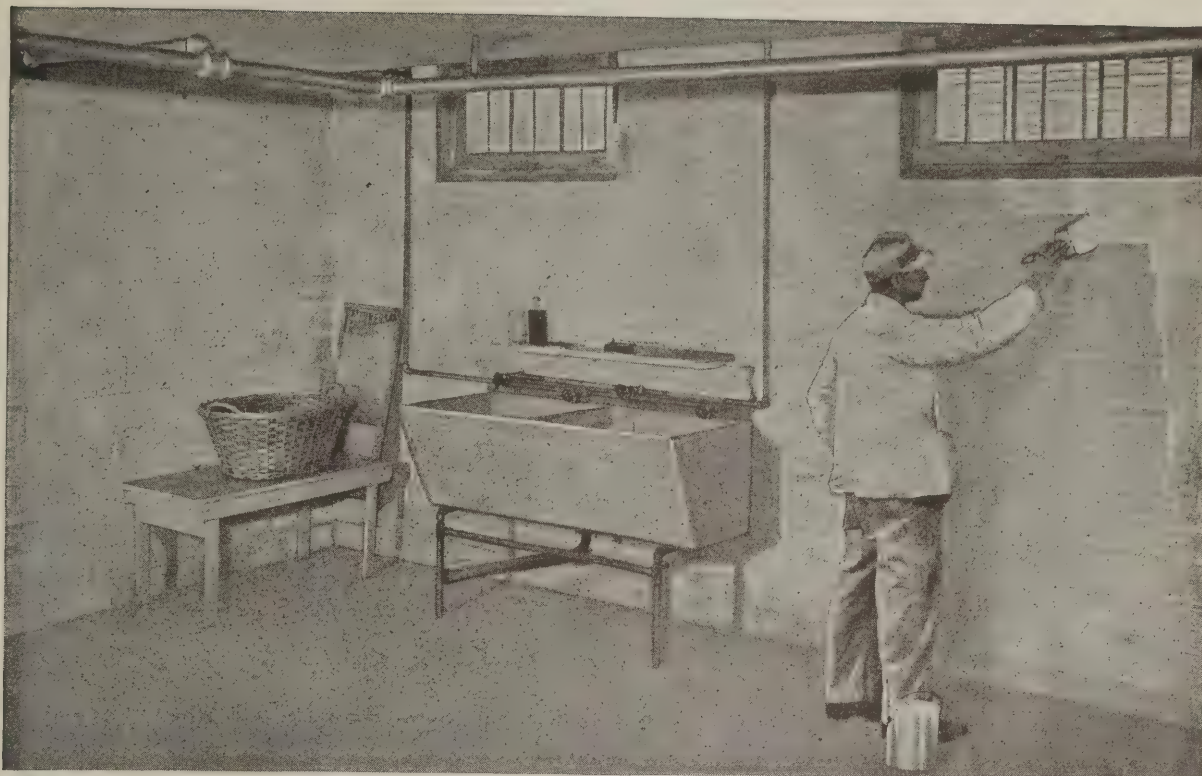
THE CELOTEX COMPANY
CONWAY BLDG. CHICAGO

PLANT—NEW ORLEANS

CELOTEX
INSULATING LUMBER

is 7-16 in. thick, 4
ft. wide, 8 ft. to
12 ft. long. Wt.
approx. 60
lbs. per 100
square feet

CELOTEX
INSULATING LUMBER



Here's Your Winter Job at Real Pay!

How many damp basements are there close by your shop—places that get damp and smelly every time it rains a couple of days? Plenty, all right; and every one an invitation to you to keep several men busy drying them up this winter *at a real profit* when it's too stormy to work outside.

You can do it—at *real pay*—with Medusa Cement Paint. And the customers whose damp basements you “cure” will swing lots of other jobs your way next spring and tell their friends to do the same—stained, discolored or cracked stucco to renew; leaky cisterns and vaults to

make water-tight; farm concrete work of many kinds to freshen up; and plenty more.

Medusa Cement Paint is a powder, furnished in white or colors, and made ready for use simply by adding water. Brush or spray it on: two coats are plenty. Durable, damp-proof, effective. A pound will cover from 10 to 15 square feet with two coats. Use it on your new work, too, of course.

Want to try it? We'll gladly send sample, free, with interesting particulars.

THE SANDUSKY CEMENT COMPANY

Department T. P.

Cleveland, Ohio

Manufacturers of Medusa Stainless White Cement (Plain and Waterproofed); Medusa Gray Cement (Plain and Waterproofed); Medusa Waterproofing (Powder or Paste) and Medusa Cement Paint

MEDUSA

• Waterproof •
CEMENT PAINT





More Window Display Space! *the need of every retail merchant!*

These Distributors Carry Complete Stocks of Desco Construction

Pacific Builders Supply Co., Los Angeles, Calif.
John J. Kinsella Co., Chicago, Ill.
Thoma & Son Inc., Fairfield, Ia.
H. Neuer Glass Co., Cincinnati, Ohio.
Atlas Paint & Glass Mfg. Co., Kansas City, Mo.
S. Schemer, Baltimore, Md.
St. Paul Glass Co., St. Paul, Minn.
Toronto Plate Glass Importing Co., Toronto, Canada.
John Lucas & Co. Inc., Pittsburgh, Penna.
Akron Mirror & Glass Co., Akron, Ohio.
Riddle Co., Nashville, Tenn.
Patek Bros., Milwaukee, Wis.
Jamaica Plate Glass Co., Inc., Jamaica, N. Y.

Write for name of the Desco dealer nearest you if it is not convenient to buy from one of the above distributors.

Store display windows are an important asset in the success of every modern retail establishment. The merchant realizes that his windows—his store front—can be made business builders by attracting passersby through the door.

Store fronts of modern type are now regarded as a necessity—and the contractor's task simply becomes one of installing a store exterior of proven worth—a store front that is attractive.

Through our co-operation any contractor or carpenter can become a Desco Store Front specialist—and without any special knowledge or experience. We have enabled scores of contractors to build up a profitable business in Desco Store Fronts and we can do the same for you. Mail the coupon below and we will explain in detail how Desco Store Front construction is sold to contractors and how we will co-operate with you to increase your profits.

See Sweet's Catalog

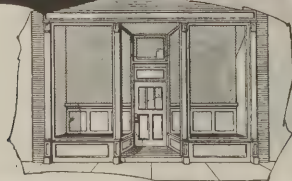
DETROIT SHOW CASE COMPANY

1655 Fort St. West

Detroit, Michigan

(102)

Desco STORE FRONTS



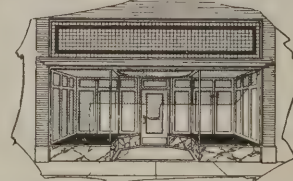
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Detroit Show Case Co., Detroit, Mich.

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Without obligation upon my part you may send me a copy of your book containing information regarding store fronts.

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I can't tell you all there is to tell about this C. H. & E. money saver in this limited space, but I would like to have you know a few facts concerning its wonderful adaptability, its simplicity and strength, and its certain ability to increase production in less time, and at less cost. Write for the facts today. It will place you under no obligation, and will, in time, save you considerable money.

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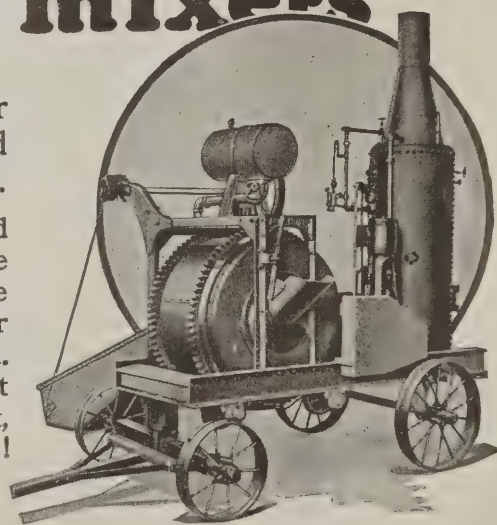
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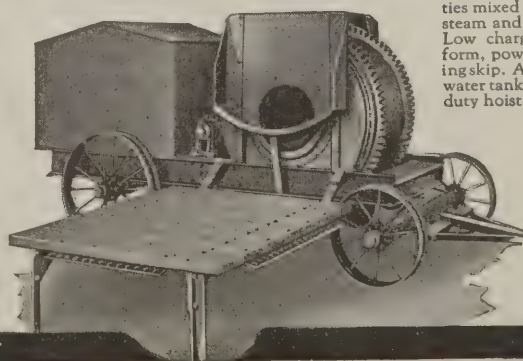
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Get the details of construction—the liberal drum dimensions—double gear drum drive—the drum roller construction—universal bearings, mixing action—the two side discharge control—trouble-proof power—dust-proof housing. Get these details and you will see why the Dandie offers a remarkable value. Write for catalog D 12 today.

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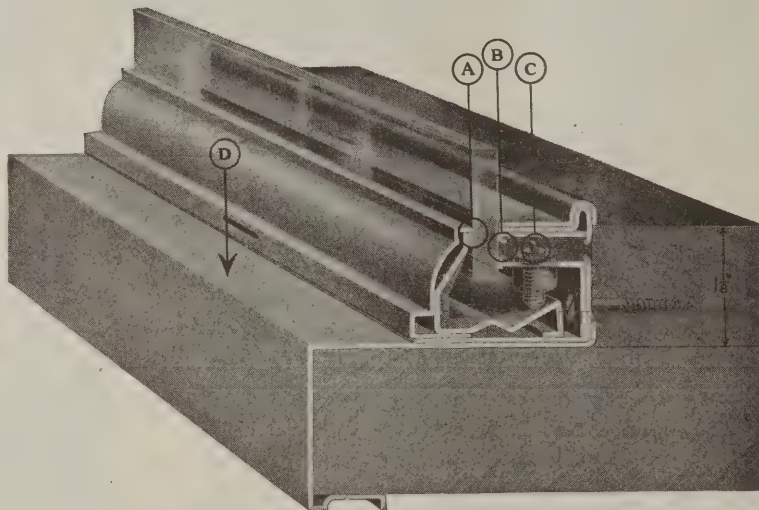
Insurance figures reveal that millions of dollars literally "go to smash" each year through plate glass breakage. And the loss of time and show window space would add many millions more.

Yet this huge national waste is needless and preventable. Faulty setting is the chief cause. Faulty setting is next to impossible when you include in all your store front specifications the following

Glazing Specification

All Metal Sash, Corner Bars, Division Bars and Self-Adjusting Setting Blocks Used in Store Fronts Must Be Listed by the Underwriters' Laboratories

A is the point where the outer member presses against the glass, when the delicate watch-like turning of the key at C brings the glass automatically into contact with the rabbet of gutter B sliding on the anti-friction Murnane Self-Adjusting Setting Block.



The Sill Covering D extends from the inner side of the rabbet to the lower edge of the face, eliminating joints, perpendicular screws or nails—positively protecting the wood against deterioration, for leakage is impossible.

No. 110 Zouri Combination Key-Set Sash and 705 Sill Covering

Why tolerate an unnecessary evil when this certain remedy is known? The installation of Zouri Key-Set construction will prove a boon to insurance companies, manufacturers, merchants and consumers.

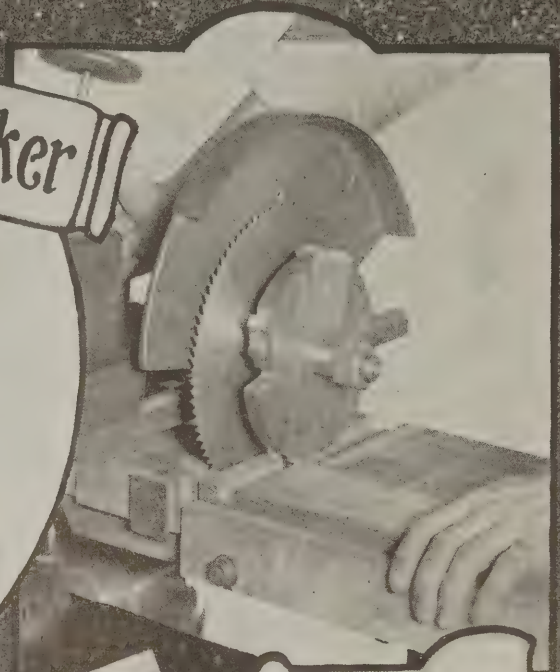
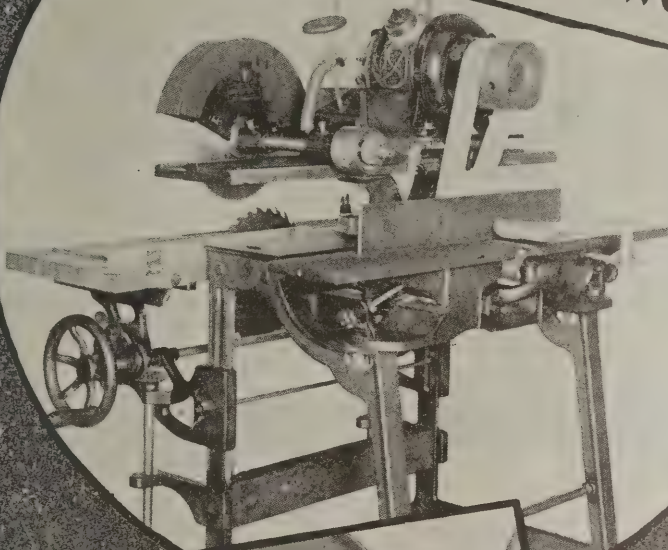
All Zouri Key-Set Sash, Corner, Division Bars, and Self Adjusting Blocks have been listed by the Underwriters' Laboratories.

Zouri Drawn Metals Company

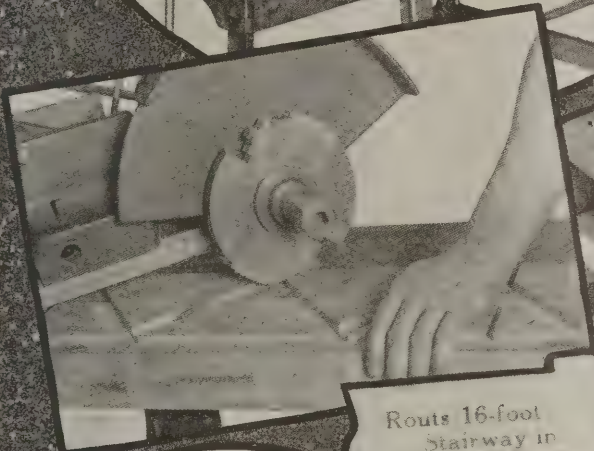
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The Master Woodworker

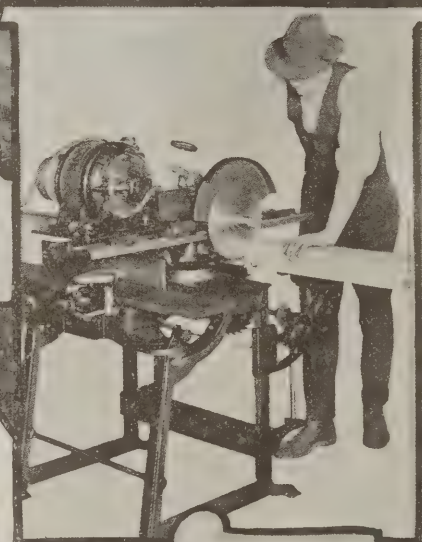


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One Operation



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MODEL No. 7 For Contractors and Builders

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No power wasted on countershaft.

A portable universal woodworker driven by special electric motors, developing 3½ H. P. Can be run from any 110 volts ordinary house circuit. Catalogue on request.

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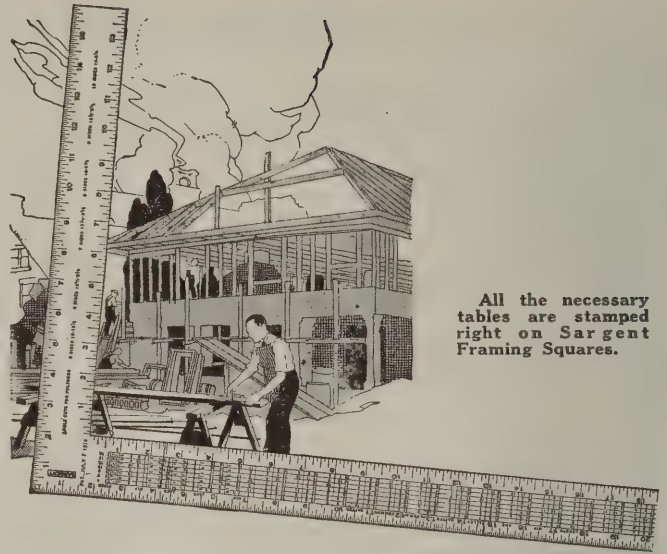
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This is one of the points on which the layman is competent and quick to pass offhand judgment. The modern building provided with safe standards is so constructed that the door should swing wide open with ease and silence.

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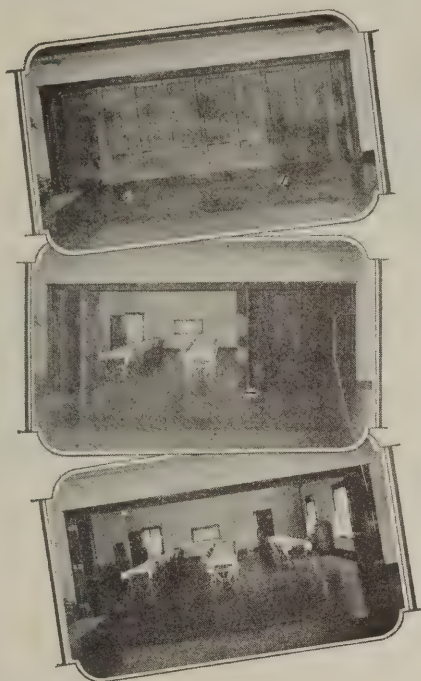
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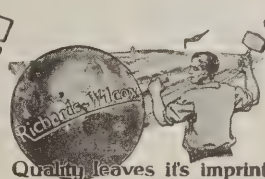
For large openings, such as the one illustrated, **R-W Accordion Door Hardware** is most desirable. The doors operate smoothly, fold compactly against the wall when opened, and never stick or sag.

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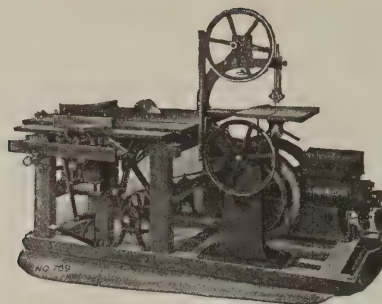
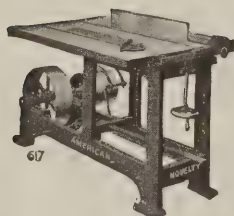
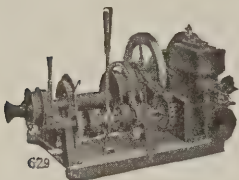
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with 20" Band
Saw.

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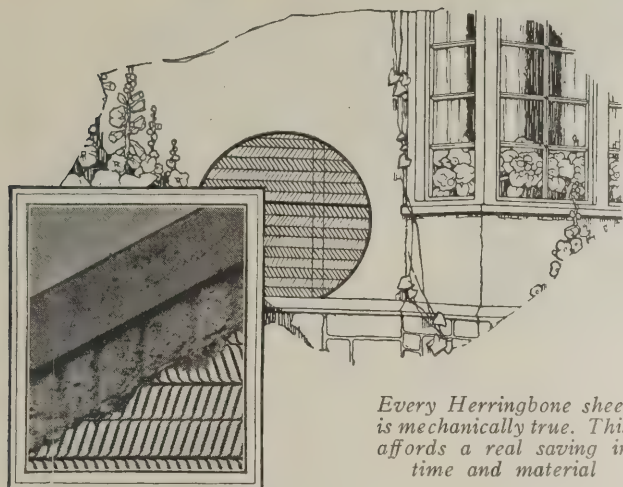
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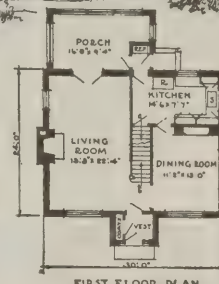
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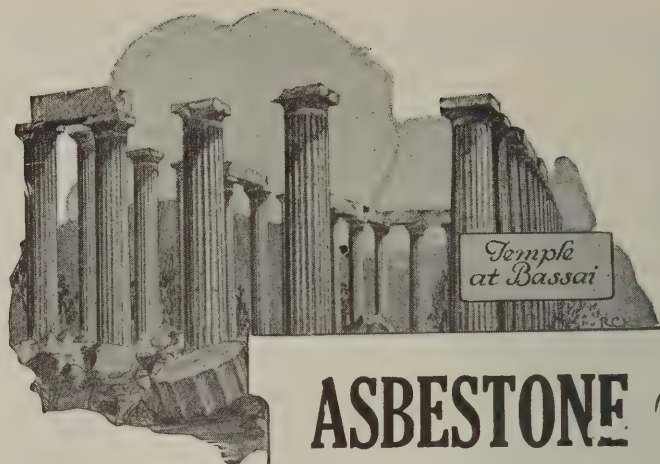
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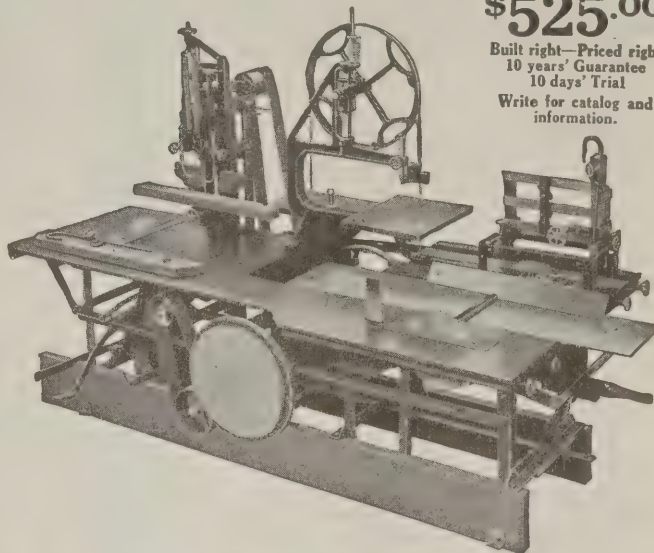
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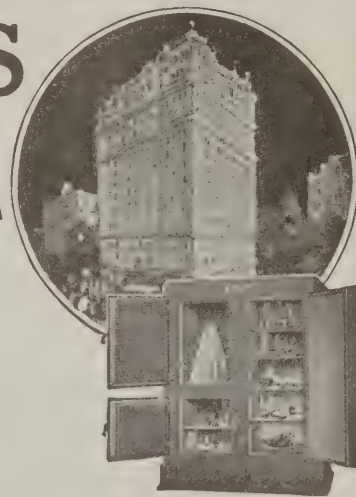
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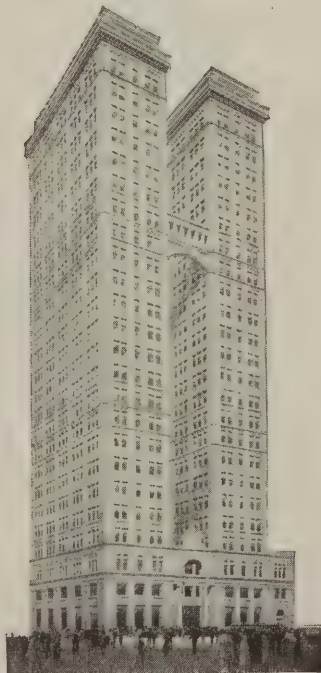
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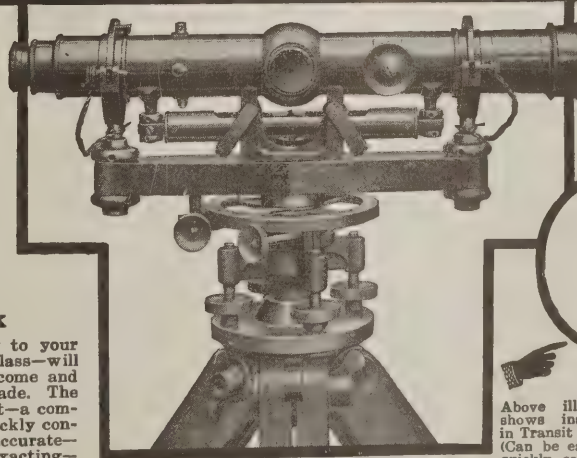
This instrument will add immeasurably to your efficiency and put you in the big builder class—will do more to increase your business, income and prestige than any investment you ever made. The Aloe Convertible Level is the world's best—a combination of both level and transit and quickly converted to the use of either. Absolutely accurate—satisfies the requirements of the most exacting—yet so simple that anyone can use it.

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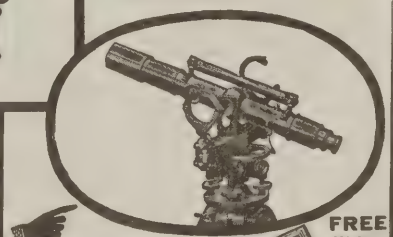
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A. S. ALOE CO., 613 Olive St., St. Louis, Mo.



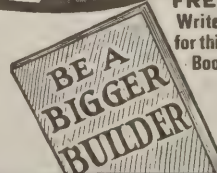
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Order the Aloe—try it for 10 days—put it to the most rigid tests. If you are not pleased, return it at our expense and your \$5.00 will be refunded.



Above illustration shows instrument in Transit position. (Can be easily and quickly converted.)

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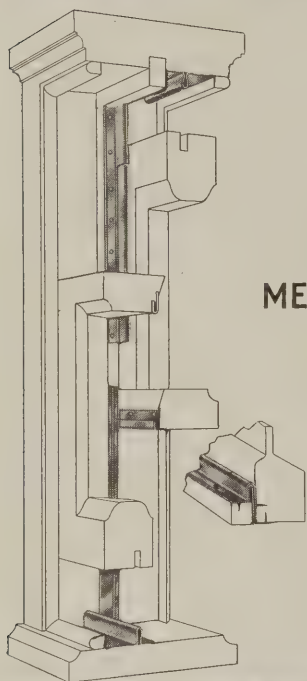
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THE IDEAL EXTERIOR WALL COVERING

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200 answered, "The best in the market."
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MANUFACTURERS

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"NOT A KICK IN A MILLION FEET"



Fig. 157

Note the construction of patent interlocking device used on Edwards Metal Shingles and Spanish Tile.



Fig. 367

Metal Spanish Tile for main part of roof.

Edward's "Queen Anne" Metal Shingles



Residence of Senator George S. Nixon, Reno, Nev. Edwards Metal Spanish Tile used on this building.

EDWARDS Metal Spanish Tile

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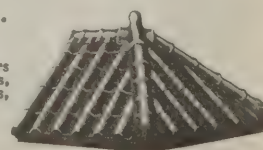
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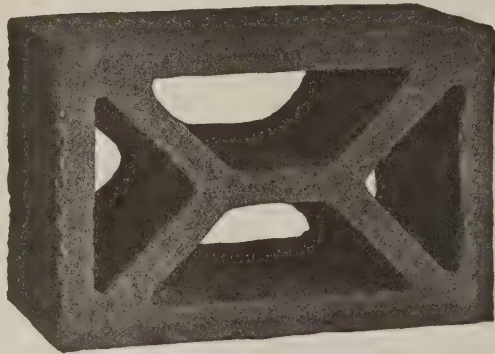
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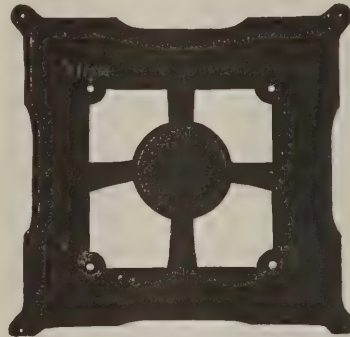
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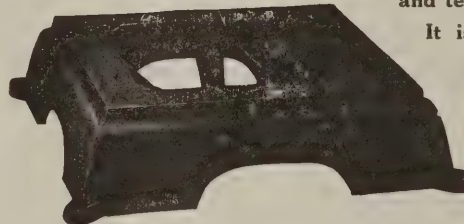
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PATENT IRON BASE

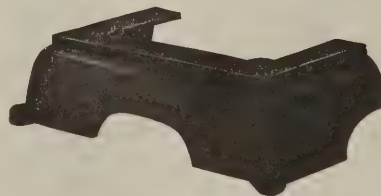
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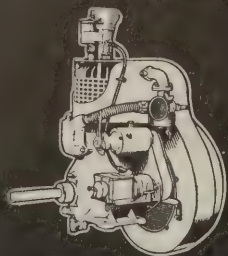
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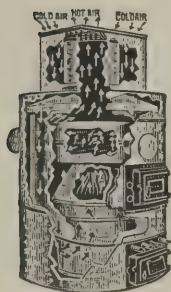
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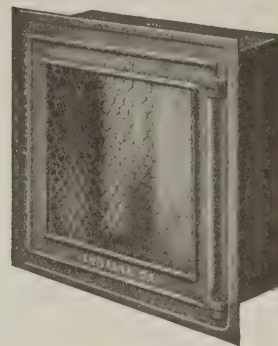
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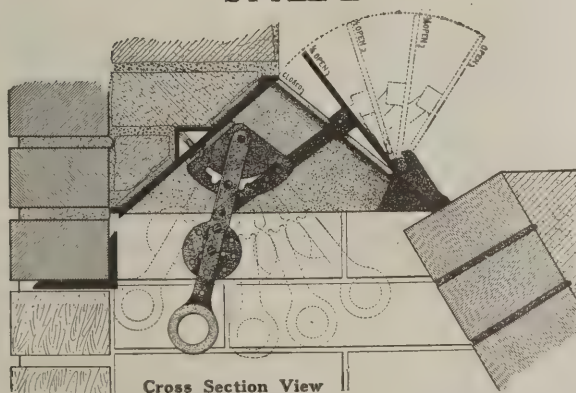
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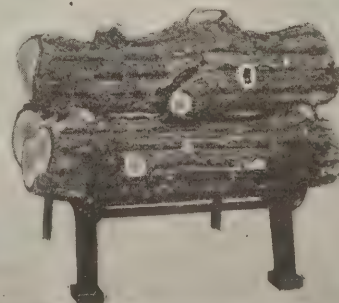
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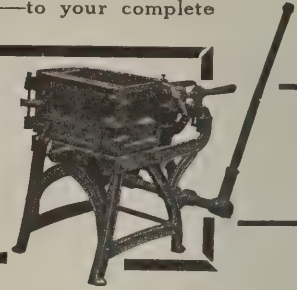


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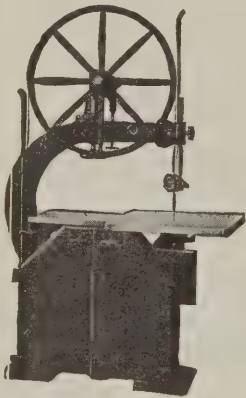
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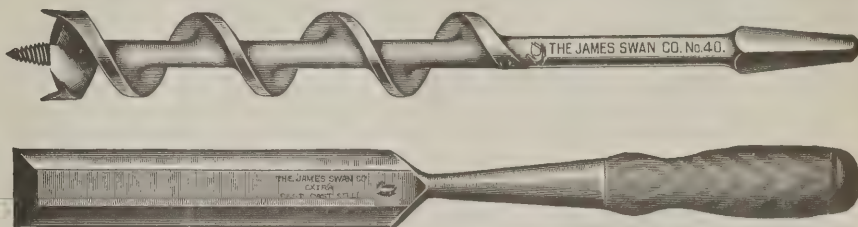


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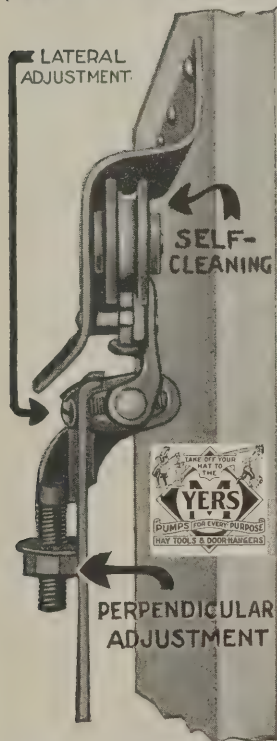
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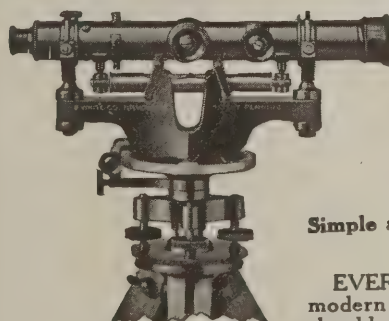
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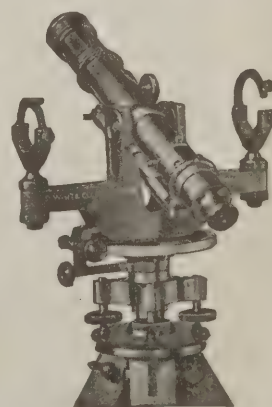
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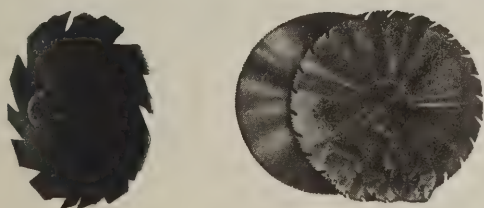
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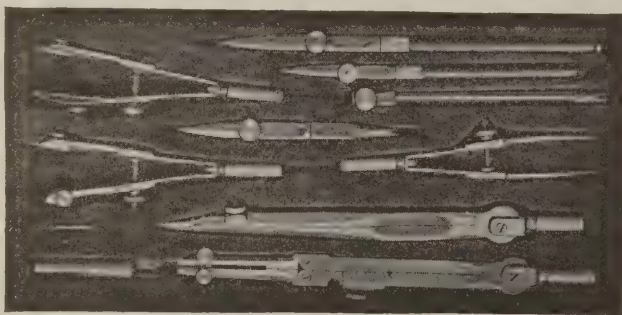
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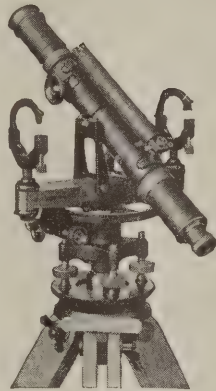
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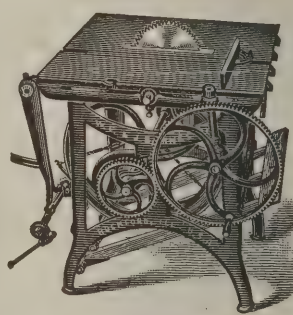
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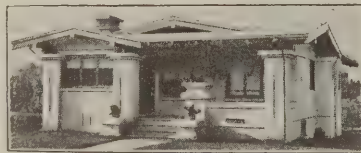
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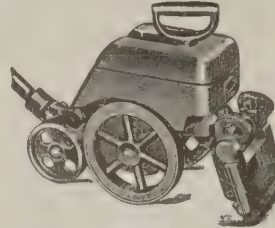
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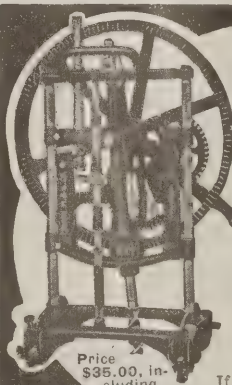
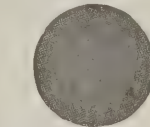
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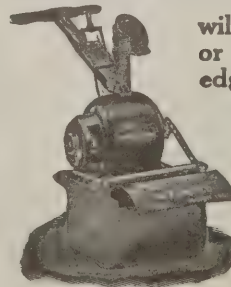
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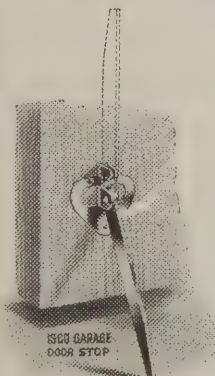
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Hand Power Elevators and Dumbwaiters

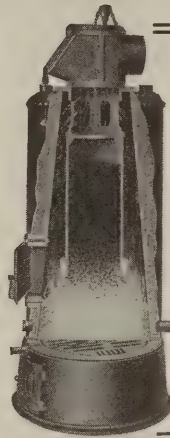
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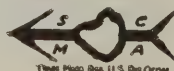
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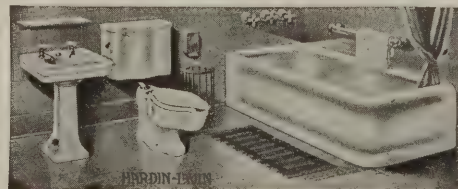
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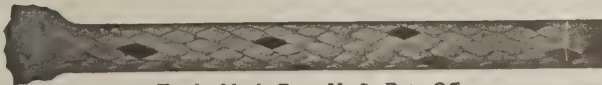
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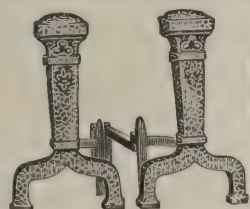
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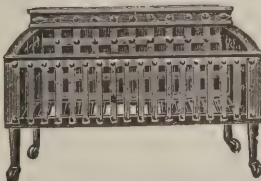
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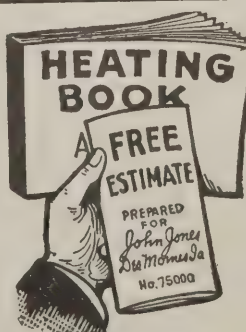


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For further information you are referred to the page numbers of advertisements of products which are advertised in this issue.

If still further information is desired on any article, do not hesitate to write the manufacturers for it, or write to NATIONAL BUILDER and we will get the data and descriptions for you.

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Beecher, Peck & Lewis. (See page 104)
Detroit, Mich.
Brantford Roofing Co., Ltd. (See page 104)
Brantford, Ont., Canada.
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Lockport Paper Co. (See page 104)
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Balers—Cement Sack

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Bandsaw Machinery

Crescent Machine Co. (See page 112)
Leetonia, O.

Bars—Store Front

Zouri Drawn Metals Co. (See page 98)
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Wis. (See page inside back cover)
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Erie, Pa.

Bolts—Door and Window

McKinney Mfg. Co. (See page 12)
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(See page 115)
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(See page 89)
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Keith's Corp. (See page 116)
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Portland Cement Association. (See page 103)
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911 California Bldg., Los Angeles, Cal.
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Boring Machines

Crescent Machine Co.
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Braces—Screen Door

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Brackets—Folding

The Griffin Mfg. Co. (See page 100, 110)
Erie, Pa.

Brackets—Roof

Adjustable Roof Bracket Co.
Pekin, Ill.
Elite Mfg. Co. ("Reliable")
Ashland, O.
D. P. Kurtz
1541 S. Main St., Elkhart, Ind.

Brackets—Scaffold

Elite Mfg. Co. ("Reliable")
Ashland, O.
Folding Scaffold Bracket Co.
250 W. Lafayette Blvd., Detroit, Mich.
The Steel Scaffolding Co. ("Trouble-Saver")
Evansville, Ind.

Brackets—Shelf

McKinney Mfg. Co. (See page 12)
Metropolitan and Liverpool Sts., Pittsburgh, Pa.
The Griffin Mfg. Co. (See page 100, 110)
Erie, Pa.

Brass Goods

American Brass Co.
Waterbury, Conn.
Brasco Manufacturing Co. (See page 11)
5025 S. Wabash Ave., Chicago, Ill.

Brick Cleaners

Elgin Gas Motor Co.
60 River St., Elgin, Ill.
N. T. Fuller
Spring and First Sts., New Bedford, Mass.
Maroa Mfg. Co.
Maroa, Ill.

Brick—Common

Common Brick Manufacturers Association
2121 Discount Bldg., Cleveland, O.
(See page 89)

Brick—Enameled

American Face Brick Assn. (See page 3)
130 N. Wells St., Chicago, Ill.

Brick—Face

Acme Brick Co.
Adams Bldg., Danville, Ill.
The Alliance Brick Co.
24 Review Bldg., Alliance, O.
American Face Brick Assn. (See page 3)
130 N. Wells St., Chicago, Ill.
The Federal Clay Products Co.
Mineral City, O.
Fiske & Co., Inc.
30 Franklin St., Boston, Mass.

Brick—Fire

Alsey Brick & Tile Co.,
Alsey, Ill.
Chicago Fire Brick Co.
133 W. Washington St., Chicago, Ill.
Crescent Refractories Co.
Curtwensville, Pa.
Eureka Fire Brick Works
1507 First Nat'l Bank Bldg., Pittsburgh, Pa.
Garfield Fire Clay Co.
Robinson, Pa.
A. P. Green Fire Brick Co.
Mexico, Mo.
Harbison Walker Refractories Co.
Farmers Bank Bldg., Pittsburgh, Pa.
Oak Hill Fire Brick & Coal Co.
Oak Hill, O.
Peekskill Fire Brick Works, Inc.
26 S. Water St., Peekskill, N. Y.
Seaboard Refractories Co.
Box 327, Perth Amboy, N. J.
M. C. Valentine & Bro. Co.
Woodbridge, N. J.

Brick Machines—Cement

Anchor Concrete Machinery Co.
Adrian, Mich. ("Anchor"—See page 110)
Besser Sales Co.
53 W. Jackson Blvd., Chicago, Ill.
Concrete Equipment Co. (See page 114)
530 Ottawa Ave., Holland, Mich.
Helm Brick Machine Co.
Cadillac, Mich.
Ideal Concrete Machinery Co., Colerain &
Monmouth. (See page 112)
Cincinnati, O.
L. V. Thayer
27 W. 43rd St., New York, N. Y.

Brushes

John L. Whiting—J. J. Adams Co.
700 Harrison Ave., Boston, Mass.

Brushes—Air

Paasche Air Brush Co.
1909 Diversey Pkwy., Chicago, Ill.

Brushes—Polishing

S. C. Johnson & Son. (See page 79)
Racine, Wis.

Buckets—Clamshell

Forsythe Brothers. ("Buffalo")
30 Church St., New York, N. Y.

Builders Hardware

National Manufacturing Co. (See back cover)
Sterling, Ill.
Nicholas Hardware Co. (See pages 109, 119)
121 Marion St., Oak Park, Ill.
Peck, Stow & Wilcox Co.
221 W. Center St., Southington, Conn.
Penn Hardware Co.
Foot of Spruce St., Reading, Pa.
Russell & Erwin Manufacturing Co.
New Britain, Conn. ("Russwin")
Simmons Hardware Co.
900 Spruce St., St. Louis, Mo.
Warner Hardware Co.
13 S. 6th St., Minneapolis, Minn.

Building Paper

Brown Co. (See front cover)
Portland, Me.
C. B. Hewitt & Brothers, Inc.
16-24 Ferry St., New York, N. Y.
The Lehon Co. (See page 109)
44th St., on Oakley Blvd., Chicago, Ill.
The B. F. Nelson Mfg. Co.
401 Main St., N. E., Minneapolis, Minn.

Building Plans

American Face Brick Assn. (See page 3)
130 N. Wells St., Chicago, Ill.
Architectural House Planning Service Co.
20 S. 18th St., Philadelphia, Pa.
(See page 115)
Common Brick Manufacturers Association
2121 Discount Bldg., Cleveland, O.
(See page 89)
Portland Cement Association. (See page 103)
111 W. Washington St., Chicago, Ill.

Buildings—Portable

Edwards Manufacturing Co. (See page 109)
Cincinnati, O.
O. K. Harry Steel Co.
2333 Papin St., St. Louis, Mo.

Bumpers—Door

The Griffin Mfg. Co. (See page 100, 110)
Erie, Pa.

Built-In Furniture

Brown Detachable Disappearing Bed Co.
201 Gloyd Ave., Kansas City, Mo.

Bumpers—Door

The Griffin Mfg. Co. (See pages 100, 110)
Erie, Pa.

Bungalow Plans

American Face Brick Assn. (See page 3)
130 N. Wells St., Chicago, Ill.
L. F. Garlinghouse Co.
123 W. 6th Ave., Topeka, Kans.
Portland Cement Association. (See page 103)
111 W. Washington St., Chicago, Ill.

Burlap

The Lehon Co. (See page 109)
44th St., on Oakley Blvd., Chicago, Ill.

Burners—Garbage

Kerner Incinerator Co. (See page 5)
1027 Chestnut St., Milwaukee, Wis.

Burners—Oil

Combustion Co.
4256 N. Western Ave., Chicago, Ill.
Nokol Co. of America
215 N. Michigan Ave., Chicago, Ill.
Olson Oil Burners
2146 Adams St., Chicago, Ill.
Winslow Boiler & Engine Co. ("Kleen-Heat")
65 E. Van Buren St., Chicago, Ill.

Burnishers

Fox Supply Co. ("Fox")
Brooklyn, Wis.

Butts

McKinney Mfg. Co. (See page 12)
Metropolitan and Liverpools Sts., Pittsburgh, Pa.
Sargent & Co. (See page 100)
45 Water St., New Haven, Conn.

Cabinet Scrapers

Fox Supply Co. ("Fox")
Brooklyn, Wis.

When writing manufacturers, mention NATIONAL BUILDER'S Buyers' Guide

BUYER'S GUIDE—Continued

Cabinets—Bathroom

The Durlach Can & Iron Works
234 Bridge St., Brooklyn, N. Y.
("Steel Maid")

Cabinets—Ironing Board

Murphy Door Bed Co. (See page 83)
22 W. Monroe St., Chicago, Ill.
Practical Products Co.
56 E. Lake St., Chicago, Ill.

Cabinets—Kitchen

Wm. M. Crane Co.
16 W. 32nd St., New York, N. Y.
Hoosier Manufacturing Co.
New Castle, Ind.
G. I. Sellers & Sons Co.
Elwood, Ind.
Wasmuth-Endicott Co.
Andrews, Ind.

Cabinets—Medicine

Joseph A. Hoegger, Inc.
351 Palisade Ave., Jersey City, N. J.
The Ideal Reversible Hinge & Cabinet Co.
108 Pine St., St. Louis, Mo.
"White-Steel" Sanitary Furniture Co.
55 Mt. Vernon Ave., Grand Rapids, Mich.

Cable—Copper

Joseph Barnett & Co.
218 4th Ave., East, Cedar Rapids, Ia.

Calculating Machines

Monroe Calculating Machine Co.
Woolworth Bldg., New York, N. Y.

Cans—Ash and Garbage

Rochester Can Co.
109 Hague St., Rochester, N. Y.

Canvas

Wm. L. Barrell Co.
50 Leonard St., New York, N. Y.
The Lehon Co. (See page 109)
44th St., on Oakley Blvd., Chicago, Ill.

Capstans—House Moving

LaPlante-Choate Mfg. Co. (See page 116)
Cedar Rapids, Ia.

Cars—Industrial

Helm Brick Machine Co.
Cadillac, Mich.

Casings—Window (Wood)

Exchange Sawmills Sales Co.
1116 R. A. Long Bldg., Kansas City, Mo.

Ceilings—Metal

Brooklyn Metal Ceiling Co.
283 Greene Ave., Brooklyn, N. Y.
W. C. Hopson Co. (See page 119)
Grand Rapids, Mich.
International Steel & Iron Co. (See page 106)
1239 Edgar St., Evansville, Ind.
Milwaukee Corrugating Co.
36th Ave. and Burnham St., Milwaukee, Wis. (See inside back cover)

Cement—For Brick and Tile

Carney Cement Co.
Mankato, Minn.

Cement—Keene's

Best Bros. Cement Co.
Medicine Lodge, Kan.
United States Gypsum Co. (See page 95)
205 W. Monroe St., Chicago, Ill.

Cement—Portland

Alpha Portland Cement Co. ("Alpha")
19 Centre Square, Easton, Pa.
Atlas Portland Cement Co.
25 Broadway, New York, N. Y.
Knickerbocker Portland Cement Co., Inc.
342 Madison Ave., New York, N. Y.
Lehigh Portland Cement Co.
Allentown, Pa.
Louisville Cement Co.
Louisville, Ky.
Portland Cement Association. (See page 103)
111 W. Washington St., Chicago, Ill.
The Sandusky Cement Co. (See page 93)
6026 Engineers Bldg., Cleveland, O.

Cement—Waterproofed

The Sandusky Cement Co. (See page 93)
6026 Engineers Bldg., Cleveland, O.

Chandeliers

Lightolier Co.
569 Broadway, New York, N. Y.

Channels—Steel

Sykes Metal Lath & Roofing Co.
Niles, O. (See page 87)

Checks—Door

Park Manufacturing Co.
47 Lagrange St., Worcester, Mass.
Sentinel Manufacturing Co.
315 Seventh Ave., Three Rivers, Mich.

Chests—Ice

Herrick Refrigerator Co. (See page 105)
6th and River Sts., Waterloo, Ia.

Chests—Tool

Federal Metal Weatherstrip Co.
1240 Fullerton Ave., Chicago, Ill.
(See page 119)
Wedell & Boers
28 Jefferson Ave., Detroit, Mich.

Chisels—Carpenters

The James Swan Co. (See page 113)
279 Bank St., Seymour Conn.

Chutes—Coal

Canton Foundry & Machine Co.
Canton, O.
Church Appliance Mfg. Co.
935 Hennepin St., LaSalle, Ill.
Indiana Foundry Co. (See page 111)
Indiana, Pa.
Kewanee Manufacturing Co.
401 N. Tremont St., Kewanee, Ill.
Leavitt Mfg. Co. ("Leavitt")
Cor. Race and Griggs St., Urbana, Ill.

Chutes—Foundation Wall

Sykes Metal Lath & Roofing Co.
Niles, O. (See page 87)

Clamps—Carpenters

Black Bros. Co.
P. O. Box 107, Mendota, Ill.
Emmert Mfg. Co.
W. Main St., Waynesboro, Pa.
Handy Manufacturing Co.
29 E. Madison St., Chicago, Ill.
James L. Taylor Mfg. Co.
108 Parker Ave., Poughkeepsie, N. Y.

Clamps—Steel

Norfolk Mfg. Co.
16 Maple Ave., Hartford, Conn.

Clamps—Timber

Schenk Timber Clamp Corp.
501 5th Ave., New York, N. Y.

Clay—Fire

W. S. Dickey Clay Mfg. Co.
Kansas City, Mo.
The Humphrey Brick & Tile Co.
Brookville, Pa.
The Interstate Clay Products Co.
20 E. Jackson Blvd., Chicago, Ill.

Closets—Chemical

Chemical Toilet Corp.
2626 S. Salina St., Syracuse, N. Y.
Rowe Sanitary Manufacturing Co.
508 W. Congress St., Detroit, Mich.
Shiel Manufacturing Co.
38 E. Bacon St., Hillsdale, Mich.

Closets—Water

Philip Haas Co.
123 N. Webster St., Dayton, O.

Cloth—Wire

Buffalo Wire Works Co., Inc.
316-332 Terrace St., Buffalo, N. Y.
Gilbert & Bennett Mfg. Co. (See page 119)
First Nat'l Bank Bldg., Chicago, Ill.
The New Jersey Wire Cloth Co.
644 S. Broad St., Trenton, N. J.
New York Wire Cloth Co.
342 Madison Ave., New York, N. Y.
Reynolds Wire Co.
85 Crawford Ave., Dixon, Ill.

Coal Handling Machinery

Conveyors Corporation of America
326 W. Madison St., Chicago, Ill.

Coatings—Roof

The Lehon Co. (See page 109)
44th St., on Oakley Blvd., Chicago, Ill.

Colonnades

Bertelsen Adjustable Grille Co. (See page 119)
2117 S. Troy St., Chicago, Ill.

Columns—Concrete Filled

Picuri Column Co., Inc.
305-307 Harrison St., Hoboken, N. J.

Columns—Metal

Crex Patent Column Co.
2300 S. Springfield Ave., Chicago, Ill.
Union Metal Mfg. Co.
1435 Maple Ave., N. E., Canton, O.
Waukesha Steel Products Co.
Waukesha, Wis.

Columns—Wood

Hartmann-Sanders Co.
2155-87 Elston Ave., Chicago, Ill.
A. F. Schwerd Mfg. Co.
39 Cortlandt St., New York, N. Y.

Compounds—Calking and Glazing

H. B. Fred Kuhls
65th St. and 3rd Ave., Brooklyn, N. Y.
Weatherproof Calking Co.
757 N. Washington Ave., Minneapolis, Minn.

Compressors—Air

American Floor Surfacing Machine Co.
515 S. St. Clair St., Toledo, O.
(See page 8)
Buhl Machine Co.
605 S. Dearborn St., Chicago, Ill.
Norwalk Iron Works Co.
Water St., S. Norwalk, Conn.

Conduit and Fittings

Enameled Metals Co.
P. O. Box 678, Pittsburgh, Pa.
General Electric Co. (See page 81)
Schenectady, N. Y.
Mark Manufacturing Co.
111 W. Washington St., Chicago, Ill.
National Metal Molding Co.
Fulton Bldg., Pittsburgh, Pa.
The Youngstown Sheet & Tube Co.
Stambaugh Bldg., Youngstown, O.

Contractors' Woodworkers

American Saw Mill Machinery Co.
Hackettstown, N. J.
("American"—See page 102)

Conveyors—Portable

National Conveying Equipment Corp.
1134 N. Kilbourn Ave., Chicago, Ill.
Portable Machinery Co.
Lakeview Ave., Passaic, N. J.

Copper

Copper & Brass Research Assn.
25 Broadway, New York, N. Y.
Taunton-New Bedford Copper Co.
Taunton, Mass.

Cord—Dumbwaiter

Samson Cordage Works. (See page 119)
88 Broad St., Boston 9, Mass.

Cord—Fasteners (Sash)

H. A. Wulf
161 Main St., Norwich, Conn.

Cord—Sash

B. & B. Sash Cord Co.
100 Clarkson St., Ansonia, Conn.
Mallison Braided Cord Co.
Athens, Ga.
Samson Cordage Works. (See page 119)
88 Broad St., Boston 9, Mass.
Silver Lake Co.
Newtonville, Mass.
The Turner & Stanton Co.
East Broad St., Norwich, Conn.

Cord—Shade

Samson Cordage Works. (See page 119)
88 Broad St., Boston 9, Mass.

Cork Carpet

Nairn Linoleum Co.
Kearney, N. J.
Scott & West Co.
15 E. 40th St., New York, N. Y.
W. & J. Sloane
Fifth Ave. and 47th St., New York, N. Y.
Joseph Wild & Co.
230 Fifth Ave., New York, N. Y.

Corners—Building (Metal)

Edwards Manufacturing Co. (See page 109)
Cincinnati, O.
F. D. Kees Mfg. Co.
24 High St., Beatrice, Nebr.

If you don't see what you want, write to NATIONAL BUILDER for it

BUYER'S GUIDE — Continued

Cornices—Copper

The Taunton-New Bedford Copper Co.
Taunton, Mass.

Cornices—Sheet Metal

Milwaukee Corrugating Co.
36th Ave. and Burnham St., Milwaukee,
Wis. (See inside back cover)

Coverings—Pipe

Servicised Products Co. (See page 85)
1528 First Nat'l Bank Bldg., Chicago, Ill.

Cranes—Gasoline

Koehring Co. (See page 97)
31st and Concordia, Milwaukee, Wis.

Cranes—Hand Power

Reading Chain & Block Corp.
2140 Adams St., Reading, Pa.

Cross Cut and Dadoing Machines

Hutchinson Mfg. Co.
Norristown, Pa.
The Woodworker Mfg. Co. (See page 99)
612 Brush St., Detroit, Mich.

Crushers and Pulverizers

Hydraulic Ramming Concrete Stone Ma-
chinery Co.
788 McBride Ave., Little Falls, N. J.

Cupolas

The Philip Bernard Co.
2300 Floyd Ave., Sioux City, Ia.
Lichty Metal Products Co.
922 Sycamore St., Waterloo, Ia.
Shrauger & Johnson
400 Walnut St., Atlantic, Ia.

Cutters—Asbestos Shingle

Cundlach Machine Co.
408 E. Main St., Belleville, Ill.

Cutters—Bar

Koehring Co. (See page 97)
31st and Concordia, Milwaukee, Wis.

Cypress—Tide Water

Southern Cypress Manufacturers' Association
Hibernia Bank Bldg., New Orleans, La.
(See page 118)

Dampers—Fireplace

Colonial Fireplace Co. (See page 111)
4611 Roosevelt Rd., Chicago, Ill.
H. W. Covert Co.
137 E. 46th St., New York, N. Y.
The Donley Brothers Co.
3627 E. 74th St., Cleveland, O.

Deadeners—Sound

Celotex Products Co. (See page 92)
Conway Bldg., Chicago, Ill.

Derricks—Hand Power

LaPlante-Choate Mfg. Co. (See page 116)
Cedar Rapids, Ia.
Sasgen Derrick Co. (See page 117)
3101 Grand Ave., Chicago, Ill.

Door Controls

Omerberg Door Control Co.
411 Merrill Bldg., Milwaukee, Wis.

Door Hangers—Barn

McKinney Mfg. Co. (See page 12)
Metropolitan and Liverpool Sts., Pitts-
burgh, Pa.

Door Mats—Steel

McKinney Mfg. Co. (See page 12)
Metropolitan and Liverpool Sts., Pitts-
burgh, Pa.

Doors—Cleanout

Indiana Foundry Co. (See page 111)
Indiana, Pa.
Sykes Metal Lath & Roofing Co.
Niles, O. (See page 87)

Doors—Coal Chute

Sykes Metal Lath & Roofing Co.
Niles, O. (See page 87)

Doors—Fire

Coburn Trolley Track Manufacturing Co.
Holyoke, Mass.
Merchant & Evans Co.
2035 Washington Ave., Philadelphia, Pa.

Richards-Wilcox Manufacturing Co.
Aurora, Ill. (See page 101)

Victor Manufacturing Co.
Newburyport, Mass.
The Willis Manufacturing Co.
Galesburg, Ill.

Doors—Fireproof

The Compound & Pyrono Door Co.
1104 Broad St., St. Joseph, Mich.
Thorp Fire Proof Door Co.
1600-1610 Central Ave., Minneapolis, Minn.

Doors—Hollow Metal

Dahlstrom Metallic Door Co.
Buffalo and E. 2nd St., Jamestown, N. Y.
J. C. McFarland Co.
LaPorte, Ind.
Solar-Sturges Manufacturing Co.
470 E. Starr Ave., Columbus, O.
J. P. Sprague Co.
708 Mutual Bldg., Kansas City, Mo.

Doors—Revolving

Revolving Doors, Inc.
556 W. 27th St., New York, N. Y.

Doors—Sidewalk

Empire Metal Tank Works
East Rochester, N. Y.

Doors—Softwood

The Long-Bell Lumber Co. (See page 108)
Kansas City, Mo.

Doors—Steel Rolling

The Kinnear Manufacturing Co.
250 Field Ave., Columbus, O.

Doors—Veneered

The Compound & Pyrono Door Co.
1104 Broad St., St. Joseph, Mich.

Drainers—Cellar

Penberthy Injector Co.
1242 Holden Ave., Detroit, Mich.

Drilling Machinery

The American Well Works
Aurora, Ill.
Wodack Electric Tool Corp.
23-27 S. Jefferson St., Chicago, Ill.

Dryers—Clothes

Hill Clothes Dryer Co.
40 Central St., Worcester, Mass.
Rollyn Hawkins Furnace Co.
950 E. Maryland St., Indianapolis, Ind.

Dumbwaiters

Capital Lift & Mfg. Co.
209 S. High St., Columbus, O.
Energy Elevator Co.
214-18 New St., Philadelphia, Pa.
Highwood Dumbwaiter Co.
Closter, N. J.
Imperial Mfg. Co.
234 W. 4th St., Williamsport, Pa.
Kimball Bros. Co. (See page 101)
Council Bluffs, Ia.
Sedgwick Machine Works. (See page 118)
157 W. 15th St., New York, N. Y.
Sidney Elevator Manufacturing Co.
Sidney, O.
J. G. Speidel (See page 118)
245 W. Buttonwood St., Reading, Pa.

Dumps—Ash

Indiana Foundry Co. (See page 111)
Indiana, Pa.
Maroa Manufacturing Co. ("Boss")
Maroa, Ill.

Dye—Wood

S. C. Johnson & Son. (See page 79)
Racine, Wis.

Elbows—Exhaust Pipe

The F. Dieckmann Co.
1180 Harrison Ave., Cincinnati, O.

Electrical Supplies

Benjamin Electric Mfg. Co.
847 W. Jackson Blvd., Chicago, Ill.
Buffalo Fuse Corporation
752 Main St., Buffalo, N. Y.
Bussmann Mfg. Co.
3819 N. 23rd St., St. Louis, Mo.
Chicago Fuse Manufacturing Co.
Lafin and 15th Sts., Chicago, Ill.
Monarch Refillable Fuse Co.
Jamestown, N. Y.

Elevating Machinery

Kimball Bros. Co. (See page 101)
Council Bluffs, Ia.
Sedgwick Machine Works. (See page 118)
157 W. 15th St., New York, N. Y.

Elevator Accessories

Elevator Supplies Co., Inc.
1515 Willow Ave., Hoboken, N. J.

Elevators—Building Material

C. H. & E. Manufacturing Co., Inc.
Clinton and Mineral Sts., Milwaukee, Wis.
(See page 96)
Sasgen Derrick Co. (See page 117)
3101 Grand Ave., Chicago, Ill.
J. G. Speidel. (See page 118)
245 W. Buttonwood St., Reading, Pa.

Elevators—Cup

A. F. Meyer Manufacturing Co.
340 Walnut St., Morton, Ill.

Elevators—Freight

Kimball Bros. Co. (See page 101)
Council Bluffs, Ia.
Ohio Elevator & Machine Co.
Curtis and Jefferson Ave., Columbus, O.
Otis Elevator Co.
260 11th Ave., New York, N. Y.
Sidney Elevator Mfg. Co.
Sidney, O.
Warner Elevator Mfg. Co.
2600 Spring Grove Ave., Cincinnati, O.
Warsaw Elevator Co.
Warsaw, N. Y.

Elevators—Grain

Camp Manufacturing Co.
Washington, Ill.
G. & D. Manufacturing Co.
Streator, Ill.
The Meadows Manufacturing Co.
Bell and McClun Sts., Bloomington, Ill.
Morton Corporation
600 Meyer Block, Morton, Ill.

Elevators—Hand

The Kerscher Elevator Co.
918 Michigan St., Toledo, O.
Kimball Bros. Co. (See page 101)
Council Bluffs, Ia.
Sedgwick Machine Works. (See page 118)
157 W. 15th St., New York, N. Y.
The Storm Mfg. Co.
50 Vesey St., Newark, N. J.

Elevators—Sidewalk

Kimball Bros. Co. (See page 101)
Council Bluffs, Ia.

Enamels

Carpenter-Morton Co.
77 Sudbury St., Boston, Mass.
Cheesman-Elliott Co., Inc.
23 Flatbush Ave., Brooklyn, N. Y.
S. C. Johnson & Son. (See page 79)
Racine, Wis.
R. F. Johnston Paint Co.
205 E. Pearl St., Cincinnati, O.
Standard Varnish Works
443 Fourth Ave., New York, N. Y.
The Tropical Paint & Oil Co.
1246 W. 70th St., Cleveland, O.

Engines—Gasoline

Fuller & Johnson Mfg. Co.
1342 Washington Ave., Madison, Wis.
Hardin-Lavin Co. (See page 118)
4522 Cottage Grove Ave., Chicago, Ill.
Hercules Corporation, The
7 Morton St., Evansville, Ind.
Milwaukee Locomotive Mfg. Co.
Bellevue Pl. and River, Milwaukee, Wis.
New Way Motor Co. (See page 110)
Lansing, Mich.
Novo Engine Co.
702 Porter St., Lansing, Mich.
Witte Engine Works
16th and Oakley, Kansas City, Mo.

Engines—Kerosene

Hardin-Lavin Co. (See page 118)
4522 Cottage Grove Ave., Chicago, Ill.
Ottawa Manufacturing Co.
Ottawa, Kan.
Worthington Pump & Machinery Corp.
162 Holthoff Pl., Cudahy, Wis.

Engineers—Inspecting and Testing

Pittsburgh Testing Laboratory
Box 1115, 7th and Bedford Ave., Pitts-
burgh, Pa.

BUYER'S GUIDE—Continued

Equipment—Barn

Franklin Barn Equipment Co.
Box 627, Monticello, Ia.
Glor Brothers & Willis Manufacturing Co.
Main Street, Attica, N. Y.
Hudson Mfg. Co.
324 Third Ave., N., Minneapolis, Minn.
Ideal Barn Equipment Co.
Horicon, Wis.
C. A. Libbey Co.
Oshkosh, Wis.
James Manufacturing Co.
Fort Atkinson, Wis.
The Klinzing Barn Equipment Co.
New Holstein, Wis.
J. E. Porter Corporation
491 Guion St., Ottawa, Ill.
Stanley C. Swift Mfg. Co.
Water St., Cuba, N. Y.

Equipment—Concrete Handling

Inslay Manufacturing Co.
E. St. Clair and Olney Sts., Indianapolis, Ind.

Equipment—Welding and Cutting

Carbic Manufacturing Co.
Duluth, Minn.

Estimating Blanks

Frank R. Walker Co. (See page 116)
536 Lake Shore Drive, Chicago, Ill.

Excavators

Koehring Co. (See page 97)
31st and Concordia, Milwaukee, Wis.

Explosives

Equitable Powder Manufacturing Co.
East Alton, Ill.
Giant Powder Co.
First Nat'l Bank Bldg., San Francisco, Cal.
Grasselli Powder Co.
Guardian Bldg., Cleveland, O.
Hercules Powder Co.
Wilmington, Del.
The Trojan Powder Co.
Hunsicker Bldg., Allentown, Pa.

Extinguishers—Fire

Foamite-Childs Corporation
Utica, N. Y.
Globe Automatic Sprinkler Co.
2035 Washington Ave., Philadelphia, Pa.
Phoenix Fire Extinguishing Co.
11 Grove St., Norwich, Conn.

Fans—Electric

General Electric Co. (See page 81)
Schenectady, N. Y.

Fans—Ventilating

American Blower Co.
6004 Russell St., Detroit, Mich.
General Electric Co. (See page 81)
Schenectady, N. Y.
Hersh Brothers Co.
Mill St., Allentown, Pa.
B. F. Sturtevant Co.
Damon St., Hyde Park, Boston, Mass.

Felts

The Lehon Co. (See page 109)
44th St., on Oakley Blvd., Chicago, Ill.
Richardson Co., Lockland
Cincinnati, O.

Fence Posts—Steel

Carbo Steel Products Co.
2600 W. 111th St., Chicago, Ill.

Fence Posts—Wood

Hall Brothers Cedar Co.
519 El Paso St., Jacksonville, Tex.

Fences—Iron and Steel

Anchor Post Iron Works
50 Church St., New York, N. Y.
Cincinnati Iron Fence Co.
3300 Spring Grove Ave., Cincinnati, O.
Enterprise Iron Works
24th and Yandes Sts., Indianapolis, Ind.
Kokomo Fence Manufacturing Co.
Kokomo, Ind.
The Fred J. Meyers Mfg. Co.
Hamilton, O.
Page Steel & Wire Co.
929 Connecticut Ave., Bridgeport, Conn.
The Stewart Iron Works Co.
Cincinnati, O.

Fences—Woven Wire

Gilbert & Bennett Mfg. Co. (See page 119)
First Nat'l Bank Bldg., Chicago, Ill.
The Knapp Fence Co.
1148 E. 134th St., Cleveland, O.

Filler—Joint

Compo-Board Co. (See page 109)
5777 Lyndale Ave., E., Minneapolis, Minn.

Filler—Paint

S. C. Johnson & Son. (See page 79)
Racine, Wis.

Filler—Wood

S. C. Johnson & Son. (See page 79)
Racine, Wis.
S. E. M. Rice Filler Co.
41 40th St., Irvington, N. J.

Filters

Everson Filter Co.
70 W. Lake St., Chicago, Ill.

Filtration Systems

Graver Corporation
4809 Todd Ave., East Chicago, Ind.

Finish—Wall

Celotex Products Co. (See page 92)
Conway Bldg., Chicago, Ill.
S. C. Johnson & Son. (See page 79)
Racine, Wis.
Keystone Varnish Co.
71 Otsego St., Brooklyn, N. Y.

Finish—Wood

S. C. Johnson & Son. (See page 79)
Racine, Wis.
The Marietta Paint & Color Co.
Marietta, O.

Fireplaces

Grand Rapids Marble & Fireplace Co.
New Keeler Bldg., Grand Rapids, Mich.
Edwin A. Jackson & Bro., Inc.
50 Beekman St., New York, N. Y.
Chas. F. Lorenzen Co.
521 W. Monroe St., Chicago, Ill.

Fireplace Furnishings

Colonial Fireplace Co. (See page 111)
4611 Roosevelt Rd., Chicago, Ill.
Peerless Manufacturing Co.
15th and Ormsby Sts., Louisville, Ky.
Stover Mfg. & Engine Co.
Henderson St., Freeport, Ill.

Fittings—Conduit

Appleton Electric Co.
1701-13 Wellington Ave., Chicago, Ill.

Fixtures—Lighting

Beardslee Chandelier Mfg. Co.
216 S. Jefferson St., Chicago, Ill.
Duplex Lighting Works of General Electric Co.
6 W. 48th St., New York, N. Y.
Falkenback Mfg. Co., Inc.
429 Whitlock Ave., New York, N. Y.
General Electric Co. (See page 81)
Schenectady, N. Y.
Lightolier Co.
569 Broadway, New York, N. Y.
The Reflectolite Co.
914 Pine St., St. Louis, Mo.
The Edward N. Riddle Co.
27 Broadway, Toledo, O.
Shapiro & Aronson, Inc.
20 Warren St., New York, N. Y.

Fixtures—Plumbing

Bradley Washfountain Co.
413-419 Third St., Milwaukee, Wis.
B. Karol & Sons Co. (See page 118)
808 S. Kedzie Ave., Chicago, Ill.
Kohler Co.
Kohler, Wis.
Thomas Maddock's Sons Co.
Ewing St., Trenton, N. J.
The J. L. Mott Iron Works
Lalor and Hancock Sts., Trenton, N. J.
Standard Sanitary Manufacturing Co.
Bessemer Bldg., Pittsburgh, Pa.
The Trenton Potteries Co.
N. Clinton Ave. and Ott St., Trenton, N. J.

Fixtures—Store

Robert Brand & Sons Co.
Cape and Court Sts., Oshkosh, Wis.
J. Peterson Co.
25th St. and 4th Ave., Rock Island, Ill.

Flag Poles

Newark Steel Post Co.
West Orange, N. J.

Flashings—Copper

Taunton-New Bedford Copper Co.
Taunton, Mass.

Floor Cleaners

American Floor Surfacing Machine Co.
515 S. St. Clair St., Toledo, O.
(See page 8)

Floor Polish

The Butcher Polish Co.
245 State St., Boston, Mass.

Floor Polishing Machines

American Floor Surfacing Machine Co.
515 S. St. Clair St., Toledo, O.
(See page 8)
Cavicchi Polishing Machinery Co.
62-68 Walnut St., Neponset, Boston, Mass.
Wayvell-Chappell & Co. (See page 117)
40 N. Jackson St., Waukegan, Ill.

Floor Scraper Blades

Fox Supply Co. ("Fox")
Brooklyn, Wis.

Floor Scrapers

American Floor Surfacing Machine Co.
515 S. St. Clair St., Toledo, O.
(See page 8)
Fox Supply Co. ("Fox")
Brooklyn, Wis.
G. J. Kepplinger
Dwight, Ill.

M. L. Schleuter. (See page 117)
222 W. Illinois St., Chicago, Ill.

Floor Scrubbers

American Floor Surfacing Machine Co.
515 S. St. Clair St., Toledo, O.
(See page 8)
Electric Rotary Machine Co. (See page 117)
32-40 S. Clinton St., Chicago, Ill.

Floor Waxer

American Floor Surfacing Machine Co.
515 S. St. Clair St., Toledo, O.
(See page 8)

Flooring—Built Up

Carter Bloxonend Flooring Co.
R. A. Long Bldg., Kansas City, Mo.

Flooring—Composition

American Magnestone Co. (See page 118)
Springfield, Ill.
Corkstone Products Corp.
119-23 N. Collington Ave., Baltimore, Md.
Flexotile Floor Co.
719 Race St., Rockford, Ill.
Imperial Floor Co., Inc.
59 Halstead St., Rochester, N. Y.
The Marbleloid Co.
461 Eighth Ave., New York, N. Y.
Franklyn R. Muller & Co. (See page 104)
Waukegan, Ill.
National Kellastone Co. (See page 109)
155 E. Superior St., Chicago, Ill.
The Robbond Co. (See page 6)
Van Wert, O.
Special Service Flooring Corporation
2039 Grand Central Terminal, New York, N. Y.

Flooring—Factory

The Jennison-Wright Co.
2463 Broadway, Toledo, O.
Oak Flooring Manufacturers' Association
1014 Ashland Block, Chicago, Ill.
(See page 106)

Flooring—Fireproof

Franklyn R. Muller & Co. (See page 104)
Waukegan, Ill.

Flooring—Hardwood

E. L. Bruce Co.
Memphis, Tenn.
Exchange Sawmills Sales Co.
1116 R. A. Long Bldg., Kansas City, Mo.
The Long-Bell Lumber Co. (See page 108)
Kansas City, Mo.
Maple Flooring Manufacturers' Association
Stock Exchange Bldg., Chicago, Ill.
Oak Flooring Manufacturers' Association
1014 Ashland Block, Chicago, Ill.
(See page 106)

Flooring—Mosaic

Wood Mosaic Co. (See page 108)
New Albany, Ind.

Write the manufacturers or NATIONAL BUILDER for further information

BUYER'S GUIDE — Continued

Flooring—Parquetry

Oak Flooring Manufacturers' Association
1014 Ashland Block, Chicago, Ill.
(See page 106)
Wood-Mosaic Co. (See page 108)
New Albany, Ind.

Flooring—Plastic

American Magnestone Co. (See page 118)
Springfield, Ill.

Flooring—Rubber Tile

Monatiquot Rubber Works Co.
Hancock St., South Braintree, Mass.
W. H. Salisbury & Co., Inc.
308-310 W. Madison St., Chicago, Ill.

Flooring—Sanitary

Asbestolith Manufacturing Co.
1 Madison Ave., New York, N. Y.
Chas. F. Lorenzen Co.
521 W. Monroe St., Chicago, Ill.

Flooring—Sub-Floor

Bishopric Manufacturing Co.
3 Este Ave., Cincinnati, O.
(“Bishopric”—See page 1)

Flooring—Terrazzo

Franklyn R. Muller & Co. (See page 104)
Waukegan, Ill.

Flooring—Tile

Chas. F. Lorenzen Co.
521 W. Monroe St., Chicago, Ill.
National Floor Tile Co.
P. O. Box 184, Mobile, Ala.
Forete Mfg. Co.
26 Verona Ave., Newark, N. J.

Flooring—Wood Block

The Long-Bell Lumber Co. (See page 108)
Kansas City, Mo.

Floors—Wood

American Magnestone Co. (See page 118)
Springfield, Ill.
Exchange Sawmills Sales Co.
1116 R. A. Long Bldg., Kansas City, Mo.
The Long-Bell Lumber Co. (See page 108)
Kansas City, Mo.
Oak Flooring Manufacturers' Association
1014 Ashland Block, Chicago, Ill.
(See page 106)

Forms—Concrete Construction

Blaw-Knox Co.
Box 915, Pittsburgh, Pa.
Collapsible Joist Form Co.
505 Finance Bldg., Kansas City, Mo.
Concrete Engineering Co. (See page 108)
Omaha, Nebr.
Davis Engineering Co.
159 Clinton St., Schenectady, N. Y.
M-M Building System, Inc.
133 Main St., Salamanca, N. Y.
Metal Forms Corp.
1440 Booth St., Milwaukee, Wis.

Fountains—Bubbling

B. Karol & Sons Co. (See page 118)
808 S. Kedzie Ave., Chicago, Ill.

Frames—Barn

Andersen Lumber Co. (See page 4)
South Stillwater, Minn.

Frames—Building

Andersen Lumber Co. (See page 4)
South Stillwater, Minn.

Frames—Cellar Sash

Andersen Lumber Co. (See page 4)
South Stillwater, Minn.

Frames—Door

Andersen Lumber Co. (See page 4)
South Stillwater, Minn.

Frames—Sash

Andersen Lumber Co. (See page 4)
South Stillwater, Minn.
Anderson Manufacturing Co.
Louisville, Ky.

Frames—White Pine

Andersen Lumber Co. (See page 4)
South Stillwater, Minn.

Frames—Window

Andersen Lumber Co. (See page 4)
South Stillwater, Minn.
C. W. Hodgen
2211 Troost Ave., Kansas City, Mo.

Fronts—Store

Brasco Manufacturing Co.
5025 S. Wabash Ave., Chicago, Ill.
(“Brasco”—See page 11)
Detroit Show Case Co. (See page 94)
1652-94 W. Fort St., Detroit, Mich.

Furnaces

Bovee Furnace Works. (See page 111)
Waterloo, Ia.
The Excelsior Steel Furnace Co.
118 S. Clinton St., Chicago, Ill.
The Globe Stove & Range Co.
Kokomo, Ind.
Green Foundry & Furnace Works
Third and Elm Sts., Des Moines, Ia.
Hero Furnace Co. (See page 10)
DeKalb Avenue, Sycamore, Ill.
Holland Furnace Co.
Holland, Mich.
Home Furnace Co.
Holland, Mich.
Homer Furnace Co.
S. Clay St., Coldwater, Mich.
Illinois Malleable Iron Co.
1801 Diversey Blvd., Chicago, Ill.
International Heater Co.
101 Park Ave., Utica, N. Y.
Keith Furnace Co.
336 S. W. 11th St., Des Moines, Ia.
Modern Way Furnace Co.
221 E. Berry St., Fort Wayne, Ind.
The Monitor Stove Co.
Woodrow St., Cincinnati, O.
National Warm Air Heating & Ventilating
Assn.
52 W. Gay St., Columbus, O.
Rudy Furnace Co.
Dowagiac, Mich.
Standard Heater Co.
453 N. Racine Ave., Chicago, Ill.
Taplin Furnace Co.
21 Sheldon Ave., N. E., Grand Rapids,
Mich.
Tubular Heating & Ventilating Co.
232 Quarry St., Philadelphia, Pa.
The Wise Furnace Co.
Akron, O.

Garage Hardware

The Griffin Mfg. Co. (See pages 100, 110)
Erie, Pa.
Hunt-Helm-Ferris & Co.
Harvard, Ill.
McKinney Mfg. Co. (See page 12)
Metropolitan and Liverpool Sts., Pitts-
burgh, Pa.

Garage Sets

McKinney Mfg. Co. (See page 12)
Metropolitan and Liverpool Sts., Pitts-
burgh, Pa.

Garages

Asbestos Shingle, Slate & Sheathing Co.
Ambler, Pa. (See inside front cover)
International Steel & Iron Co. (See page 106)
1239 Edgar St., Evansville, Ind.
Milwaukee Corrugating Co.
36th Ave. and Burnham St., Milwaukee,
Wis. (See inside back cover)

Gasoline Motors

New Way Motor Co. (See page 110)
Lansing, Mich.

Generators—Gas

Night Commander Lighting Co.
304 S. Milwaukee St., Jackson, Mich.

Glass—Ornamental

Rawson & Evans Co.
710-712 W. Washington Blvd., Chicago, Ill.

Glass—Plate

Plate Glass Mfrs. of America
1307 First Nat'l Bank Bldg., Pittsburgh, Pa.

Glassware—Illuminating

Pittsburgh Lamp, Brass & Glass Co.
Cor. Liverpool and Oxlone, Pittsburgh, Pa.

Glue—Waterproof

Monite Waterproof Glue Co.
1628 N. Second St., Minneapolis, Minn.

Glues

L. W. Ferdinand & Co.
152 Kneeland St., Boston, Mass.

Granite

National Building Granite Quarries Assn.
31 State St., Boston, Mass.
The Northern Granite & Stone Co.
739 Hanna Bldg., Cleveland, O.

Grates—Fireplace

Colonial Fireplace Co. (See page 111)
4611 Roosevelt Rd., Chicago, Ill.

Greenboards

The Beaver Products Co., Inc.
Buffalo, N. Y.

Grilles

Bertelsen Adjustable Grille Co. (See page 119)
2117 S. Troy St., Chicago, Ill.
The Hart & Cooley Co., Inc.
New Britain, Conn.
Tuttle & Bailey Mfg. Co.
2 W. 45th St., New York, N. Y.

Grinders—Disk

Crescent Machine Co.
Leetonia, O. (“Crescent”—See page 112)

Grinders—Tool

S. Cheney & Son. (See page 110)
Box 37, Manlius, N. Y.
Luther Grinder Mfg. Co.
285 S. Water St., Milwaukee, Wis.
Wisconsin Electric Co.
16th St. and Junction Ave., Racine, Wis.

Guards—Window

Gilbert & Bennett Mfg. Co. (See page 119)
First Nat'l Bank Bldg., Chicago, Ill.

Gutters—Copper

Taunton-New Bedford Copper Co.
Taunton, Mass.

Gypsum Products

J. B. King & Co.
322 W. Genesee St., Buffalo, N. Y.
United States Gypsum Co. (See page 95)
205 W. Monroe St., Chicago, Ill.

Hair Insulation

H. W. Johns-Manville Co.
41st and Madison Ave., New York, N. Y.

Hangers—Clothes

Knappe & Vogt Co.
600 Richmond St., Grand Rapids, Mich.
Lawson Mfg. Co.
230 W. Superior St., Chicago, Ill.
Nickerson Mfg. Co.
600 Grainger St., Knoxville, Tenn.

Hangers—Door

Allith-Prouty Co.
Danville, Ill. (“Allith”—See page 113)
Hunt, Helm, Ferris & Co.
Harvard, Ill.
McKinney Mfg. Co. (See page 12)
Metropolitan and Liverpool Sts., Pitts-
burgh, Pa.
F. E. Meyers & Bro. Co. (See page 113)
Ashland, O.
Richards-Wilcox Manufacturing Co.
Aurora, Ill. (See page 101)

Hangers—Eave Trough

Mercer Manufacturing Co.
Mercer, Pa.

Hangers—Screen

National Mfg. Co. (See back cover)
Sterling, Ill.

Hangers—Storm Sash

National Mfg. Co. (See back cover)
Sterling, Ill.

Hardeners—Concrete

The Sandusky Cement Co. (See page 93)
6026 Engineers Bldg., Cleveland, O.
L. Sonneborn Sons, Inc.
260 Pearl St., New York, N. Y.

Hardeners—Floor

Aquabar Waterproofing Products
428 Perry Bldg., Philadelphia, Pa.
Cal Chemical Co.
First Nat'l Bank Bldg., Hagerstown, Md.
General Chemical Co.
40 Recta St., New York, N. Y.
General Fireproofing Co. (See page 103)
Youngstown, O.
Master Builders Co.
1836 Euclid Ave., Cleveland, O.
The Truscon Laboratories
Ganiff and G. T. R. R., Detroit, Mich.

When writing manufacturers, mention NATIONAL BUILDER'S Buyers' Guide

BUYER'S GUIDE—Continued

Hardware—Casement

Carrier Adjuster Co.
Biltmore, N. C.
The Casement Hardware Co.
230 E. Ohio St., Chicago, Ill.
Andrew Hoffman Manufacturing Co.
906 Steger Bldg., Chicago, Ill.
Monarch Metal Products Co. ("Monarch")
5020 Penrose St., St. Louis, Mo.
Richards-Wilcox Manufacturing Co.
Aurora, Ill. (See page 101)

Hardware—Door

Bayer-Gardner-Himes Co.
101 Park Ave., New York, N. Y.
P. & F. Corbin
Park St., New Britain, Conn.
National Mfg. Co.
Sterling, Ill. (See back cover)
The Consolidated Iron-Steel Mfg. Co.
1290 E. 53rd St., Cleveland, O.
(Builders' Hardware Division)
Nicholas Hardware Co. (See pages 102, 119)
121 Marion St., Oak Park, Ill.
Richards-Wilcox Mfg. Co.
Aurora, Ill. (See page 101)

Hardware—Fire Door

Allith-Prouty Co.
Danville, Ill. ("Allith"—See page 113)
Richards-Wilcox Mfg. Co.
Aurora, Ill. (See page 101)
Victor Mfg. Co.
Newburyport, Mass.

Hardware—Garage

Albany Hardware Spec. Mfg. Co.
Albany, Pa.
Allith-Prouty Co.
Danville, Ill. ("Allith"—See page 113)
The Loudon Machinery Co.
Fairfield, Ia.
McKinney Mfg. Co. (See page 12)
Metropolitan and Liverpool Sts., Pittsburgh, Pa.
National Mfg. Co.
Sterling, Ill. (See back cover)
Richards-Wilcox Mfg. Co.
Aurora, Ill. (See page 101)
The Topping Mfg. Co.
246 E. 4th St., Ashland, O.

Hardware—Screen

McKinney Mfg. Co. (See page 12)
Metropolitan and Liverpool Sts., Pittsburgh, Pa.
National Mfg. Co.
Sterling, Ill. (See back cover)

Hardware—Silo

The Pierce Co.
930 Wyandotte St., Kansas City, Mo.

Hardware—Window

The Williams Pivot Sash Co.
E. 57th St. at Perkins Ave., Cleveland, O.

Hinges—Door

The Griffin Mfg. Co.
Erie, Pa. (See pages 100, 110)

Heaters—Concrete Mixer

Aeroil Burner Co., Inc.
266-270 Hudson Ave., Union Hill, N. J.
Hauck Mfg. Co.
10th and 11th Sts., Brooklyn, N. Y.

Heaters—Electric

Strait & Richards, Inc. (See page 111)
Fabyan Pl. and Selva St., Newark, N. J.

Heaters—Fireplace

Strait & Richards, Inc. (See page 111)
Fabyan Pl. and Selva St., Newark, N. J.

Heaters—Garage

Superior Mfg. Co.
Liverpool St., Pittsburgh, N. S., Pa.
Thatcher Furnace Co.
135 W. 35th St., New York, N. Y.

Heaters—Gas

American Heater Corp.
1100 N. 6th St., St. Louis, Mo.
General Gas Light Co.
Cor. Park and Water Sts., Kalamazoo, Mich.
Pittsburgh Water Heater Co.
Box 1109, Pittsburgh, Pa.

Heaters—Water

Automatic Electric Heater Co.
Warren, Pa.
Bastian-Morley Co.
401 Tylor St., LaPorte, Ind.

Economy Heater Co.

108 S. La Salle St., Chicago, Ill.
The Hercules Mfg. Co.
711 Cherry St., Chattanooga, Tenn.
Humphrey Co.
501 N. Rose St., Kalamazoo, Mich.
Hoffman Heater Co.
Lorain, O.
New Detroit Heater Co.
3957 Grand River Ave., Detroit, Mich.
Patterson-Kelley Co., Inc.
101 Park Ave., New York, N. Y.
Ruud Mfg. Co.
444 Oliver Ave., Pittsburgh, Pa.
S. Wilkes Mfg. Co. (See page 118)
3525 Shields Ave., Chicago, Ill.

Heating Plants—Hot Air Furnace

Bovee Furnace Works
Waterloo, Ia. (See page 111)
Campbell Heating Co.
1313 Locust St., Des Moines, Ia.
Chattanooga Roofing & Foundry Co.
Chattanooga, Tenn.
Hero Furnace Co.
Sycamore, Ill. (See page 10)

Heating Plants—Hot Water

Andrews Heating Co.
2529 University Ave., S. E. Minneapolis, Minn. ("Andrews"—See page 119)
Chandler Heater Co.
12th Ave. and 12th St. W., Cedar Rapids, Ia.

Heating Plants—Pipeless Furnace

Andrews Heating Co.
2529 University Ave., S. E., Minneapolis, Minn. ("Boiler Plate"—See page 119)
Bovee Furnace Works
Waterloo, Ia. ("Bovee"—See page 111)
Hero Furnace Co.
Sycamore, Ill. (See page 10)
The Williamson Heater Co.
335 W. 5th Ave., Cincinnati, O.

Heating Plants—Steam

American District Steam Co.
North Tawanda, N. Y.
American Radiator Co.
104 W. 42nd St., New York, N. Y.
Andrews Heating Co.
2529 University Ave., S. E., Minneapolis, Minn. ("Andrews"—See page 119)
McAlear Mfg. Co.
1901 S. Western Ave., Chicago, Ill.
Warren Webster & Co.
Point and Pearl Sts., Camden, N. J.

Heating Supplies

Federal Stamping Co.
Holland, Mich.
Globe Machinery & Supply Co.
205-211 W. Court Ave., Des Moines, Ia.
Hero Furnace Co.
Sycamore, Ill. (See page 10)
Hoffman Specialty Co.
29 Field St., Waterbury, Conn.
B. Karol & Sons Co. (See page 118)
808 S. Kedzie Ave., Chicago, Ill.

Heating Supplies—Air Washer

Hero Furnace Co.
Sycamore, Ill. (See page 10)

Hinges—Butt

The Griffin Mfg. Co.
Erie, Pa. (See pages 100, 110)
National Mfg. Co.
Sterling, Ill. (See back cover)
McKinney Mfg. Co. (See page 12)
Metropolitan and Liverpool Sts., Pittsburgh, Pa.

Hinges—Floor

National Mfg. Co.
Sterling, Ill. (See back cover)

Hinges—Gate

National Mfg. Co.
Sterling, Ill. (See back cover)

Hinges—Ornamental

The Griffin Mfg. Co.
Erie, Pa. (See pages 100, 110)

Hinges—Screen Door

National Mfg. Co.
Sterling, Ill. (See back cover)

Hinges—Spring

Allith-Prouty Co.
Danville, Ill. ("Allith"—See page 113)
Bommer Spring Hinge Co.
250-272 Classon Ave., Brooklyn, N. Y.
Chicago Spring Butt Co.
1500 Carroll Ave., Chicago, Ill.

Hinges—Steel

Nicholas Hardware Co. (See pages 102, 119)
121 Marion St., Oak Park, Ill.

Hinges—T and Strap

The Griffin Mfg. Co.
Erie, Pa. (See pages 100, 110)

Hoists

The Brown Clutch Co.
1737 Camp St., Sandusky, O.
Buffalo Hoist & Derrick Co.
30 Church St., New York, N. Y.
Patten Mfg. Co.
Chattanooga, Tenn.

Hoists—Chain

Reading Chain & Block Corp.
2140 Adams St., Reading, Pa.
J. G. Speidel (See page 118)
245 W. Buttonwood St., Reading, Pa.

Hoists—Electric

American Cement Machine Co.
Keokuk, Ia. (See page 117)
C. H. & E. Mfg. Co., Inc.
Clinton and Mineral Sts., Milwaukee, Wis. (See page 96)
Gillis & Geoghegan
537 W. Broadway, New York, N. Y.
Kimball Bros. Co.
Council Bluffs, Ia. (See page 101)
O. K. Clutch & Machinery Co.
Florence and Barber Sts., Columbia, Pa.
Reading Chain & Block Corp.
2140 Adams St., Reading, Pa.
Stanley Hoist & Machine Co.
1 Union St., Jersey City, N. J.

Hoists—Friction

American Cement Machine Co.
Keokuk, Ia. (See page 117)

Hoists—Gasoline

American Cement Machine Co.
Keokuk, Ia. (See page 117)
American Saw Mill Machinery Co.
Hackettstown, N. J.
("American"—See page 102)
C. H. & E. Mfg. Co., Inc. (See page 96)
Clinton and Mineral Sts., Milwaukee, Wis.

House Lining

The Lehon Co. (See page 109)
44th St. on Oakley Blvd., Chicago, Ill.

House Models—Cardboard

Architectural House Planning Service Co.
20 S. 18th St., Philadelphia, Pa.
(See page 115)

House Plans

American Face Brick Assn. (See page 3)
130 N. Wells St., Chicago, Ill.
Common Brick Mfg. Assn. (See page 89)
2121 Discount Bldg., Cleveland, O.
Keith's Corp. (See page 116)
541 Albany Bldg., Minneapolis, Minn.
Kin-Wi-Co. Homes System
P. O. Box 313, Middletown, N. Y.
Portland Cement Assn. (See page 103)
111 W. Washington St., Chicago, Ill.
E. W. Stillwell (See page 116)
911 California Bldg., Los Angeles, Cal.
Gordon M. Tamblin (See page 115)
Sweeney Bldg., Denver, Colo.

Hot Water Heaters

S. Wilkes Mfg. Co. (See page 118)
3525 Shields Ave., Chicago, Ill.

Ice Chests

Herrick Refrigerator Co. (See page 105)
6th and River Sts., Waterloo, Ia.

Icing Attachments—Outside

Herrick Refrigerator Co. (See page 105)
6th and River Sts., Waterloo, Ia.

Incinerators

Kerner Incinerator Co. (See page 5)
1027 Chestnut St., Milwaukee, Wis.
E. C. Stearns & Co.
224 Oneida St., Syracuse, N. Y.

Ink Stands

Kolesch Co. (See page 116)
138 Fullerton St., New York, N. Y.

Inserts—Concrete

Kohler Die & Specialty Co.
1239 Lincoln Highway, De Kalb, Ill.

If you don't see what you want, write to NATIONAL BUILDER for it

BUYER'S GUIDE — Continued

Instruments—Drawing

A. S. Aloe Co. (See page 107)
513 Olive St., St. Louis, Mo.
American Lead Pencil Co.
220 5th Ave., New York, N. Y.
Cardinal Vellum Mfg. Co.
15 Label St., Montclair, N. J.
Geier & Blunn
670 River St., Troy, N. Y.
Hoffman Drawing Stand Co.
281 Meigs St., Rochester, N. Y.
F. Weber Co.
1220 Buttonwood St., Philadelphia, Pa.
David White Co., Inc.
905 Chestnut St., Milwaukee, Wis.
("White's Improved"—See page 113)

Instruments—Surveying

A. S. Aloe Co. (See page 107)
513 Olive St., St. Louis, Mo.
L. Beckmann Co. (See page 116)
100 Adams St., Toledo, O.
Leupold Voelpel & Co.
107 E. 70th St., N., Portland, Ore.
Warren-Knight Co. (See page 116)
136 N. 12th St., Philadelphia, Pa.
Wissler Instrument Co. (See page 117)
627 N. Broadway, St. Louis, Mo.
David White Co., Inc.
905 Chestnut St., Milwaukee, Wis.
("White's Improved"—See page 113)

Insulating Lumber

Banner Rock Products Co.
Alexandria, Ind.
Celotex Products Co. (See page 92)
Conway Bldg., Chicago, Ill.

Jacks—House Moving

LaPlante-Choate Mfg. Co.
Cedar Rapids, Ia. (See page 116)

Jointers—Woodworking

Hutchinson Mfg. Co.
Norristown, Pa.
The Woodworker Mfg. Co. (See page 99)
612 Brush St., Detroit, Mich.

Joists—Pressed Steel

Central Steel Co.
Massillon, O. ("National")

Kickplates—Brass

Brasco Mfg. Co. (See page 11)
5025 S. Wabash Ave., Chicago, Ill.
Detroit Show Case Co. (See page 94)
1652-94 W. Fort St., Detroit, Mich.

Kitchenettes

La Grange Fixtures Corp.
La Grange, Ind. ("Kozy-Kitch")

Kitchens—Steel

Frank S. Betz Co.
Hammond, Ind. ("Betzco")
Bisk Corp.
Box 988, Campello Sta., Brockton, Mass.
Murphy Door Bed Co. (See page 83)
22 W. Monroe St., Chicago, Ill.

Knives—Machine

Lancaster Machine & Knife Works
Court St., Lancaster, N. Y.
The L. & J. White Co.
143 Perry St., Buffalo, N. Y.
Whisler Mfg. Co.
515 W. Main St., Ottumwa, Ia.

Ladders

F. E. Meyers & Bro. Co.
Ashland, O. (See page 113)
Tuckaway Folding Ladder Co., Inc.
111 Broadway, New York, N. Y.

Lamps—Electric

General Electric Co.
Schenectady, N. Y. (See page 81)
Lightolier Co.
569 Broadway, New York, N. Y.
Westinghouse Lamp Co.
165 Broadway, New York, N. Y.

Lamps—Floor

Lightolier Co.
569 Broadway, New York, N. Y.

Lamps—Street

General Electric Co.
Schenectady, N. Y. (See page 81)

Latches

National Mfg. Co.
Sterling, Ill. (See back cover)
Sargent & Co. (See page 100)
45 Water St., New Haven, Conn.
Wrightsville Hardware Co.
Water St., Wrightsville, Pa.

Lath

Bishopric Mfg. Co. (See page 1)
3 Este Ave., Cincinnati, O.
Exchange Sawmills Sales Co.
1116 R. A. Long Bldg., Kansas City, Mo.
Sykes Metal Lath & Roofing Co.
Niles, O. (See page 87)

Lath—Metal

Associated Metal Lath Mfrs.
Edison Bldg., Chicago, Ill.
The Bostwick Steel Lath Co.
Niles, O.
Concrete Engineering Co.
Omaha, Neb. (See page 108)
Expanded Metal Engineering Co.
525 W. 33rd St., New York, N. Y.
General Fireproofing Co.
Youngstown, O. (See page 103)
The Goldsmith Metal Lath Co.
S. E. Cor. 3rd and Egglestone Ave., Cincinnati, O.
Milwaukee Corrugating Co.
36th Ave. and Burnham St., Milwaukee, Wis.
(See inside back cover)
North Western Expanded Metal Co.
407 S. Dearborn St., Chicago, Ill.
The Fireproof Products Co., Inc.
257 E. 133rd St., New York, N. Y.
Sykes Metal Lath & Roofing Co.
Niles, O. (See page 87)
The Youngstown Pressed Steel Co.
Warren, O.

Laundry Equipment

Chas. Wesely Co.
3116-28 S. Canal St., Chicago, Ill.

Leaders—Copper

Taunton-New Bedford Copper Co.
Taunton, Mass.

Levels—Builders'

A. S. Aloe Co. (See page 107)
513 Olive St., St. Louis, Mo.
L. Beckmann Co. (See page 116)
100 Adams St., Toledo, O.
H. A. Borling,
Madison, O.
Modern Utilities Co.
106 N. 2nd St., Harrisburg, Pa.
Pittsburgh Instrument & Machine Co.
40 Water St., Pittsburgh, Pa.
J. Sand & Sons
4841 Rivard St., Detroit, Mich.
Wissler Instrument Co. (See page 117)
627 N. Broadway, St. Louis, Mo.
Warren-Knight Co. (See page 116)
136 N. 12th St., Philadelphia, Pa.
David White Co., Inc.
905 Chestnut St., Milwaukee, Wis.
("White's Improved"—See page 113)

Levels—Carpenters'

L. Beckmann Co.
100 Adams St., Toledo, O. (See page 116)
David White Co., Inc.
905-15 Chestnut St., Milwaukee, Wis.
("White's Improved"—See page 113)

Lifts—Sash

National Mfg. Co.
Sterling, Ill. (See back cover)

Lighting Plants

The Electric Auto-Lite Co.
Willys Light Div., 221 Cherry St., Toledo, O.
Matthews Engineering Co.
Sandusky, O.
Phelps Light & Power Co.
Rock Island, Ill.
Perfection Battery Mfg. Co.
2300-2306 S. La Salle St., Chicago, Ill.
Radiant Mfg. Co.
Cor. Monroe and King Sts., Sandusky, O.
Stearns Motor Mfg. Co.
Ludington, Mich.
Sunbeam Electric Mfg. Co.
Evansville, Ind.
Tirrill Gas Machine Lighting Co.
50 Church St., New York, N. Y.

Lighting Systems

Delco-Light Co.
N. Taylor St., Dayton, O.

Lightning Rods

The Burkett Lighting Rod Co.
Cor. Park Ave. and Vine St., Fremont, O.
Diamond Cable Co.
Bourbon, Ind.
Dodd & Struthers
118 8th St., Des Moines Ia.
Moore Bros. Lightning Rod Co.
Maryville, Mo.
St. Louis Lightning Rod Co.
2139 De Kalb St., St. Louis, Mo.
W. C. Shinn Mfg. Co.
14 E. Jackson Blvd., Chicago, Ill.
Toledo Cable Co.
1035 Grand Ave., Toledo, O.

Lime

The Kelley Island Lime & Transport Co.
Leader-News Bldg., Cleveland, O.
Louisville Cement Co.
315 Guthrie St., Louisville, Ky.
The Luckey Lime & Supply Co.
Luckey, O.
National Lime Assn.
918 G St., N. W., Washington, D. C.
Ohio Hydrate & Supply Co.
Woodville, O.
Palmer Lime & Cement Co.
103 Park Ave., New York, N. Y.
Security Cement & Lime Co.
P. O. Box 105, Hagerstown, Md.
Charles Warner Co.
Wilmington, Del.
The Western Lime & Cement Co.
504 Trust Co., Bldg., Milwaukee, Wis.
The Woodville Lime Products Co.
622 Madison Ave., Toledo, O.

Lime—Hydrated

National Lime & Stone Co.
Carey, O.
Ohio Hydrate & Supply Co.
Woodville, O.
United States Gypsum Co. (See page 95)
205 W. Monroe St., Chicago, Ill.

Lime—Masons and Builders

Ohio Hydrate & Supply Co.
Woodville, O.

Lime—Plastering

Ohio Hydrate & Supply Co.
Woodville, O.

Limestone

Indiana Limestone Quarriesmen's Assn.
Bedford, Ind.

Lining—Flue

Campfield Raggle Block Co.
401 Colonial Bldg., Richmond, Ind.
Haeger Brick & Tile Co.
Sherer Bldg., Aurora, Ill.

Linoleum

Armstrong Cork Co.
Linoleum Division, Lancaster, Pa.
Armstrong Cork & Insulation Co.
24th St. and Allegheny River, Pittsburgh, Pa.
The George W. Blabon Co.
212 5th Ave., New York, N. Y.
Certain-Teed Products Corp.
1801 Boatmen's Bank Bldg., St. Louis, Mo.
Congoleum Co., Inc.
1100 Morris Bldg., Philadelphia, Pa.
Cook's Linoleum Co.
E. State St., Trenton, N. J.
Farr & Bailey Mfg. Co.
Philadelphia, Pa.
Thos. Potter & Sons Co., Inc.
N. Penn Jct., Philadelphia, Pa.

Lockers—Metal

Keighley Mfg. Co.
124 3rd Ave., Pittsburgh, Pa.

Locks—Door

National Brass Co.
1601 Madison Ave., Grand Rapids, Mich.
Sargent & Co. (See page 100)
45 Water St., New Haven, Conn.
Segal Lock & Hardware Co., Inc.
159 Leonard St., New York, N. Y.
The Yale & Towne Mfg. Co.
Stamford, Conn.

Locks—Sash

National Mfg. Co.
Sterling, Ill. (See back cover)

Logs—Electric

Strait & Richards, Inc. (See page 111)
Fabyan Pl. and Selva St., Newark, N. J.

See page —, refers to an advertisement. Read it for further information

BUYER'S GUIDE—Continued

Logs—Gas

Chas. F. Lorenzen Co.
521 W. Monroe St., Chicago, Ill.
Strait & Richards, Inc. (See page 111)
Fabyan Pl. and Selvage St., Newark, N. J.

Lumber—Asbestos

Asbestos Shingle, Slate & Sheathing Co.
Ambler, Pa. (See inside front cover)

Lumber—Creosoted

The Long-Bell Lumber Co. (See page 108)
Kansas City, Mo.
Republic Creosoting Co.
1614 Merchants Bank Bldg., Indianapolis, Ind.

Lumber—Cypress

Southern Cypress Mfrs. Assn. (See page 118)
Hibernia Bank Bldg., New Orleans, La.

Lumber—Insulating

Celotex Products Co. (See page 92)
Conway Bldg., Chicago, Ill.

Lumber—Manufacturers

Exchange Sawmills Sales Co.
1116 R. A. Long Bldg., Kansas City, Mo.
Hardwood Manufacturers' Institute
1020 S. Wabash Ave., Chicago, Ill.
The Long-Bell Lumber Co.
Kansas City, Mo. (See page 108)
National Lumber Manufacturers' Assn.
904 International Bldg., Washington, D. C.
The North Carolina Pine Assn.
Norfolk, Va.
Northern Hemlock & Hardwood Assn.
Box 669, Oshkosh, Wis.
Oak Flooring Manufacturers' Assn.
1014 Ashland Blk., Chicago, Ill.
(See page 106)
The Pacific Lumber Co. of Illinois
332 S. Michigan Ave., Chicago, Ill.
The Red River Lumber Co.
807 Hennepin, Minneapolis, Minn.
Southern Cypress Manufacturers' Assn.
Hibernia Bank Bldg., New Orleans, La.
(See page 118)
Southern Pine Assn.
601 Interstate Bldg., New Orleans, La.
Tacoma Lumbermen's Club
Tacoma, Wash.
West Coast Lumbermen's Assn.
425 Henry Bldg., Seattle, Wash.
Weyerhaeuser Forest Products
Merchants Natl. Bank Bldg., St. Paul, Minn.
White Pine Bureau
1401 Merchants Natl. Bank Bldg., St. Paul, Minn.

Luminous Paints

The Radium Co. of Colorado
Radium Bldg., 1429 18th St., Denver, Colo.

Magnesite Stucco

American Materials Co.
101 Park Ave., New York, N. Y.
("Elastica"—See page 108)
Art Stucco Materials Co.
12854 Oakland Ave., Detroit, Mich.
("Elastica"—See page 108)
Great Lakes Corp.
288 E. Water St., Milwaukee, Wis.
Magnesite Products Co.
133 W. Washington St., Chicago, Ill.
Franklyn R. Muller & Co.
Waukegan, Ill. (See page 104)
Magnesite Cement Laboratories
310 W. Central Ave., South Williamsport, Pa.
National Kellastone Co. (See page 109)
155 E. Superior St., Chicago, Ill.
North-West Materials Co.
St. Paul, Minn. ("Elastica"—See page 108)
The Rochbond Co.
Van Wert, O. (See page 6)
F. E. Schundler,
210 Railroad St., Joliet, Ill.
Wisconsin Lime & Cement Co.
Conway Bldg., Chicago, Ill.
("Elastica"—See page 108)

Magnestone Flooring

American Magnestone Co.
Springfield, Ill. (See page 118)

Mail Boxes—Built-In

O. O. Kolstad,
Duluth, Minn.
Penn-Greg Mfg. Co.
805-11 University Ave., St. Paul, Minn.

Mantels

Hornet Mantel Co.
1112-1120 Market St., St. Louis, Mo.

Mantel Bases—Wood

Colonial Fireplace Co. (See page 111)
4611 Roosevelt Rd., Chicago, Ill.

Marble

American & Venetian Marble Co.
519 Southwest Blvd., Kansas City, Mo.
Appalachian Marble Co.
Knoxville, Tenn.

Marquees

ProBert Sheet Metal Co.
Cincinnati, O.

Masons' Lime

Ohio Hydrate & Supply Co.
Woodville, O.

Metal—Expanded

The Consolidated Expanded Metal Companies
Braddock, Pa.

Metal—Fireproofing

H. H. Robertson Co.
First National Bank Bldg., Pittsburgh, Pa.

Metal Sash

Voltz Manufacturing Co.
914 Penn St., St. Joe, Mo.
Zouri Drawn Metals Co. (See page 98)
Chicago Heights, Ill.

Metal Shingles

Cortright Metal Roofing Co.
50 N. 23rd St., Philadelphia, Pa.
(See pages 118, 119)
W. C. Hopson Co. (See page 119)
Grand Rapids, Mich.

Metal Spraying Machines

Metals Coating Company of America
495-97 N. Third St., Philadelphia, Pa.

Metal Weatherstrips

Allmetal Weatherstrip Co.
126 W. Kinzie St., Chicago, Ill.
"Allmetal" (See page 107)
American Metal Weatherstrip Co.,
144 Division Ave., N., Grand Rapids, Mich.
George Angell Co.
400 Penobscot Bldg., Detroit, Mich.
Bronze Weatherstrip Company
134 Milk St., Boston, Mass.
Concrete Engineering Co. (See page 108)
Omaha, Nebr.
Diamond Metal Weatherstrip Co.
Columbus, O. (See page 90)
Federal Metal Weatherstrip Co.
1240 Fullerton Ave., Chicago, Ill.
(See page 119)
Eveleth Manufacturing Co.
12 Ashland Ave., River Forest, Ill.
Michigan Engine Valve Co.
437 W. Columbia St., Detroit, Mich.
Sager Metal Weatherstrip Co.
162 W. Austin Ave., Chicago, Ill.
Tite Metal Weatherstrip Co.
6052 S. Tripp Ave., Chicago, Ill.

Millwork

American Sash & Door Co.
16th and Bellefontaine, Kansas City, Mo.
Andersen Lumber Co. (See page 4)
South Stillwater, Minn.
Carr, Ryder & Adams Co.
11th and Jackson, Dubuque, Ia.
Exchange Sawmills Sales Co.
1116 R. A. Long Bldg., Kansas City, Mo.
Farley & Loetscher Mfg. Co.
7th and White Sts., Dubuque, Ia.
Huttig Manufacturing Co.
Muscatine, Ia.
Metz Manufacturing Co.
17th and Elm Sts., Dubuque, Ia.
Morgan Sash & Door Co.
2287 Blue Island Ave., Chicago, Ill.
Paine Lumber Co., Ltd.
Oshkosh, Wis.
Roberts Sash & Door Co.
908-934 W. Cullerton Ave., Chicago, Ill.
Western Pine Mfg. Co., Ltd.
Astor and Jackson Ave., Spokane, Wash.
Wholesale Sash & Door Association
28 E. Jackson Blvd., Chicago, Ill.

Mirrors

Pittsburgh Plate Glass Co.
1618 Frick Bldg., Pittsburgh, Pa.

Mixers—Asphalt

The East Iron & Machine Co.
E. Market St., Lima, O.

Mixers—Cement

A. S. Aloe Co. (See page 107)
513 Olive St., St. Louis, Mo.
American Cement Machine Co. (See page 117)
Keokuk, Ia.
Anchor Concrete Machinery Co. "Anchor"
Adrian, Mich. (See page 110)
Archer Iron Works
2440 W. 34th Place, Chicago, Ill.
Austin Machinery Corporation
3500 Dorr St., Toledo, O.
Badger Concrete Mixer Co. "Badger"
221 Grand Ave., Milwaukee, Wis.
The Bolte Manufacturing Co.
1st Ave., Kearney, Neb.
Buhl Machine Company
605 S. Dearborn St., Chicago, Ill.
Bragstad Concrete Machinery Co.
113-119 S. Broadway, Canton, S. Dak.
Chain Belt Co.
736 Park Ave., Milwaukee, Wis.
Concrete Mixer Association
1204, 111 W. Washington St., Chicago, Ill.
Concrete Equipment Co. (See page 114)
530 Ottawa Ave., Holland, Mich.
Helm Brick Machine Co. (See page 114)
Cadillac, Mich. "Helm"
Ideal Concrete Machinery Co. (See page 112)
Colerain and Monmouth, Cincinnati, O.
The Jaeger Machine Co.
520 Dublin Ave., Columbus, O.
Koehring Co. (See page 97)
31st and Concordia, Milwaukee, Wis.
The Lakewood Engineering Co.
Station G, Cleveland, O.
Lansing Co.
Lansing, Mich.
Little Whirlwind Mixer Co.
1311 Kane St., La Crosse, Wis.
New Way Mfg. Co.
Starr Ave., Box 311, Eau Claire, Wis.
Peerless Mixer Co.
401½ Main St., Cedar Falls, Ia.
Republic Iron Works (See page 9)
Tecumseh, Mich.
Remmell Mfg. Co.
Kewashum, Wis.
The T. L. Smith Co.
Milwaukee, Wis.
Sheldon Engine & Sales Co.
170 W. 2nd St., Waterloo, Ia.
Stewart Manufacturing Co.
124 Rath St., Waterloo, Ia.

Mixers—Mortar and Plaster

C. H. & E. Manufacturing Co., Inc.
Clinton and Mineral Sts., Milwaukee, Wis.
(See page 96)
The Knickerbocker Co.
601 Liberty St., Jackson, Mich.

Mixers—Paving

The Foote Co.
Nunda, N. Y.
Koehring Co. (See page 97)
31st and Concordia, Milwaukee, Wis.
Ransome Concrete Machinery Co.
Dunellen, N. J.

Moisteners—Air

Onward Manufacturing Co.
128 Main St., Menasha, Wis.

Molds—Block

Republic Iron Works (See page 9)
Tecumseh, Mich.

Molds—Cement Brick

Ideal Concrete Machinery Co. (See page 112)
Colerain & Monmouth, Cincinnati, O.
Zagelmeyer Cast Stone Block Machinery Co.
801 S. Henry St., Bay City, Mich.

Molds—Cement Fence Posts

D. & A. Post Mold Co.
Three Rivers, Mich.

Molds—Cement Sewer Pipe

Concrete Equipment Co. (See page 114)
530 Ottawa Ave., Holland, Mich.

Molds—Concrete

Conklin Construction Co.
33 West Main St., Hartford, Mich.
MacArthur Cement Products Co.
104 N. Main St., Burlington, Ia.
S. P. Stone Co.
600 Joyce Realty Bldg., Columbus, O.
Viani Concrete Mold Co.
312 S. Clark St., Chicago, Ill.

Write the manufacturers or NATIONAL BUILDER for further information

BUYER'S GUIDE—Continued

Mortar Colors

Chattanooga Paint Co.
600 West 23rd St., Chattanooga, Tenn.
Jamestown Paint & Varnish Co.
Jamestown, Pa.
Ricketson Mineral Paint Works
1206 Railway Exchange Bldg., Milwaukee, Wis.
The Roll Mfg. Co.
16710 Waterloo Rd., Cleveland, O.
Tamms Silica Co.
30 N. La Salle St., Chicago, Ill.

Mortises—Door Lock

Colgan Machinery & Supply Co.
Hayden Bldg., Columbus, O. (See page 117)
Enterprise Mortising Machinery Co.
699 Grove St., Columbus, O.

Mortising Attachments

The Woodworker Manufacturing Co.
612 Brush St., Detroit, Mich. (See page 99)

Mortising Machines

W. F. & John Barnes Co. (See page 116)
436 Ruby St., Rockford, Ill.
Colgan Machinery & Supply Co.
Hayden Bldg., Columbus, O. (See page 117)
Forest City Bit & Tool Co.
1206 Kiswaukee St., Rockford, Ill.
Greenlee Brothers & Co.
Rockford, Ill.
The Parks Ball Bearing Machine Co.
1540-46 Knowlton St., Cincinnati, O.
(See page 105)

Mosaics

Chas. F. Lorenzen Co.
521 W. Monroe St., Chicago, Ill.

Mosaic Flooring—Wood

Wood-Mosaic Co. (See page 108)
New Albany, Ind.

Motors—Electric

American Electric Motors, Inc.
57 Erie St., Milwaukee, Wis.
Jas. Clark, Jr., Electric Co.
520 W. Main St., Louisville, Ky.
General Electric Co. (See page 81)
Schenectady, N. Y.

Motors—Gasoline

New Way Motor Co. (See page 110)
Lansing, Mich.

Mouldings—Base (Metal)

Brasco Manufacturing Co. (See page 11)
5025 S. Wabash Ave., Chicago, Ill.
Detroit Show Case Co. (See page 94)
1652-94 W. Fort St., Detroit, Mich.
Zouri Drawn Metals Co. (See page 98)
Chicago Heights, Ill.

Mouldings—Base (Wood)

Detroit Show Case Co. (See page 94)
1652-94 W. Fort St., Detroit, Mich.

Mouldings—Composition

Asbestos Shingle, Slate & Sheathing Co.
Ambler, Pa. (See inside front cover)

Mouldings—Metal

Brasco Manufacturing Co. (See page 11)
5025 S. Wabash Ave., Chicago, Ill.
Detroit Show Case Co. (See page 94)
1652 W. Fort St., Detroit, Mich.
Milwaukee Corrugating Co.
36th Ave. and Burnham St., Milwaukee, Wis. (See inside back cover)

Mouldings—Wood

Andersen Lumber Co. (See page 4)
South Stillwater, Minn.
Exchange Sawmills Sales Co.
1116 R. A. Long Bldg., Kansas City, Mo.

Nailers

Pearson Mfg. Co.
Robbinsdale, Minn.

Nails

W. H. Maze Co.
Peru, Ill.
The F. A. Neider Co.
Augusta, Ky.
Norton Iron Works,
Ashland, Ky.
Reading Iron Co.
Baer Bldg., Reading, Pa.

Nails—Roofing and Slating

Milwaukee Corrugating Co.
36th Ave. and Burnham St., Milwaukee, Wis. (See inside back cover)

Nails—Shingle

Creo-Dipt Co., Inc.
Oliver St., North Tonawanda, N. Y.

Oak Flooring

Oak Flooring Manufacturers Association
1014 Ashland Block, Chicago, Ill.
(See page 106)

Ornamental Iron

The Columbia Iron and Wire Works
1006-1020 Ninth St., S. W., Canton, O.
The Dow Co.
1025-51 Franklin St., Louisville, Ky.
The Mack Iron & Wire Co.
Sandusky, O.
Parker Rust Proof Co.
2177 Milwaukee St., E., Detroit, Mich.
The Van Dorn Iron Works Co.
2685 E. 79th St., Cleveland, O.

Ornaments—Sheet Metal

Miller and Doing
60 York St., Brooklyn, N. Y.

Ornaments—Wood

Ornamental Products Co.
14th Ave. & LaFayette Blvd., Detroit, Mich.

Outlets—Electric

Electric Outlet Co., Inc.
8 W. 40th St., New York City, N. Y.
General Electric Co. (See page 81)
Schenectady, N. Y.

Outside Icing

Herrick Refrigerator Co. (See page 105)
6th and River Sts., Waterloo, Ia.
Beaver Products Co., Inc.
Buffalo, N. Y.

The Clinton Metallic Paint Co.
Clinton, N. Y.

Goheen Corporation of New Jersey
Emmet & Goble Sts., Newark, N. J.
S. C. Johnson & Son (See page 79)
Racine, Wis.

National Paint & Manganese Co.
Lynchburg, Va.

Eugene E. Nice Co.
230 S. Second St., Philadelphia, Pa.

The Sherwin-Williams Co.
601 Canal Rd., N. W., Cleveland, O.

Wadsworth Howland & Co., Inc.
211-219 47th St., Brooklyn, N. Y.

U. S. Gutta Percha Paint Co.
Providence, R. I. "Barreled Sunlight."

Paint—Cement

The Sandusky Cement Co. (See page 93)
6026 Engineers Bldg., Cleveland, O.

Paint Spraying Machines

DeVilbiss Mfg. Co.
3768 Detroit Ave., Toledo, O.
Eclipse Air Brush Co.
79 Orange St., Newark, N. J.
Spray Engineering Co.
60 High St., Boston, Mass.

Paints

Adams & Elting Co.
1833 Seward St., Chicago, Ill.
Atlantic Paint Mfg. Co.
1007-9-11 Marquette Ave., Minneapolis, Minn.

Paper—Blue Print

New York Blue Print Paper Co.
102 Reade St., New York, N. Y.

Paper—Building

Asbestos Shingle, Slate & Sheathing Co.
Ambler, Pa. (See inside front cover)
Brown Co. (See front cover)
Portland, Me.
Si Fo Products Co.
1120 East 7th St., St. Paul, Minn.

Paper—Roofing and Sheathing

The Beaver Products Co., Inc.
Buffalo, N. Y.
Brown Paper Co. (See front cover)
Portland, Me.

Partitions—Steel

Empire Steel Partition Co., Inc.
3rd Ave. & 11th St., College Point, Long Island, N. Y.
The Hart & Hutchinson Co.
New Britain, Conn.
The Hughes-Keenan Co.
260 N. Mulberry St., Mansfield, O.
The Sanymetal Products Co.
978 E. 64th St., Cleveland, O.

Partitions—Wood Rolling

Monroe Screen, Blind & Partition Co.
Lima, O.
The J. G. Wilson Corporation
11 East 36th St., New York City, N. Y.

Pebbledash

The Roebond Co. (See page 6)
Van Wert, O.
Stucco Products Co.
95th St. & Colfax Ave., South Chicago, Ill.

Pipe—Brass

Bridgeport Brass Co.
Bridgeport, Conn.

Pipe—Sewer

American Vitrified Products Co.
15 Broad St., Akron, O.
Cannelton Sewer Pipe Co.
Cannelton, Ind.
Wm. E. Dee Co.
30 N. La Salle St., Chicago, Ill.
Miller & Coulson
5748-50 Ellsworth Ave., Pittsburgh, Pa.
Pioneer Mfg. Co.
Newell & Mobile, Waterloo, Ia.
Scott-Moore Clay Mfg. Co.
216 Packer St., Uhrichsville, O.
Stevens Bros. Co.
Stevens Pottery, Ga.

Pipe—Vitrified

The Ohio Vitrified Pipe Co.
Commercial Bank Bldg., Uhrichsville, O.

Planes—Carpenters

Sargent & Co. (See page 100)
45 Water St., New Haven, Conn.
Common Brick Manufacturers Association
2121 Discount Bldg., Cleveland, O.
(See page 89)
Craftsman Bungalow Co.
660 Empire Bldg., Seattle, Wash.
Portland Cement Association (See page 103)
111 W. Washington St., Chicago, Ill.
E. W. Stillwell Co. (See page 116)
911 California Bldg., Los Angeles, Calif.
Gordon M. Tamblin (See page 115)
Sweeney Bldg., Denver, Colo.
Frank R. Walker Co. (See page 116)
536 Lake Shore Drive, Chicago, Ill.

Plan Service

American Face Brick Assn. (See page 3)
130 N. Wells St., Chicago, Ill.
Architectural House Planning Service Co.
20 S. 18th St., Philadelphia, Pa.
(See page 115)
The Architects' Small House Service Bureau
of the U. S., Inc., Minneapolis, Minn.
Architectural Service Bureau
140 N. Sixth St., Philadelphia, Pa.
Common Brick Manufacturers Association
2121 Discount Bldg., Cleveland, O.
(See page 89)
Keith's Corp. (See page 116)
541 Albany Bldg., Minneapolis, Minn.
Portland Cement Association (See page 103)
111 W. Washington St., Chicago, Ill.
Gordon M. Tamblin (See page 115)
Sweeney Bldg., Denver, Colo.

Planners

The Woodworker Mfg. Co. (See page 98)
612 Brush St., Detroit, Mich.

Plans—Building

American Face Brick Assn. (See page 3)
130 N. Wells St., Chicago, Ill.
Architectural House Planning Service Co.
20 S. 18th St., Philadelphia, Pa.
(See page 115)

Plaster—Asbestos

Asbestos Shingle, Slate & Sheathing Co.
Ambler, Pa. (See inside front cover)
The Roebond Co. (See page 6)
Van Wert, O.

Plaster Base

Bishopric Manufacturing Co. (See page 1)
3 Este Ave., Cincinnati, O.
Celotex Products Co. (See page 92)
Conway Bldg., Chicago, Ill.
M. J. MacAdams Corp.
Conway Bldg., Chicago, Ill.

Plaster—Finish

United States Gypsum Co. (See page 95)
205 W. Monroe St., Chicago, Ill.

Plaster—Moulding

United States Gypsum Co. (See page 95)
205 W. Monroe St., Chicago, Ill.

BUYER'S GUIDE—Continued

Plaster—Wall

Fairmont Wall Plaster Co.
Fairmont, W. Va.
National Kellastone Co. (See page 109)
155 E. Superior St., Chicago, Ill.
The Paragon Plaster Co.
Syracuse, N. Y.
United States Gypsum Co. (See page 95)
205 W. Monroe St., Chicago, Ill.

Plasterboard

The American Gypsum Co.
Port Clinton, O.
The Beaver Products Co., Inc. "Bestwall."
Buffalo, N. Y.
Bishopric Manufacturing Co. (See page 1)
3 Este Ave., Cincinnati, O.
United States Gypsum Co. (See page 95)
205 W. Monroe St., Chicago, Ill.

Plates—Door

Brasco Manufacturing Co. (See page 11)
5025 S. Wabash Ave., Chicago, Ill.
Zouri Drawn Metals Co. (See page 98)
Chicago Heights, Ill.

Plugs—Wall

Sykes Metal Lath & Roofing Co.
Niles, O. (See page 87)

Plumbing Supplies

James B. Clow & Sons
534-546 S. Franklin St., Chicago, Ill.
Crane Company
836 South Michigan Ave., Chicago, Ill.
Wolff Manufacturing Co.
255 N. Hoyne Ave., Chicago, Ill.
Wheeling Sanitary Manufacturing Co.
4th & West Sts., Wheeling, W. Va.

Porch Bases

S. Cheney & Son (See page 110)
Box 37, Manlius, N. Y.

Portland Cement

Giant Portland Cement Co.
603-10 Pennsylvania Bldg., Philadelphia, Pa.
Lehigh Portland Cement Co.
Allentown, Pa.
Portland Cement Association (See page 103)
111 W. Washington St., Chicago, Ill.
The Sandusky Cement Co. (See page 93)
6026 Engineers Bldg., Cleveland, O.
Universal Portland Cement Co.
210 S. La Salle St., Chicago, Ill.

Pulleys—Sash

The American Pulley Co.
4200 Wissahickon Ave., Philadelphia, Pa.
Andersen Lumber Co. (See page 4)
South Stillwater, Minn.

Pulleys—Screw

Andersen Lumber Co. (See page 4)
South Stillwater, Minn.

Pumps—Centrifugal

Chicago Pump Co.
2336 Wolfram St., Chicago, Ill.
Erie Pump & Engine Works
Medina, N. Y.
Evinrude Motor Co.
Station B, Milwaukee, Wis.
Morris Machine Works
100 Genessee St., Baldwinsville, N. Y.

Pumps—Contractors

C. H. & E. Manufacturing Co., Inc.
Clinton & Mineral Sts., Milwaukee, Wis.
(See page 96)
Koehring Co. (See page 97)
31st & Concordia, Milwaukee, Wis.
F. E. Meyers & Bro. Co. (See page 113)
Ashland, O.

Pumps—Force

C. H. & E. Manufacturing Co., Inc.
(See page 96)
Clinton & Mineral Sts., Milwaukee, Wis.
Rider-Ericsson Engine Co.
24-26 Murray St., New York, N. Y.

Pumps—Electric

The Dayton Pump & Manufacturing Co.
500 Webster St., Dayton, O.
W. & B. Douglas
Middletown, Conn.
The Humphreys Manufacturing Co.
E. 5th St., Mansfield, O.
F. E. Meyers & Bro. Co. (See page 113)
Ashland, O.

Pumps—Gasoline

National Pump & Manufacturing Co.
24 State St., York, Pa.
Wayne Oil Tank & Pump Co.
Fort Wayne, Ind.

Pumps—Hand Power

Mast, Foos & Co.
34 Isabella St., Springfield, Ill.

Quantity Surveys

The Quantity Survey Co., Inc.
17 W. 45th St., New York, N. Y.

Radiators

Monitor Bi-Loop Radiator Co.
408 Finance Bldg., Philadelphia, Pa.
United States Radiator Corp.
133 E. Grand River Ave., Detroit, Mich.

Radiators—Hot Water

Central Radiator Co.
41 E. 42nd St., New York, N. Y.
Niagara Radiator & Boiler Co.
North Tonawanda, N. Y.

Radiators—Ventilating (Gas)

Hugo Manufacturing Co.
49th Ave. West & Superior St., W. Duluth, Minn.

Ranges—Electric

The Cook Electric Heating Co.
717 Frankfort Ave., Cleveland, O.
Edison Electric Appliance Co.
5600 W. Taylor St., Chicago, Ill.

Ranges—Gas

Detroit Stove Works
6900 E. Jefferson St., Detroit, Mich.
National Stove Co.
12th & Long Ave., Lorain, O.
Richardson & Boynton Co.
260 5th Ave., New York, N. Y.
Weir Stove Company
330 W. Water St., Taunton, Mass.

Receivers—Ash

Sharp Rotary Ash Receiver Corp.
396 Bridge St., Springfield, Mass.

Reflectors

Ivanhoe-Regent Works
5716 Euclid Ave., Cleveland, O.
Pittsburgh Reflector & Illuminating Co.
Bowman Bldg., Pittsburgh, Pa.
National X-Ray Reflector Co.
235 W. Jackson Blvd., Chicago, Ill.
The Phoenix Glass Co.
230 Fifth Ave., New York, N. Y.

Refrigerating Machinery

The Isko Co.
2525 Clybourn Ave., Chicago, Ill.
Kelvinator Sales Corp. "Kelvinator"
2051 W. Fort St., Detroit, Mich.
York Manufacturing Co.
York, Pa.

Refrigerators

The Brecht Co.
1201 Cass Ave., St. Louis, Mo.
Grand Rapids Refrigerator Co.
Clyde Park Ave., Grand Rapids, Mich.
Herrick Refrigerator Co. (See page 105)
6th & River Sts., Waterloo, Ia.
Jewett Refrigerator Co.
27 Candler St., Buffalo, N. Y.
Lorillard Refrigerator Co.
409 Madison Ave., New York, N. Y.
McCray Refrigerator Co.
Kendallville, Ind.
Northey Mfg. Co.
Park Ave. & Bluff St., Waterloo, Ia.

Refrigerators—Outside Icing

Herrick Refrigerator Co. (See page 105)
6th & River Sts., Waterloo, Ia.

Registers—Electric

Electric Heating & Mfg. Co.
Westlake at Republican St., Seattle, Wash.

Registers—Hot Air Furnace

The Auer Register Co.
3608 Payne Ave., Cleveland, O.
Bovee Furnace Works (See page 111)
Waterloo, Ia.
Best Register Co.
P. O. Box 13, Station "A," Milwaukee, Wis.
Clo-Mix Co., The
112 W. Crawford St., Elkhart, Ind.
Independence Register & Mfg. Co.
414 Perry Payne Bldg., Cleveland, O.
Rock Island Register Co.
2435 Fifth Ave., Rock Island, Ill.
United States Register Co.
Burchard St., M. C. & Allegan Div., Battle Creek, Mich.
Walworth Run Foundry Co.
2488 W. 27th St., Cleveland, O.

Regulators—Heat

Fulton Co.
P. O. Box 796, Knoxville, Tenn.
Minneapolis Heat Regulator Co.
2745 Fourth Ave., S., Minneapolis, Minn.
Sahlin Manufacturing Co.
31 Ottawa St., N. W., Grand Rapids, Mich.
Sonder-Hornsby Co.
Tamaqua, Pa.

Reinforcing

Buffalo Steel Co.
Tonawanda, N. Y.
Concrete Steel Co.
42 Broadway, New York City, N. Y.
Corrugated Bar Co., Inc.
Mutual Life Bldg., Buffalo, N. Y.
Kalman Steel Co.
22 W. Monroe St., Chicago, Ill.
Electric Welding Co.
906 Century Bldg., Pittsburgh, Pa.
Franklin Steel Works
P. O. Box 635, Franklin, Pa.
General Fireproofing Co. (See page 103)
Youngstown, O.
National Steel Fabric Co.
Union Arcade Bldg., Pittsburgh, Pa.
The Pollak Steel Co.
Cincinnati, O.
R. C. Products Trust
1048 Engineer Bldg., Cleveland, O.
Removers—Paint and Varnish
S. C. Johnson & Son (See page 79)
Racine, Wis.

Rigs—Ripsaw

Hutchinson Mfg. Co.
Norristown, Pa.
The Woodworker Mfg. Co. (See page 99)
612 Brush St., Detroit, Mich.

Rigs—Saw

C. H. & E. Manufacturing Co., Inc.
Clinton & Mineral Sts., Milwaukee, Wis.
(See page 96)
Oshkosh Mfg. Co.
Oshkosh, Wis.
The Parks Ball Bearing Machine Co.
1540-46 Knowlton St., Cincinnati, O.
(See page 105)
Sheldon Manufacturing Co. "Sheldon"
Nehawka, Nebr.
Standard Scale & Supply Co.
1631 Liberty Ave., Pittsburgh, Pa.

Rigs—Saw (Portable)

C. H. & E. Manufacturing Co., Inc.
Clinton & Mineral Sts., Milwaukee, Wis.
(See page 96)

Roof Insulation

Celotex Products Co. (See page 92)
Conway Bldg., Chicago, Ill.
Servicised Products Co. (See page 85)
1528 First Nat'l Bank Bldg., Chicago, Ill.

Roofing

The Barrett Co.
40 Rector St., New York City, N. Y.
The Berger Mfg. Co.
Canton, O.
The Lehon Co. (See page 109)
44th St. on Oakley Blvd., Chicago, Ill.
H. M. Reynolds Shingle Co. (See page 7)
640 Rumsey St., Grand Rapids, Mich.
Richardson Co.
Lockland, Cincinnati, O.
H. W. Johns-Manville Co.
41st & Madison Ave., New York City, N. Y.
Servicised Products Co. (See page 85)
1528 First Nat'l Bank Bldg., Chicago, Ill.

Roofing—Accessories

Miller & Gleason "Miller Drip Edge"
South Fifth St., Olean, N. Y.

Roofing—Asbestos Shingles

Asbestos Shingle, Slate & Sheathing Co.
Ambler, Pa. (See inside front cover)
The Barber Asphalt Co.
Land Title Bldg., Philadelphia, Pa.
Mohawk Asbestos Slate Co.
1147 Mohawk St., Utica, N. Y.
Servicised Products Co. (See page 85)
1528 First National Bank Bldg., Chicago, Ill.

Roofing—Asphalt (Ready)

Hydrex Asphalt Products Corporation
120 Liberty St., New York, N. Y.
The Lehon Co. (See page 109)
44th St., on Oakley Blvd., Chicago, Ill.
The National Asbestos Mfg. Co.
163-93 Henderson St., Jersey City, N. J.

If you don't see what you want, write to NATIONAL BUILDER for it

BUYER'S GUIDE—Continued

Richardson Co.
Lockland, Cincinnati, O.
Stormcote Roofing Corp.
31st and St. Clair Ave., E. St. Louis, Ill.

Roofing—Asphalt Shingles

Beaver Products Co., Inc.
Buffalo, N. Y.
Beckman-Dawson Roofing Co. (See page 104)
19 S. La Salle St., Chicago, Ill.
Beecher, Peck & Lewis (See page 104)
Detroit, Mich.
Bird & Son, Inc.
East Walpole, Mass.
Brantford Roofing Co., Ltd. (See page 104)
Brantford, Ont., Canada
Canadian Roofing Mfg. Co., Ltd.
Windsor, Ont., Canada (See page 104)
The Lehon Co. (See page 109)
44th St. on Oakley Blvd., Chicago, Ill.
Lockport Paper Co. (See page 104)
Lockport, N. Y.
The Earl R. Maltby Co., Inc.
Erie Ave. and Walck Rd., N. Tonawanda, N. Y.
Peck Asphalt Shingle Co. (See page 104)
125 W. Jefferson Ave., Detroit, Mich.
H. M. Reynolds Shingle Co. (See page 7)
640 Rumsey St., Grand Rapids, Mich.
Richardson Co.
Lockland, Cincinnati, O.

Roofing—Built-Up

Beaver Products Co., Inc. ("Vulcanite")
Buffalo, N. Y.
Beckman-Dawson Roofing Co. (See page 104)
19 S. LaSalle St., Chicago, Ill.
Beecher, Peck & Lewis. (See page 104)
Detroit, Mich.
Brantford Roofing Co., Ltd. (See page 104)
Brantford, Ont., Canada
Canadian Roofing Mfg. Co., Ltd.
Windsor, Ont., Canada. (See page 104)
The Lehon Co. (See page 109)
44th St., on Oakley Blvd., Chicago, Ill.
Lockport Paper Co. (See page 104)
Lockport, N. Y.
Peck Asphalt Shingle Co. (See page 104)
125 W. Jefferson Ave., Detroit, Mich.
H. M. Reynolds Shingle Co. (See page 7)
640 Rumsey St., Grand Rapids, Mich.
Richardson Co., Lockland
Cincinnati, O.

Roofing—Cement

Estate of J. G. Hetzel
67 Maine St., Newark, N. J.
Richardson Co., Lockland
Cincinnati, O.
Servicised Products Co. (See page 85)
1528 First Nat'l Bank Bldg., Chicago, Ill.

Roofing—Copper

Rome Brass & Copper Co.
Rome, N. Y.
Taunton-New Bedford Copper Co.
Taunton, Mass.

Roofing—Corrugated

H. W. Johns-Manville Co.
41st and Madison Ave., New York, N. Y.

Roofing—Metal

Anaconda Copper Mining Co.
25 Broadway, New York, N. Y.
Milwaukee Corrugating Co.
36th Ave. and Burnham St., Milwaukee, Wis. (See inside back cover)

Roofing—Metal Shingles

Cortright Metal Roofing Co.
(See page 118, 119)
50 N. 23rd St., Philadelphia, Pa.
Milwaukee Corrugating Co.
36th Ave. and Burnham St., Milwaukee, Wis. (See inside back cover)

Roofing Paper

The Beaver Products Co., Inc.
Buffalo, N. Y.
Brown Co. (See front cover)
Portland, Me.

Roofing—Roll

The Beaver Products Co., Inc. ("Vulcanite")
Buffalo, N. Y.
The Lehon Co. (See page 109)
44th St., on Oakley Blvd., Chicago, Ill.
H. M. Reynolds Shingle Co. (See page 7)
640 Rumsey St., Grand Rapids, Mich.
Richardson Co.
Lockland, Cincinnati, O.
Servicised Products Co. (See page 85)
1528 First Nat'l Bank Bldg., Chicago, Ill.

Roofing—Rubber

40 N. Jackson St., Waukegan, Ill.
Richardson Co.
The Ruberoid Co.
95 Madison Ave., New York, N. Y.

Roofing—Slate

Belmont Slate Co.
Bangor, Pa.
Blue Ridge Slate Corp.
120 Milk St., Boston, Mass.
The Chapman Slate Co.
Main St., First Nat'l Bank Bldg., Bethlehem, Pa.
Kansas City Slate & Tile Roofing Co.
21st St. and Forest Ave., Kansas City, Mo.
Knickerbocker Slate Corp.
153 E. 38th St., New York, N. Y.
Rising & Nelson Slate Co.
West Pawlet, Vt.
Servicised Products Co. (See page 85)
1528 First Nat'l Bank Bldg., Chicago, Ill.
Vendor Slate Co. (See page 115)
Easton, Pa.
F. C. Sheldon Slate Co.
Granville, N. Y.

Roofing—Stained Shingles

Creo-Dipt Co., Inc.
Oliver St., North Tonawanda, N. Y.

Roofing—Thatched

Creo-Dipt Co., Inc.
Oliver St., North Tonawanda, N. Y.

Roofing—Tin

N. & G. Taylor Co.
300 Chestnut St., Philadelphia, Pa.

Roofing and Siding—Asbestos

Asbestos Shingle, Slate & Sheathing Co.
Ambler, Pa. (See inside front cover)

Roofs—Gypsum

United States Gypsum Co. (See page 95)
205 W. Monroe St., Chicago, Ill.

Roofs—Silos

General Manufacturing Co.
Cor. Franklin and 9th Sts., Goshen, Ind.

Routers

The Woodworker Mfg. Co. (See page 99)
612 Brush St., Detroit, Mich.

Rules—Extension

A. S. Aloe Co. (See page 107)
513 Olive St., St. Louis, Mo.
Lufkin Rule Co.
Hess St., Saginaw, Mich.
Rustless Rule Co.
Buffalo, N. Y.

Rules—Slide

Master Rule Manufacturing Co., Inc.
841 E. 136th St., New York, N. Y.

Safes

Victor Safe & Lock Co.
Cleney Ave., Cincinnati, O.

Salamanders

Mostberger Iron Co.
878 S. Division St., Buffalo, N. Y.

Sanderplanes

American Floor Surfacing Machine Co.
515 S. St. Clair St., Toledo, O.
(See page 8)

Sanders

American Floor Surfacing Machine Co.
515 S. St. Clair St., Toledo, O.
(See page 8)
Electric Rotary Machine Co. (See page 117)
32-40 S. Clinton St., Chicago, Ill.
Heath Machine Co.
Montrose, Pa.
Kelley Electric Machine Co.
111 Dearborn St., Buffalo, N. Y.
The Parks Ball Bearing Machine Co.
1540-46 Knowlton St., Cincinnati, O.
(See page 105)
Triple "A" Machine Co. (See page 117)
4601 Ravenswood Ave., Chicago, Ill.
Wayvell-Chappell & Co. (See page 117)
Lockland, Cincinnati, O.
The Woodworker Mfg. Co. (See page 99)
612 Brush St., Detroit, Mich.

Sandpaper

Minnesota Mining and Manufacturing Co.
701 Forest Ave., St. Paul, Minn.

Sash Chains

Bridgeport Chain Co.
964 Crescent Ave., Bridgeport, Conn.
Parker Supply Co. (See page 107)
785 E. 135th St., New York, N. Y.
Smith & Egge Mfg. Co.
Lafayette and Allen Sts., Bridgeport, Conn.

Sash—Hollow Metal

Brasco Manufacturing Co. (See page 11)
5025 S. Wabash Ave., Chicago, Ill.
Detroit Show Case Co. (See page 94)
1652 W. Fort St., Detroit, Mich.
Zouri Drawn Metals Co. (See page 98)
Chicago Heights, Ill.

Sash—Steel

The William Bayley Co.
126-50 W. North St., Springfield, O.
The Bogert & Carrough Co.
512-526 Straight St., Paterson, N. J.
Federal Bridge & Structural Co.
Waukesha, Wis.
International Steel & Iron Co. (See page 106)
1239 Edgar St., Evansville, Ind.
David Lupton's Sons Co.
Allegheny Ave. and Tulip St., Philadelphia, Pa.
Truscon Steel Co.
250 Lafayette Blvd., Detroit, Mich.

Saw Mill Machinery

The Enterprise Co.
328 S. Main St., Columbiana, O.
Warner Manufacturing Co.
King St., Ottawa, Kan.

Saws—Band

Heston & Anderson
507 W. Washington St., Fairfield, Ia.
Huther Bros. Saw Mfg. Co., Inc.
Rochester, N. Y. (See page 115)
The Parks Ball Bearing Machine Co.
1540-46 Knowlton St., Cincinnati, O.
(See page 105)
York Saw Works
York, Pa.

Saws—Circular

E. C. Aitkins & Co.
402 S. Illinois, Indianapolis, Ind.
E. F. Decker Saw Works
51-67 Westerlo St., Albany, N. Y.
Huther Bros. Saw Mfg. Co., Inc.
Rochester, N. Y. (See page 115)
Kidder Machine Co.
35 Hermon St.
Worcester, Mass.
Simonds Manufacturing Co.
Fitchburg, Mass.

Saws—Grooving

Huther Bros. Saw Manufacturing Co., Inc.
Rochester, N. Y. (See page 115)

Saws—Rip

The Woodworker Mfg. Co. (See page 99)
612 Brush St., Detroit, Mich.

Saws—Scroll

W. F. & John Barnes Co. (See page 116)
436 Ruby St., Rockford, Ill.
The Woodworker Mfg. Co. (See page 99)
612 Brush St., Detroit, Mich.

Scaffold Brackets

Elite Mfg. Co. ("Reliable")
Ashland, O.

Scaffolds—Steel

Economy Scaffold Co.
4619 W. Fulton St., Chicago, Ill.
Elite Mfg. Co. ("Reliable")
Ashland, O.
Neville Mfg. Co.
Kewanee, Ill.
The Patent Scaffolding Co.
506 S. Canal St., Chicago, Ill.

Schools—Correspondence

Chicago Technical College. (See page 91)
2721 S. Michigan Ave., Chicago, Ill.
(Home study courses for builders, plan reading courses, estimating courses, architectural courses, drafting courses, correspondence courses for builders and superintending courses for builders.)
Columbia Correspondence School
Drexel Bldg., Philadelphia, Pa.
Columbia School of Drafting
14th and T. Sts., N. W., Washington, D. C.

BUYER'S GUIDE — Continued

Screens—Rolling

Fli-Back Screen Corporation
3 Circle St., Rochester, N. Y.
Gustave Lidseen
832-840 S. Central Ave., Chicago, Ill.
Rolup Screen Co.
410 E. 32nd St., New York, N. Y.

Screens—Window and Door

The Higgins Manufacturing Co.
Fifth and Washington Ave., Newport, Ky.
Hipolito Screen & Sash Co.
21st and Alameda Sts., Los Angeles, Cal.
Watson Manufacturing Co.
Jamestown, N. Y.
Wheeler Screen Co.
Stevens St., Geneva, Ill.

Screw Holes

The Stine Screw Holes Co.
Buckingham Bldg., Grand St., Waterbury, Conn.

Screws

Parker Supply Co. (See page 107)
785 E. 135th St., New York, N. Y.

Sets—Saw

Huthers Bros. Saw Mfg. Co., Inc.
Rochester, N. Y. (See page 115)

Sets—Screen Door

Fernald Manufacturing Co.
North East, Pa.

Setting Blocks—Self Adjusting

Zouri Drawn Metals Co. (See page 98)
Chicago Heights, Ill.

Sewage Disposal Plants

Aten Sewage Disposal Co.
286 Fifth Ave., New York, N. Y.
W. A. Covell & Co.
228 W. 4th St., Waterloo, Ia.
Dail Steel Products Co.
Cor. Main and Hosmer Sts., Lansing, Mich.
Kewanee Private Utilities Co.
Kewanee, Ill.
Russell Sewage Disposal Co.
Burlington, Ia.

Sewer Pipe Machinery—Cement

Raber & Lang Manufacturing Co.
Kendallville, Ind.

Shades—Window

Athey Co.
6035 W. 65th St., Chicago, Ill.
The Columbia Mills, Inc.
225 Fifth Ave., New York, N. Y.
Luther O. Draper Shade Co.
Spiceland, Ind.

Sharpeners

Pike Mfg. Co.
Pike, N. H.

Sheathing—Asbestos

Asbestos Shingle, Slate & Sheathing Co.
Ambler, Pa. (See inside front cover)

Sheathing Boards

Bishopric Manufacturing Co. (See page 1)
3 Este Ave., Cincinnati, O.
Celotex Products Co. (See page 92)
Conway Bldg., Chicago, Ill.

Sheathing Paper

Brown Co. (See front cover)
Portland, Me.

Sheathing and Stucco Base

Celotex Products Co. (See page 92)
Conway Bldg., Chicago, Ill.

Sheet Iron

George Focht Sons
105-123 Adams St., Hoboken, N. J.

Sheet Metal

Moeschl Edwards Corrugating Co.
Box 564, Cincinnati, O.
Northern Corrugating Co.
Pearl St., Green Bay, Wis.
Penn Metal Co.
65 Franklin St., Boston, Mass.
The Trumbull Steel Co.
S. Pine St., Warren, O.

Sheet Metal Products

The Tiffin Art Metal Co.
Broad and 2nd Ave., Tiffin, O.

Sheets—Galvanized

American Rolling Mill Co.
Middletown, O.
American Sheet & Tin Plate Co.
Frick Bldg., Pittsburgh, Pa.
American Steel Band Co.
886 Progress St., Pittsburgh, Pa.
Berger Brothers Co.
229-237 Arch St., Philadelphia, Pa.

Sheets—Monel Metal

Anderson Manufacturing Co.
511 Third St., Des Moines, Ia.
The International Nickle Co.
67 Wall St., New York, N. Y.

Shelf Covering

Apollo Metal Works. ("Nickelzinc")
Zinc St. and Porter Ave., La Salle, Ill.

Shields—Radiator

Asbestos Shingle, Slate & Sheathing Co.
Ambler, Pa. (See inside front cover)
W. H. Johnson & Co.
330-32 E. St. Joe St., Indianapolis, Ind.

Shingles

Barcrest Co.
481 Braufait St., Detroit, Mich.
The Beaver Products Co., Inc.
Buffalo, N. Y.
Beckman-Dawson Roofing Co. (See page 104)
19 S. LaSalle St., Chicago, Ill.
Beecher, Peck & Lewis. (See page 104)
Detroit, Mich.
Brantford Roofing Co., Ltd. (See page 104)
Brantford, Ont., Canada
Canadian Roofing Mfg. Co., Ltd.
Windsor, Ont., Canada. (See page 104)
F. N. DuBois Co., Inc.
247 Ninth Ave., New York, N. Y.
The Lehon Co. (See page 109)
44th St., on Oakley Blvd., Chicago, Ill.
Lockport Paper Co. (See page 104)
Lockport, N. Y.
H. W. Johns-Manville Co.
41st and Madison Ave., New York, N. Y.
Peck Asphalt Shingle Co. (See page 104)
125 W. Jefferson Ave., Detroit, Mich.
H. M. Reynolds Shingle Co. (See page 7)
640 Rumsey St., Grand Rapids, Mich.
Servicised Products Co. (See page 85)
1528 First Nat'l Bank Bldg., Chicago, Ill.

Shingles—Asbestos

Mohawk Asbestos Slate Co.
1147 Mohawk St., Utica, N. Y.
Servicised Products Co. (See page 85)
1528 First Nat'l Bank Bldg., Chicago, Ill.

Shingles—Asphalt

Beckman-Dawson Roofing Co. (See page 104)
19 S. LaSalle St., Chicago, Ill.
Beecher, Peck & Lewis. (See page 104)
Detroit, Mich.
Brantford Roofing Co., Ltd. (See page 104)
Brantford, Ont., Canada
Canadian Roofing Mfg. Co., Ltd.
Windsor, Ont., Canada. (See page 104)
The Flintkote Co., Inc.
88 Pearl St., Boston, Mass.
Ford Roofing Product Co.
111 W. Washington St., Chicago, Ill.
The Lehon Co. ("Mulehide"—See page 109)
44th St., on Oakley Blvd., Chicago, Ill.
Lockport Paper Co. (See page 104)
Lockport, N. Y.
Peck Asphalt Shingle Co. (See page 104)
125 W. Jefferson Ave., Detroit, Mich.
Richardson Co.
Lockland, Cincinnati, O.
Sifo Products Co.
Hammond, Ind.

Shingles—Metal

Edwards Mfg. Co.
Cincinnati, O.
The Thomas & Armstrong Co.
London, O.
Wheeling Metal & Mfg. Co.
Plainfield, Wheeling, W. Va.

Shingles—Tapered

Beecher, Peck & Lewis. (See page 104)
Detroit, Mich.
Beckman-Dawson Roofing Co. (See page 104)
19 S. LaSalle St., Chicago, Ill.
Brantford Roofing Co., Ltd. (See page 104)
Brantford, Ont., Canada
Canadian Roofing Mfg. Co., Ltd.
Windsor, Ont., Canada. (See page 104)
Lockport Paper Co. (See page 104)
Lockport, N. Y.
Peck Asphalt Shingle Co. (See page 104)
125 W. Jefferson Ave., Detroit, Mich.

Shovels—Hand

The Conneaut Shovel Co.
Conneaut, O.
The Wyoming Shovel Works
W. Eighth St., Wyoming, Pa.

Shovels—Power Driven

The Locomotive Crane Co. of America
Church and Victor St., Champaign, Ill.

Showers

Kenney-Cutting Products Corp.
507 Fifth Ave., New York, N. Y.

Shutters—Wood

The Aeroshade Co.
2398 Oakland Ave., Waukesha, Wis.

Shutter Workers

Mallory Manufacturing Co. ("Mallory's")
17 Bloomfield Ave., Flemington, N. J.

Silos

Baltimore Cooperage Co.
Ostend and Leadenhall Sts., Baltimore, Md.
Craine Silo Co., Inc.
27 Sheldon St., Norwich, N. Y.
Lansing Silo Co.
Lansing, Mich.
J. M. Preston Co.
Cor. Cedar and Hazel Sts., Lansing, Mich.

Skylights

American 3-Way Luxfer Prism Co.
Cicero, Ill.
The G. Drouve Co.
Bridgeport, Conn.
International Steel & Iron Co. (See page 106)
1239 Edgar St., Evansville, Ind.
Simon Ventilator Co., Inc.
101 Park Ave., New York, N. Y.

Slate Roofing

Vendor Slate Co. (See page 115)
Easton, Pa.

Slate—Structural

The Auld & Conger Co.
942 Prospect Ave., Cleveland, O.
Bangor Fidelity Slate Co.
Bangor, Pa.
Belmont Slate Co.
Bangor, Pa.
Blue Mountain Slate Mfg. Co.
Slatington, Pa.
Norton Brs.
46 Main St., Granville, N. Y.
Phoenix Slate Co.
Wind Gap, Pa.
Pennsylvania Structural Slate Co., Inc.
Drake Bldg., Easton, Pa.
Servicised Products Co. (See page 85)
1528 First Nat'l Bank Bldg., Chicago, Ill.
The Slatington-Bangor Slate Syndicate, Inc.
Slatington, Pa.
The Structural Slate Co.
Pen Argyl, Pa.

Softeners—Water

Graver Corporation
4809 Todd Ave., East Chicago, Ind.
Thomas & Baird
231 Tuscarawas St., W., Canton, O.
Warriner Sales Co.
107 W. Lewis St., Fort Wayne, Ind.

Squares—Steel

Sargent & Co. (See page 100)
45 Water St., New Haven, Conn.

Stains—Cement

Calvert Mortar Color Works
Warner and Wooster Sts., Baltimore, Md.
Pecora Paint Co.
4th, Sedgley and Venango Sts., Philadelphia, Pa.

Stains—Shingle

Parker, Preston & Co., Inc.
22-24 Ferry St., Norwich, Conn.
Robeson Preserve Co.
P. O. Box 193, Port Huron, Mich.

Stains—Wood

Creo-Dipt Co., Inc.
Oliver St., N. Tonawanda, N. Y.
James B. Day & Co.
224-26 W. Superior St., Chicago, Ill.
S. C. Johnson & Son. (See page 79)
Racine, Wis.
Valentine & Co.
456 Fourth Ave., New York, N. Y.

Stairways—Movable

The Ressler Movable Stairway Co.
1900 E. Market St., Akron, O.

Write the manufacturers or NATIONAL BUILDER for further information

BUYER'S GUIDE—Continued

Steel Buildings

Eslien Sheet Metal Works
1001 30th St., Milwaukee, Wis.
Milliken Brothers Manufacturing Co.
233 Broadway, New York, N. Y.
C. D. Pruden Corporation
Bayard and Warner Sts., Baltimore, Md.
The Steel Fabricating Corp.
Michigan City, Ind.

Steel—Structural

The Engineering Co.
1600 Winter St., Fort Wayne, Ind.
The Enterprise Iron Works
226 W. William St., Albert Lea, Minn.
Federal Window Co.
221 Grand Ave., Milwaukee, Wis.
International Steel & Iron Co. (See page 106)
1239 Edgar St., Evansville, Ind.
Lewis-Hall Iron Works
Ferry Ave. and Grand Trunk Ry., Detroit, Mich.
McClintic-Marshall Co.
1201 Oliver Bldg., Pittsburgh, Pa.
National Bridge Works
Review Ave., Long Island City, N. Y.
Joseph T. Ryerson & Son
16th and Rockwell Sts., Chicago, Ill.
Western Iron & Foundry Co.
702 E. Second St., Wichita, Kan.

Stock—Dimension

The Long-Bell Lumber Co. (See page 108)
Kansas City, Mo.

Store Fronts—Copper

Brasco Manufacturing Co. (See page 11)
5025 S. Wabash Ave., Chicago, Ill.
Detroit Show Case Co. (See page 94)
1652-94 W. Fort St., Detroit, Mich.
International Steel & Iron Co. (See page 106)
1239 Edgar St., Evansville, Ind.
The Kawneer Co.
North Front St., Niles, Mich.

Storm Sash and Screen Devices

A. N. Miller
3915 Pabst Ave., Milwaukee, Wis.

Stoves

American Stove Co.
Lorain, O.
Beckwith Co.
Dowagiac, Mich.
Geo. M. Clark Stove Co.
179 N. Michigan Ave., Chicago, Ill.
Fuller & Warren Co.
River and Moproe St., Troy, N. Y.
Kalamazoo Stove Co.
Rochester Ave., Kalamazoo, Mich.
Leonard Hi-Oven Range Co.
Indianapolis, Ind.
Moore Brothers Co.
Benton St., Joliet, Ill.
Michigan Stove Co.
3310 E. Jefferson Ave., Detroit, Mich.

Stoves—Sand Drying

Indiana Foundry Co. (See page 111)
Indiana, Penn.

Stucco

American Materials Co.
101 Park Ave., New York, N. Y.
("Elastica"—See page 108)
American Ponzolana Co.
205 Knights of Pythias Bldg., Indianapolis, Ind.
Art Stucco Materials Co.
("Elastica"—See page 108)
12854 Oakland Ave., Detroit, Mich.
Flint Rock Corporation. ("Flint Rock")
Ingomar, O.
Independent Gravel Co.
Frisco Bldg., Joplin, Mo.
Franklyn R. Muller & Co. (See page 104)
Waukegan, Ill.
National Kellastone Co. (See page 109)
155 E. Superior St., Chicago, Ill.
North-West Materials Co.
St. Paul, Minn. ("Elastica"—See page 108)
The Rockbond Co. (See page 6)
Van Wert, O.
Wisconsin Lime & Cement Co.
Conway Bldg., Chicago, Ill.
("Elastica"—See page 108)

Stucco Base

Bishopric Manufacturing Co. (See page 1)
3 Este Ave., Cincinnati, O.
Richolt Bros.
Holgate, O.

Stucco Boards

Bishopric Manufacturing Co. (See page 1)
3 Este Ave., Cincinnati, O.
Servicised Products Co. (See page 85)
1528 First Nat'l Bank Bldg., Chicago, Ill.

Stucco Machines

Goodrich-Morris Co.
326 Longworth St., Cincinnati, O.

Surfacers

American Floor Surfacing Machine Co.
515 S. St. Clair St., Toledo, O.
(See page 8)
M. L. Schleuter. (See page 117)
222 W. Illinois St., Chicago, Ill.
Triple "A" Machine Co. (See page 117)
4601 Ravenswood Ave., Chicago, Ill.

Surfacing Machines—Concrete

The Concrete Surfacing Machinery Co.
2502 Union Central Bldg., Cincinnati, O.

Surfacing Machines—Desk and Table

American Floor Surfacing Machine Co.
515 S. St. Clair St., Toledo, O.
(See page 8)

Surfacing Machines—Floor (Electric)

American Floor Surfacing Machine Co.
515 S. St. Clair St., Toledo, O.
(See page 8)
Electric Rotary Machine Co. (See page 117)
32-40 S. Clinton St., Chicago, Ill.
M. L. Schleuter. (See page 117)
222 W. Illinois St., Chicago, Ill.
Wayvell-Chappell & Co. (See page 117)
40 N. Jackson St., Waukegan, Ill.

Surfacing Machines—Floor (Hand)

American Floor Surfacing Machine Co.
515 S. St. Clair St., Toledo, O.
(See page 8)
Triple "A" Machine Co. (See page 117)
4601 Ravenswood Ave., Chicago, Ill.

Surfacing Material—Concrete

Jasperite Co.
618 Keeline Bldg., Omaha, Neb.

Swages—Saw

The Parks Ball Bearing Machine Co.
1540-46 Knowlton St., Cincinnati, O.
(See page 105)

Swimming Pool Systems

The Graver Corporation
4809 Todd Ave., East Chicago, Ind.

Switches—Electric

General Electric Co. (See page 81)
Schenectady, N. Y.
Square D Company
6090 Rivard St., Detroit, Mich.

Tables—Saw

American Saw Mill Machinery Co.
Hackettstown, N. J.
("American"—See page 102)
C. H. & E. Manufacturing Co., Inc.
Clinton and Mineral Sts., Milwaukee, Wis.
(See page 96)
Hendley & Whittemore Co.
State St., Box 444, Beloit, Wis.

Tablets—Bronze

Albert Russell & Sons Co.
129 Merrimac St., Newburyport, Mass.

Tanks—Cement Stave

A. L. Dice & Co.
West Liberty, Ia.

Tanks—Flush

Pacific Flush-Tank Co.
149 Broadway, New York, N. Y.

Tanks—Pneumatic Water

W. E. Caldwell Co. ("Caldwell")
Louisville, Ky.
Dayton Pump & Mfg. Co.
Dayton, O.
Duro Pump & Mfg. Co.
Dayton, O.
Ft. Wayne Engineering & Mfg. Co.
Ft. Wayne, Ind.
Kewanee Private Utilities Co.
Kewanee, Ill.
Milwaukee Air Power Pump Co.
886 Third St., Milwaukee, Wis.
Rider-Ericsson Engineering Co.
Walden, N. Y.
Swanstrom Water System Co.
West Hammond, Ind.

Tanks—Septic

Cement Products Co.
Wilmington, N. C.
Kaustine Co., Inc.
745 Main St., Buffalo, N. Y.
Sanitary Engineering Co.
Box 1229, Charlotte, N. C.

Tanks—Steel and Iron

Butler Mfg. Co.
1324-26 Grand Ave., Kansas City, Mo.
Columbian Steel Tank Co.
1403-1633 W. 12th St., Kansas City, Mo.
Leader Iron Works
N. Jasper St., Decatur, Ill.
Littleford Bros.
453 E. Pearl St., Cincinnati, O.
New York Central Iron Works Co., Inc.
Hagerstown, Md.
The Pfalder Co.
217 Cutler Bldg., Rochester, N. Y.

Tanks—Storage

Graver Corporation
4809 Todd Ave., East Chicago, Ind.

Tapered Shingles

Beecher, Peck & Lewis. (See page 104)
Detroit, Mich.
Beckman-Dawson Roofing Co. (See page 104)
19 S. LaSalle St., Chicago, Ill.
Brantford Roofing Co., Ltd. (See page 104)
Brantford, Ont., Canada
Canadian Roofing Mfg. Co., Ltd.
Windsor, Ont., Canada. (See page 104)
Lockport Paper Co. (See page 104)
Lockport, N. Y.
Peck Asphalt Shingle Co. (See page 104)
125 W. Jefferson Ave., Detroit, Mich.

Tapes—Measuring

A. S. Aloe Co. (See page 107)
513 Olive St., St. Louis, Mo.

Tarpaulins

United States Tent & Awning Co.
231 N. Desplaines St., Chicago, Ill.

Temperature Regulators—Automatic

Gold Car Heating & Lighting Co.
220 36th St., Brooklyn, N. Y.

Terra Cotta

American Terra Cotta & Ceramic Co.
1701 Prairie Ave., Chicago, Ill.
Atlantic Terra Cotta Co.
350 Madison Ave., New York, N. Y.
L. Martinek Co.
Humphrey St., Corona, Long Island, N. Y.
Midland Terra Cotta Co.
133 W. Washington St., Chicago, Ill.
The Winkle Terra Cotta Co.
502 Century Bldg., St. Louis, Mo.

Terrazzo

F. E. Gates Marble & Tile Co.
2107 Adams St., Indianapolis, Ind.

Thresholds—Metal

Brasco Manufacturing Co.
5025 S. Wabash Ave., Chicago, Ill.
("Brasco"—See page 11)
Detroit Show Case Co. (See page 94)
1652-94 W. Fort St., Detroit, Mich.
Zouri Drawn Metals Co. (See page 98)
Chicago Heights, Ill.

Tile

Acme Tile Co.
Passaic, N. J.
Beaver Tile, Inc.
442 W. 42nd St., New York, N. Y.
The Carborundum Co.
Niagara Falls, N. Y.
Mason City Brick & Tile Co.
Mason City, Ia.

Tile—Faience

The Rookwood Pottery Co.
Mt. Adams St., Cincinnati, O.

Tile—Fireproof

United States Gypsum Co. (See page 95)
205 W. Monroe St., Chicago, Ill.

Tile—Floor and Wall

Acme Brick Co.
Adams Bldg., Danville, Ill.
Chas. F. Lorenzen Co.
521 W. Monroe St., Chicago, Ill.
Norton Co.
New Bond St., Worcester, Mass.
United States Gypsum Co. (See page 95)
205 W. Monroe St., Chicago, Ill.

BUYER'S GUIDE — Continued

Tile—Hollow Building

Dennison Interlocking Tile Corporation
518 Guardian Bldg., Cleveland, O.
W. E. Dunn Manufacturing Co. ("Duntile")
405 W. 23rd St., Holland, Mich.
Hollow Building Tile Association
1409 Conway Bldg., Chicago, Ill.
Kalamazoo Tank & Silo Co.
Harrison St., Kalamazoo, Mich.
National Fire Products Co.
Fulton Bldg., Pittsburgh, Pa.

Tile—Partitions

United States Gypsum Co. (See page 95)
205 W. Monroe St., Chicago, Ill.

Tile Machines—Cement Roofing

Brock Brothers Manufacturing Co.
4434 Hunt Ave., St. Louis, Mo.
Concrete Tile Mch. Co.
2137 S. 48th Ave., Cicero, Ill.

Tile Machines—Concrete

Anchor Concrete Machinery Co.
Adrian, Mich. ("Anchor"—See page 110)
Blystone Manufacturing Co.
Cambridge Springs, Pa.
Ideal Concrete Machinery Co. (See page 112)
Colerain and Monmouth, Cincinnati, O.
The Kent Machine Co.
N. Water St., Kent, O.

Tile—Metal

New York Metal Ceiling Co.
537-541 W. 24th St., New York, N. Y.

Tile—Roofing

American Cement Tile Mfg. Co.
824 Oliver Bldg., Pittsburgh, Pa.
Heinz Roofing Tile Co.
1740 Champa St., Denver, Colo.
D. Helmuth
1740 E. 12th St., Cleveland, O.
B. Mifflin Hood Brick Co.
154 Greenwood Ave., Atlanta, Ga.

Tiled Wallboard

Beaver Products Co., Inc.
Buffalo, N. Y.

Timbers

Exchange Sawmills Sales Co.
1116 R. A. Long Bldg., Kansas City, Mo.
Great Southern Lumber Co.
Bogalusa, La.
The Long-Bell Lumber Co. (See page 108)
Kansas City, Mo.

Tools—Carpenters

Crescent Tool Co.
Jamestown, N. Y.
Delta File Works
4837 James St., Philadelphia, Pa.
Goodell-Pratt Co.
Wells St., Greenfield, Mass.
North Bros. Mfg. Co. ("Yankee")
Lehigh Ave. and American St., Philadelphia, Pa.
National Metal Products Co.
Indianapolis, Ind.
Parker Supply Co. (See page 107)
785 E. 135th St., New York, N. Y.
Nicholson File Co.
23 Acorn St., Providence, R. I.
Rock Island Manufacturing Co.
15th Ave. and First St., Rock Island, Ill.
The L. S. Starrett Co.
Athol, Mass.
The Stanley Works
195 Lake St., New Britain, Conn.
Syracuse Twist Drill Co.
934-938 Grape St., Syracuse, N. Y.
The James Swan Co. (See page 113)
279 Bank St., Seymour, Conn.
The Will-Burt Co.
684 N. Main St., Orrville, O.
Winsted Edge Tool Co.
32 Lake St., Winsted, Conn.

Tools—Cement Workers

Abram Cement Tool Co.
2818 Grand River Ave., Detroit, Mich.
S. Cheney & Son. (See page 110)
Box 37, Manlius, N. Y.
Goldblatt Tool Co.
1522 Walnut St., Kansas City, Mo.
Marshalltown Manufacturing Co.
Marshalltown, Ia.

Tools—Mechanics

Mayhew Steel Products Co., Inc.
291 Broadway, New York, N. Y.

The Southington Mfg. Co.
Bristol St., Southington, Conn.
The James Swan Co. (See page 113)
279 Bank St., Seymour, Conn.

Track—Door

McKinney Mfg. Co. (See page 12)
Metropolitan and Liverpool Sts., Pittsburgh, Pa.

Trailers

Detroit Trailer Co.
954 E. Milwaukee Ave., Detroit, Mich.
Highway Trailer Co.
Fulton St., Edgerton, Wis.
King Trailer Co.
635 S. Main St., Ann Arbor, Mich.
Martin Rocking Fifth Wheel Co.
21 N. Besse Pl., Springfield, Mass.
The Miami Trailer Co.
Troy, O.
Standard Trailer Co.
162 Grant St., Cambridge Springs, Pa.
The Trailmobile Co.
34th and Robertson Rd., Oakley, Cincinnati, O.
The D. Wilcox Mfg. Co.
Mechanicsburg, Pa.

Transformers

General Electric Co. (See page 81)
Schenectady, N. Y.

Transits

Warren-Knight Co. (See page 116)
136 N. 12th St., Philadelphia, Pa.
Wissler Instrument Co. (See page 117)
627 Broadway, St. Louis, Mo.

Trim—Interior (Hardwood)

Exchange Sawmills Sales Co.
1116 R. A. Long Bldg., Kansas City, Mo.

Trim—Interior (Metal)

Brasco Manufacturing Co.
5025 S. Wabash Ave., Chicago, Ill.
("Brasco"—See page 11)

Trim—Interior (Wood)

Arkansas Soft Pine Bureau
801 Boyle Bldg., Little Rock, Ark.

Truck Bodies—Demountable

American Truck Body Co., Inc.
Martinsville, Va. ("Fontaine")
J. L. Clark Manufacturing Co.
519 High St., Oshkosh, Wis.

Trucks—Motor

Four Wheel Drive Auto Co.
Clintonville, Wis.
Federal Motor Truck Co.
5780 Federal St., Detroit, Mich.
General Motors Truck Co.
Pontiac, Mich.
Graham Brothers
1256 Meldrum St., Detroit, Mich.
Garford Motor Truck Co.
Wapak Road, Lima, O.

Trusses—Roof

McKeown Brothers Co.
112 W. Adams St., Chicago, Ill.
Summerbell Truss Co.
30 N. LaSalle St., Chicago, Ill.

Vacuum Cleaners

Electric Vacuum Cleaner Co., Inc.
Ivanhoe Rd. and Euclid Ave., Cleveland, O.
Landers, Frary & Clark
Connersville, Ind.
Spencer Turbine Co.
Asylum St., Hartford, Conn.

Valves—Air

The Dole Valve Co.
1923 Carroll Ave., Chicago, Ill.
Jenkins Bros. ("Jenkins")
80 White St., New York, N. Y.
Romort Manufacturing Co.
Chicago, Ill.

Vapor Heating Specialties

Gorton & Lidgerwood Co.
96 Liberty St., New York, N. Y.
Hoffman Specialty Co.
512 Fifth Ave., New York, N. Y.
The Trane Co.
LaCrosse, Wis.

Varnish

Boston Varnish Co.
Everett Station, Boston, Mass.
Berry Brothers
Detroit, Mich.

The Glidden Co.
Madison Ave. and Berea Rd., Cleveland, O.
S. C. Johnson & Son. (See page 79)
Racine, Wis.
John Lucas & Co., Inc.
48 N. 12th St., Philadelphia, Pa.
Murphy Varnish Co.
224 McWhorter St., Newark, N. J.
National Paint & Varnish Co.
8709 Kinsman Rd., Cleveland, O.
O'Brien Varnish Co.
South Bend, Ind.
Pratt & Lambert, Inc.
320 W. 26th St., Chicago, Ill.

Veneers

American Walnut Manufacturers' Association
616 S. Michigan Ave., Chicago, Ill.
Hardwood Products Corporation
Lake St., Neenah, Wis.
The North Western Coopers & Lumber Co.
Gladstone, Mich.
Roddie Lumber & Veneer Co.
Marshfield, Wis.
United States Plywood Co.
314 W. 16th St., New York, N. Y.
Wood-Mosaic Co. (See page 108)
New Albany, Ind.

Ventilating Systems

Carrier Engineering Corp.
750 Frelinghuysen Ave., Newark, N. J.

Ventilators—Apartment

Buckeye Blower Co.
427-457 W. Town St., Columbus, O.

Ventilators—Barn

W. C. Hopson Co. (See page 119)
Grand Rapids, Mich.

Ventilators—Factory

Globe Ventilator Co.
205 River St., Troy, N. Y.

Ventilators—Roof

American-Larson Ventilating Co.
Pittsburgh, Pa.
The Burt Manufacturing Co.
929 S. High St., Akron, O.
Iona Ventilator Co., Inc.
2821 W. Dauphin St., Philadelphia, Pa.
Milwaukee Corrugating Co.
36th Ave. and Burnham St., Milwaukee, Wis. (See inside back cover)
Royal Ventilator Co.
415 Locust St., Philadelphia, Pa.

Ventilators—Steel Sash

Brasco Manufacturing Co. (See page 11)
5025 S. Wabash Ave., Chicago, Ill.
Zouri Drawn Metals Co. (See page 98)
Chicago Heights, Ill.

Ventilators—Store Front

Brasco Manufacturing Co. (See page 11)
5025 S. Wabash Ave., Chicago, Ill.
Detroit Show Case Co. (See page 94)
1652-94 W. Fort St., Detroit, Mich.
Zouri Drawn Metals Co. (See page 98)
Chicago Heights, Ill.

Ventilators—Window

Walter B. Gilbert & Co.
201 Roosevelt Ave., York, Pa.
Ideal Ventilator Co.
160 Atlantic Ave., Providence, R. I.
Iowa Ventilator Mfg. Co.
Box 365, Waterloo, Ia.
The V-W Ventilator Co.
101 N. High St., Columbus, O.
Zouri Drawn Metals Co. (See page 98)
Chicago Heights, Ill.

Wallboards

Asbestos Shingle, Slate & Sheathing Co.
Ambler, Pa. (See inside front cover)
Beaver Products Co., Inc.
Buffalo, N. Y.
Bishopric Manufacturing Co.
3 Este Ave., Cincinnati, O.
("Bishopric"—See page 1)
Celotex Products Co. (See page 92)
Conway Bldg., Chicago, Ill.
Compo-Board Co. (See page 109)
5777 Lyndale Ave., E., Minneapolis, Minn.
Cornell Wood Products Co.
190 N. State St., Chicago, Ill.
Emerson Carey Fibre Products Co.
Hutchinson, Kan.
Niagara Wall Board Co.
36 W. Huron St., Buffalo, N. Y.
Plastergon Wallboard Co.
196 Philadelphia Ave., Buffalo, N. Y.
Servicised Products Co. (See page 85)
1528 First Nat'l Bank Bldg., Chicago, Ill.

If you don't see what you want, write to NATIONAL BUILDER for it

BUYER'S GUIDE—Continued

United States Gypsum Co. (See page 95)
205 W. Monroe St., Chicago, Ill.
United States Plywood Co., Inc.
314 W. 16th St., New York, N. Y.
The Upson Co.
Upson Point, Lockport, N. Y.

Wall Coverings

Alabastine Co.
1625 Grandville Ave., Grand Rapids, Mich.
American Materials Co.
101 Park Ave., New York, N. Y.
("Elastica"—See page 108)
Art Stucco Materials Co.
12854 Oakland Ave., Detroit, Mich.
("Elastica"—See page 108)
National Kellastone Co. (See page 109)
155 E. Superior St., Chicago, Ill.
North-West Materials Co.
St. Paul, Minn. ("Elastica"—See page 108)
The Robbond Co. (See page 6)
Van Wert, O.
Wisconsin Lime & Cement Co.
Conway Bldg., Chicago, Ill.
("Elastica"—See page 108)

Wall Hangers

The Duplex Hanger Co.
E. 53rd St. and Lakeside, Cleveland, O.

Wallpaper

Wallpaper Manufacturers' Association
461 Eighth Ave., New York, N. Y.

Wall Ties

Merwin Mfg. Co.
19th and German Sts., Erie, Pa.
Niagara Metal Stamping Corp.
Niagara Falls, N. Y.
Sykes Metal Lath & Roofing Co.
Niles, O. (See page 87)

Waste Disposal Systems

Kerner Incinerator Co. (See page 5)
1027 Chestnut St., Milwaukee, Wis.

Water Heaters

S. Wilkes Mfg. Co. (See page 118)
3525 Shields Ave., Chicago, Ill.

Waterproofing for Cement

Anti-Hydro Waterproofing Co.
9 Orchard St., Newark, N. J.
("Anti-Hydro")
The Bitu-Mortar Waterproofing Co., Inc.
280 Madison Ave., New York, N. Y.
Concrete Waterproof Paint Co.
829-35 N. 3rd St., Philadelphia, Pa.
Elastelite Paint & Manufacturing Co.
11th and Market Sts., Des Moines, Ia.
General Fireproofing Co. (See page 103)
Youngstown, O.
Granolithing Chemical Co.
1591 Taylor Ave., St. Paul, Minn.
The Lehon Co. (See page 109)
44th St., on Oakley Blvd., Chicago, Ill.
Richardson Co.
Lockland, Cincinnati, O.

Water Supply Systems

Dayton Pump & Mfg. Co.
500 Webster St., Dayton, O.
Duro Pump & Mfg. Co.
Dayton, O.
National Utilities Corp.
Bellevue Pl. and River St., Milwaukee, Wis.
Milwaukee Air Power Pump Co.
886 Third St., Milwaukee, Wis.
Swanstrom Water System Co.
Lincoln and Plummer Aves., Hammond, Ind.
Western Pump Co.
Front and Gaines Sts., Davenport, Ia.

Wax—Floor

The A. S. Boyle Co. ("Old English")
1934-40 Dana Ave., Cincinnati, O.
S. C. Johnson & Son. (See page 79)
Racine, Wis.

Weatherproofed Cement

The Sandusky Cement Co. (See page 93)
6026 Engineers Bldg., Cleveland, O.

Weatherstrips

Allmetal Weatherstrip Co.
126 W. Kinzie St., Chicago, Ill.
("Allmetal"—See page 107)
Chamberlain Metal Weatherstrip Co.
721 Third Ave., Detroit, Mich.
Concrete Engineering Co. (See page 108)
Omaha, Neb.
Diamond Metal Weatherstrip Co.
Columbus, O. (See page 90)

Federal Metal Weatherstrip Co.
1240 Fullerton Ave., Chicago, Ill.
(See page 119)

Sager Metal Weatherstrip Co.
162 W. Austin Ave., Chicago, Ill.
Henry Weatherstrip Co.
508 S. Elm St., Crawfordsville, Ind.

Weathervanes

E. G. Washburne & Co.
207 Fulton St., New York, N. Y.

Welding

The Alexander Milburn Co.
1420-28 W. Baltimore St., Baltimore, Md.
Lincoln Electric Co.
E. 38th St. and Kelley Ave., Cleveland, O.

Wheelbarrows

Sterling Wheelbarrow Co.
63rd at Pullen, Milwaukee, Wis.
Syracuse Chilled Plow Co., Inc.
111 Wyoming St., Syracuse, N. Y.
The Toledo Wheelbarrow Co.
Broadway and Wabash Ry., Cleveland, O.

White Lead

Carter White Lead Co.
12042 S. Peoria St., Chicago, Ill.
Eagle-Picher Lead Co.
208 S. LaSalle St., Chicago, Ill.
National Lead Co.
111 Broadway, New York, N. Y.

White Pine Frames

Andersen Lumber Co. (See page 4)
South Stillwater, Minn.

Winches—Boom

Sasgen Derrick Co. (See page 117)
3101 Grand Ave., Chicago, Ill.

Window Frame Machines

Atlas Manufacturing Co. of Orlando
Orlando, Fla.

Window Shade Rollers

Stewart Hartshorn Co.
250 5th Ave., New York, N. Y.

Windows—Casement

International Casement Co., Inc.
84 Hopkins Ave., Jamestown, N. Y.
Whitney Window Corp.
132 E. Lake St., Minneapolis, Minn.

Windows—Detachable

Safety Detachable Window Corp.
3009 Third Ave., Minneapolis, Minn.

Windows—Hollow Metal

Zouri Drawn Metals Co. (See page 98)
Chicago Heights, Ill.

Windows—Patent

Lunken Window Co.
4006 Cherry St., Cincinnati, O.

Windows—Puttyless

Gould Manufacturing Co.
Oshkosh, Wis.

Windows—Steel

Detroit Steel Products Co.
2250 E. Grand Blvd., Detroit, Mich.

Wire and Cables (Electric)

General Electric Co. (See page 81)
Schenectady, N. Y.

Wiring Devices—Electric

The Arrow Electric Co.
Hartford, Conn.
The Bryand Electric Co.
1421 State St., Bridgeport, Conn.
General Electric Co. (See page 81)
Schenectady, N. Y.
Hart & Hageman Manufacturing Co.
342 Capitol Ave., Hartford, Conn.
Pass & Seymour, Inc.
Boyd Ave., Solvay, N. Y.
Sprague Electric Works of General Electric Co.
527 W. 34th St., New York, N. Y.
George Richards & Co.
557 W. Monroe St., Chicago, Ill.

Wood—Asbestos

Asbestos Shingle, Slate & Sheathing Co.
Ambler, Pa. (See inside front cover)

Wood Preservers

The Conrad Wood Preserving Co.
Minneapolis, Minn.
The Stark Manufacturing Co.
First and Main Sts., Kansas City, Mo.

Woodwork

Bertelsen Adjustable Grille Co.
2117 Troy St., Chicago, Ill. (See page 119)
Curtis Companies' Service Bureau
1200 S. 2nd St., Clinton, Ia.
Exchange Sawmills Sales Co.
1116 R. A. Long Bldg., Kansas City, Mo.

Woodworkers—Contractors'

American Saw Mill Machinery Co.
Hackettstown, N. J.
("American"—See page 102)

Woodworkers—Variety

American Saw Mill Machinery Co.
Hackettstown, N. J.
("American"—See page 102)
Sidney Machine Tool Co. (See page 112)
Sidney, O.

Woodworking Machinery—Foot and Hand Power

W. F. & John Barnes Co. (See page 116)
436 Ruby St., Rockford, Ill.
W. B. & J. E. Boice
114 23rd St., Toledo, O.
The Jones Superior Machine Co.
126 W. North Ave., Chicago, Ill.
Oliver Machinery Co.
1025 Clancy Ave., Grand Rapids, Mich.
Sidney Machine Tool Co. (See page 112)
Sidney, O.
The Silver Manufacturing Co.
340 Broadway, Salem, O.

Woodworking Machinery—Power Driven

American Saw Mill Machinery Co.
Hackettstown, N. J.
("American"—See page 102)
The P. L. Billingsley Co.
425-427 Elm St., Cincinnati, O.
Buss Machine Works
199 W. 8th St., Holland, Mich.
Beach Manufacturing Co.
Montrose, Pa.
C. H. & E. Manufacturing Co., Inc.
Clinton and Mineral Sts., Milwaukee, Wis.
(See page 96)
Hutchinson Mfg. Co.
Norristown, Pa.
Ingersoll Milling Machine Co.
Rockford, Ill.
The Parks Ball Bearing Machine Co.
1540-45 Knowlton St., Cincinnati, O.
(See page 105)
Sidney Machine Tool Co. (See page 112)
Sidney, O.
J. D. Wallace & Co.
1401-17 W. Jackson Blvd., Chicago, Ill.
A. D. Waymoth & Co.
Fitchburg, Mass.
The Woodworker Mfg. Co. (See page 99)
612 Brush St., Detroit, Mich.
P. B. Yates Machine Co.
Beloit, Wis.

Woodworking Machinery—Second-Hand

The Noble Machine Co.
902 Hayden St., Ft. Wayne, Ind.
Sidney Machine Tool Co. (See page 112)
Sidney, O.

Woodworking Machinery—Universal

C. H. & E. Manufacturing Co., Inc.
Clinton and Mineral Sts., Milwaukee, Wis.
(See page 96)
J. A. Fay & Egan Co.
401 Front St., Cincinnati, O.
The Woodworker Mfg. Co. (See page 99)
612 Brush St., Detroit, Mich.

Wool—Mineral

U. S. Mineral Wool Co.
280 Madison Ave., New York, N. Y.

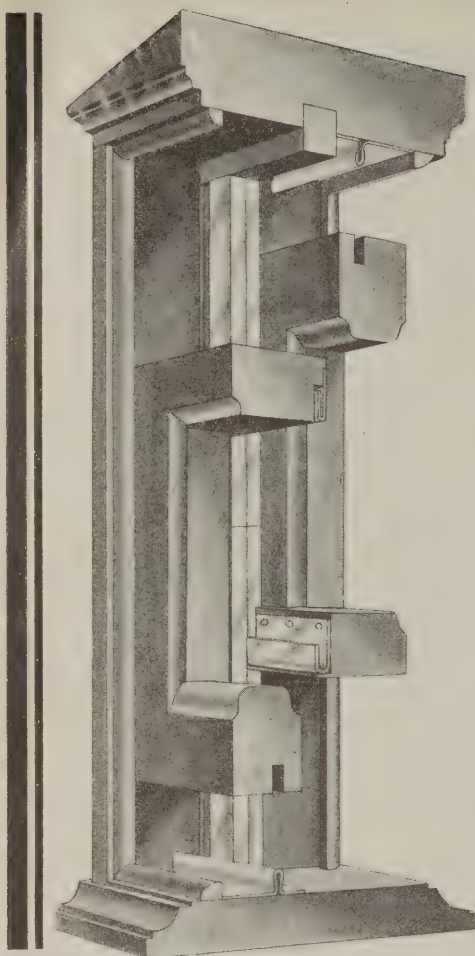
Wrapping Paper

Brown Co. (See front cover)
Portland, Me.

Zinc Shingles

Cortright Metal Roofing Co.
50 N. 23rd St., Philadelphia, Pa.
(See page 118, 119)
Illinois Zinc Co.
332 S. Michigan Ave., Chicago, Ill.
The New Jersey Zinc Co.
160 Front St., New York, N. Y.

See page —, refers to an advertisement. Read it for further information



SAGER

Metal Weatherstrip

This is a real, live, red hot proposition, an opportunity to identify yourself with a quality product that has a high reputation the country over, and a chance to do business with a company which has a long record for honesty and fair dealing; a company which backs up its product in every way.

We want men who will maintain a selling and installing agency.

This is not a fly-by-night concern, marketing a doubtful product. It is the best and fastest selling weatherstrip made, and the far-seeing men who answer this ad will benefit materially.

Write today for full details

Sager Metal Weatherstrip Co.
168 West Austin Ave., Chicago

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The New Stay-Rib

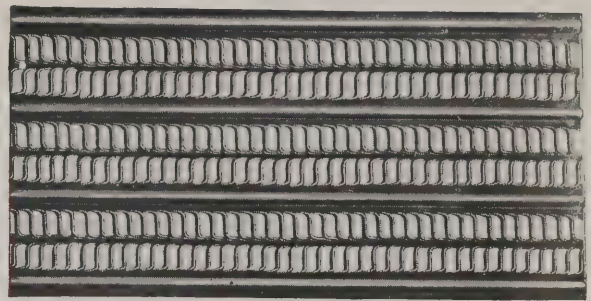
METAL LATH

Has reinforcing ribs $\frac{1}{2}$ inch wide and $1\frac{3}{4}$ inch apart, center to center, which makes a rigid, flat, strong lath, permitting wide spacing of studs, joists and channels, and effects a big saving in time, labor and material.

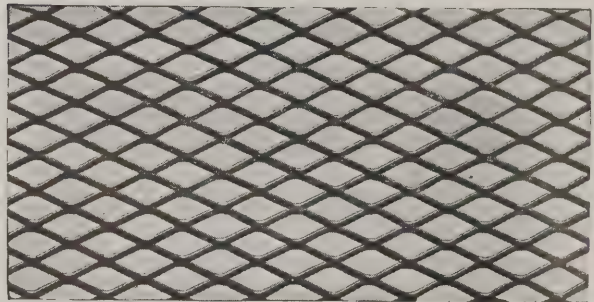
EFFECTS A BIG SAVING IN TIME, LABOR AND MATERIAL

It permits scratching in of the mortar and doubling back from same scaffold. This is practically two-coat work and means a very decided economy in both mortar and labor.

All our steel lath is heat treated and reannealed after cutting, which gives the metal longer life and greater strength



Stay-Rib Metal Lath. Size of Sheet, 24x96. Furnished in Open Hearth Steel, Painted



"Netmesh" Metal Lath. Furnished in sizes 24x96 and 30x96 inches. Open Hearth Steel, Painted or Galvanized After Formed. Also Furnished in Copper and Zinc, for Exterior Use, with Stucco

The Popular "Expansion" Family



No. 1 Bead
For Outer Angle of Plastered Wall
Patented June 13, 1922

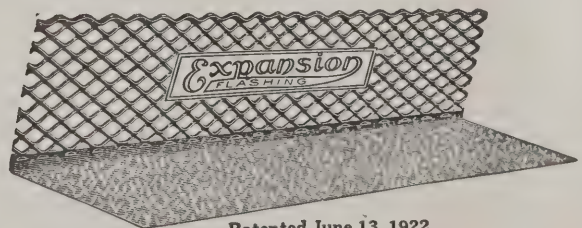
Also Furnished in 16 oz. Copper or No. 12 Pure Zinc



Patented June 13, 1922
Expansion Window and Door Casing, with O. G. Mould.
Also Made with $\frac{1}{4}$ -Round Mould
Expansion Casings Also Made in 16 oz. Cold Rolled Copper, or No. 12 Pure Zinc



Patented June 13, 1922
"Expansion" Base Screed No. 3 Made of Tight Coat Galvanized Steel



Patented June 13, 1922
Flashing No. 7—For Use with Exterior Stucco. Also Furnished in 16 oz. Copper or No. 12 Pure Zinc, as Well as Tight Coat Galvanized Steel

WRITE FOR CIRCULARS AND PRICES

MILWAUKEE CORRUGATING CO.

Milwaukee, Wis.

Branch Office and Factory at Kansas City, Mo.
Minneapolis Sales Office: Lumber Exchange

Samples of Any of Our Specialties Sent on Request



The Big 4

BARN DOOR HANGER

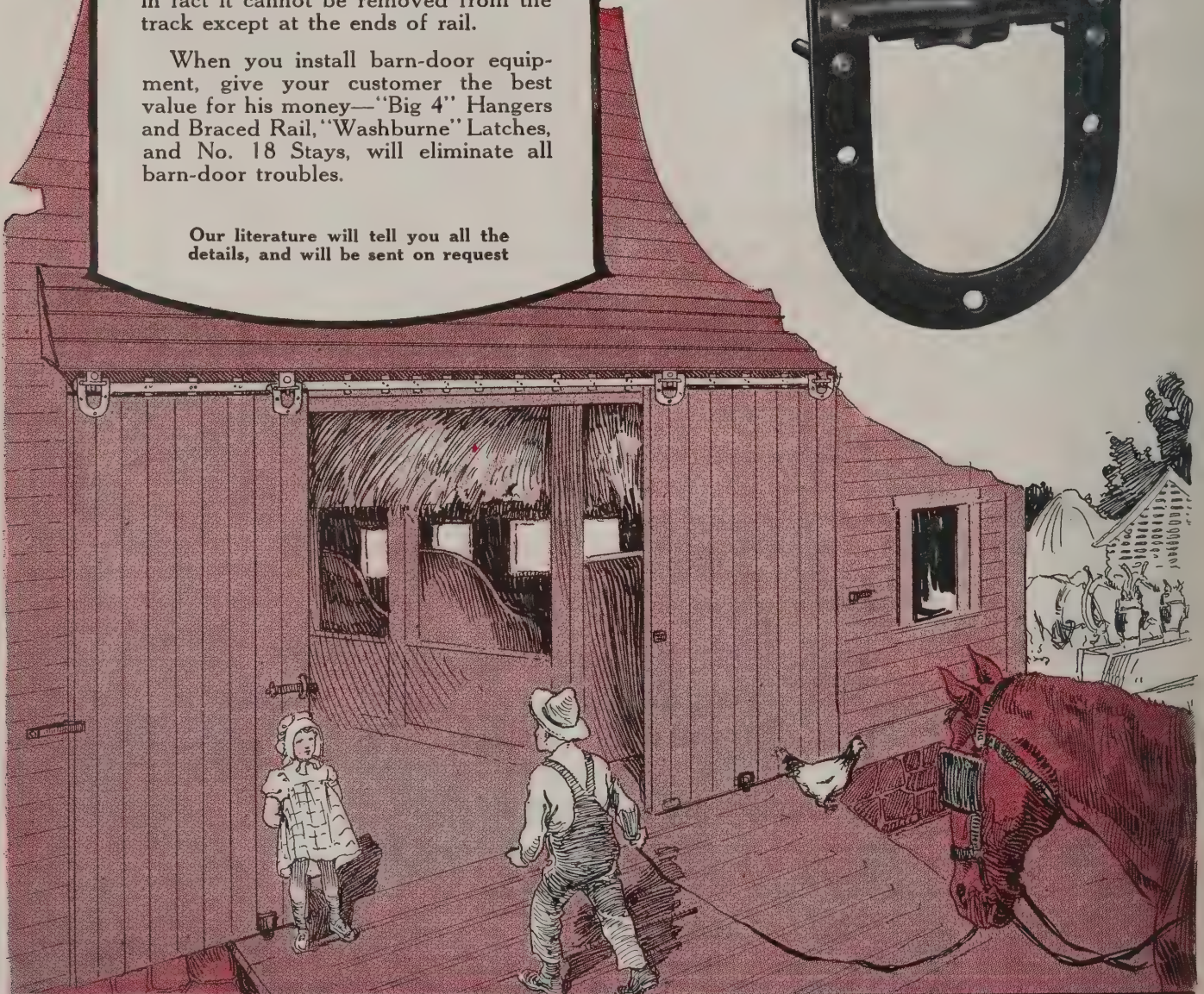
The "Big 4" Hangers are simple in construction, and built on extremely heavy lines. There are no complicated parts to get out of order, and they are all-steel, with anti-friction steel roller bearings.

The "Big 4" is both a flexible and rigid hanger. If anything runs against the door, the hanger allows it to swing out and raise higher than with any other door hanger.

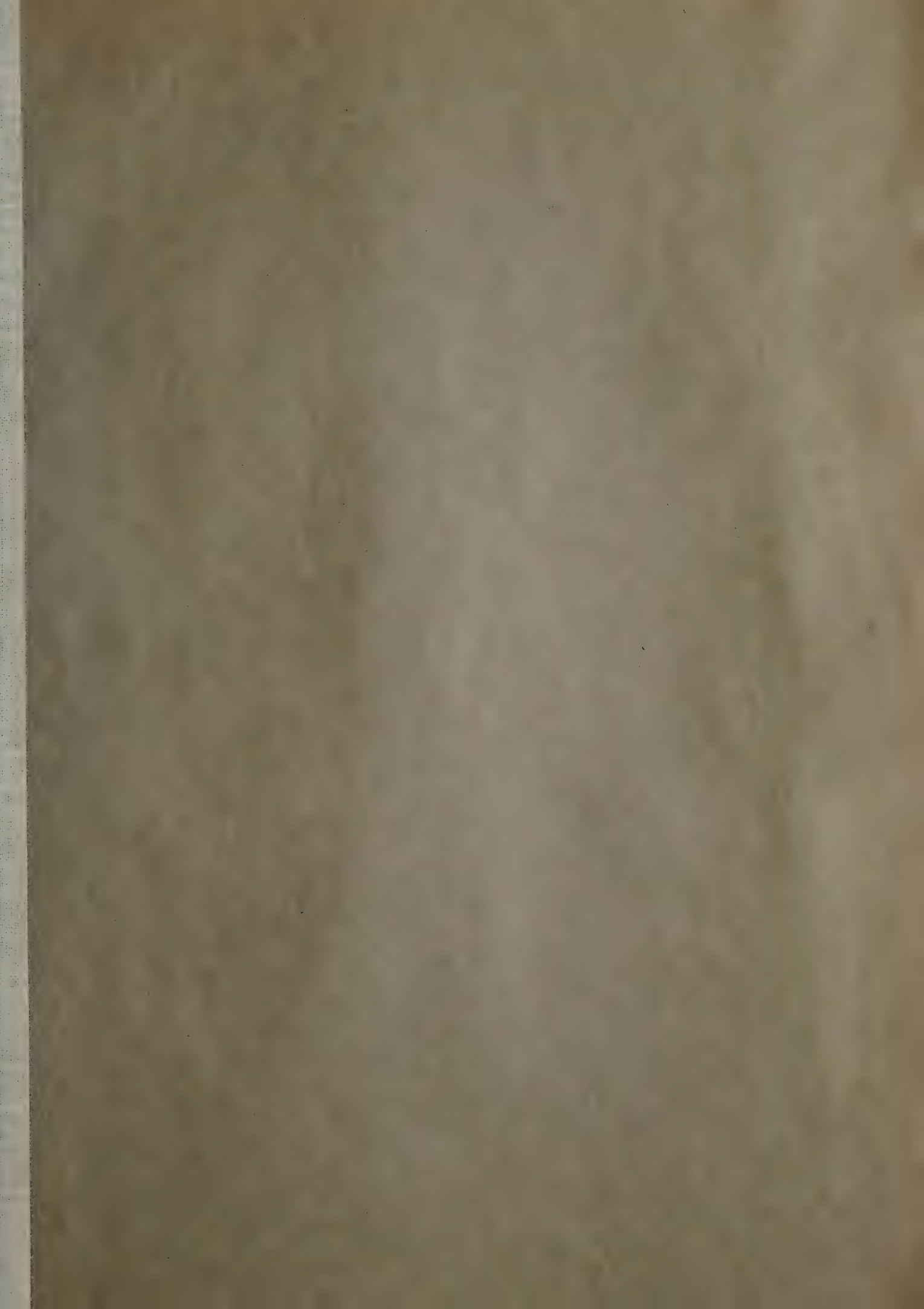
The "Big 4" cannot jump the track, in fact it cannot be removed from the track except at the ends of rail.

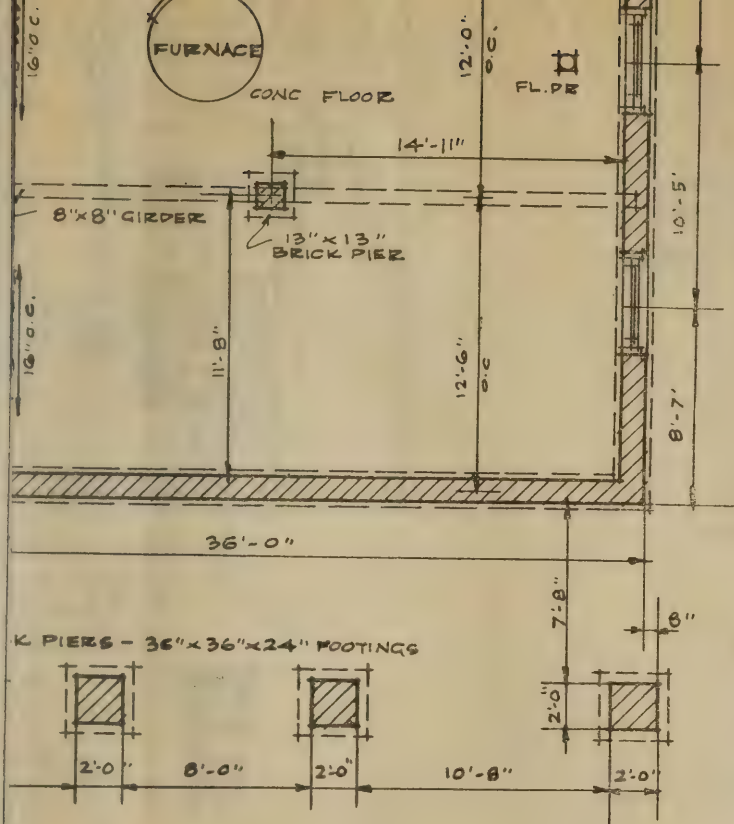
When you install barn-door equipment, give your customer the best value for his money—"Big 4" Hangers and Braced Rail, "Washburne" Latches, and No. 18 Stays, will eliminate all barn-door troubles.

Our literature will tell you all the details, and will be sent on request



NATIONAL MANUFACTURING CO., Sterling, Ill





BASEMENT - PLAN
SCALE $\frac{1}{8}" = 1'-0"$

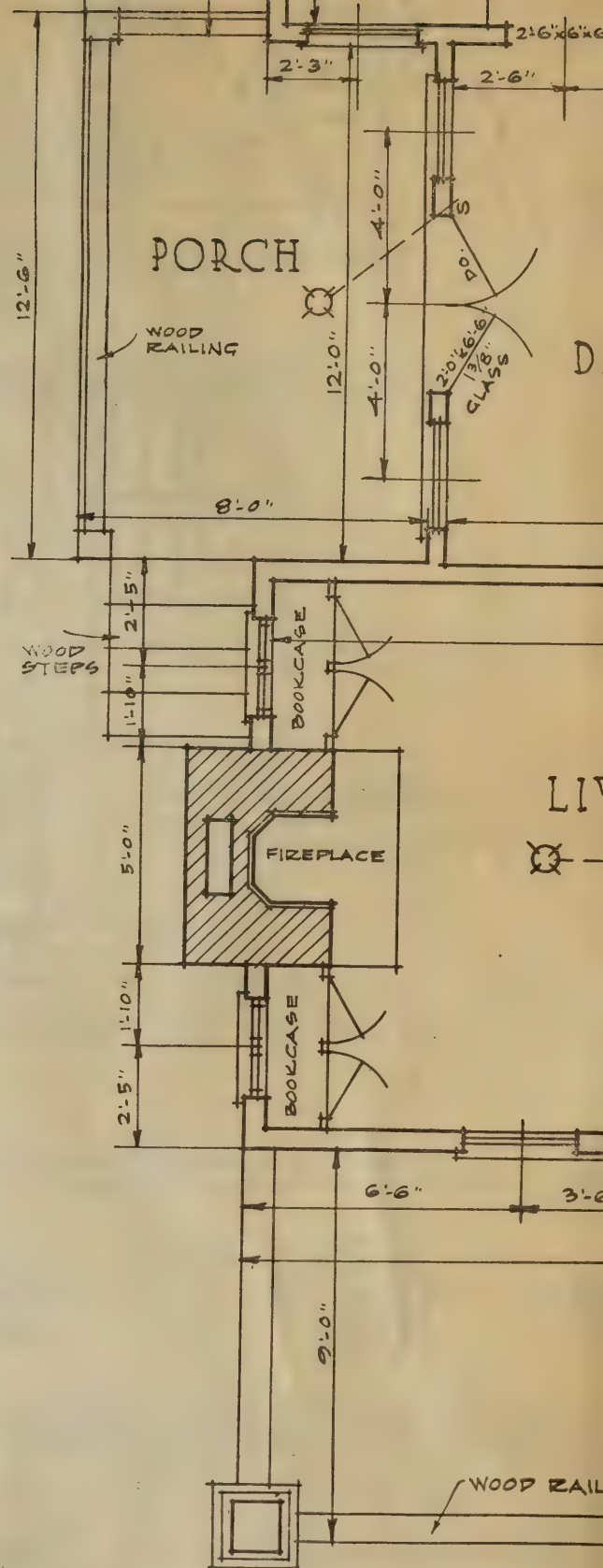
ional Builder

February, 1922

Kansas Bungalow

L. F. GARLINGHOUSE
Designer and Builder

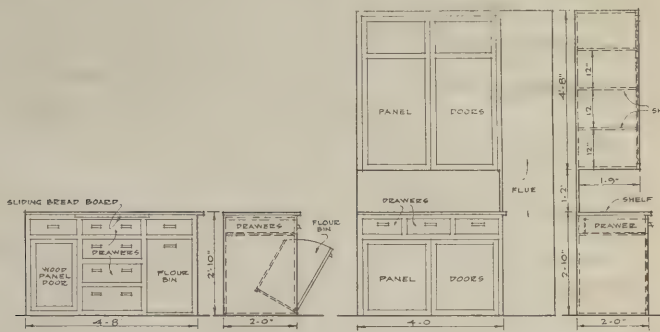
First floor plans, 1-4 inch equals 1 foot;
Second and Attic plans, and Elevations,
1-4 inch equals 1 foot. Detail dimensions as marked



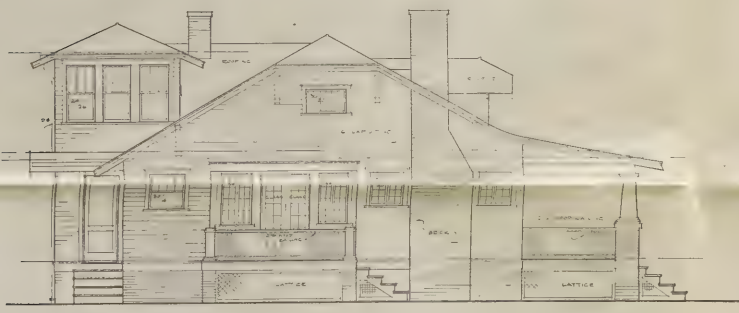
FIRST FLOOR
PLAN
SCALE $\frac{1}{4}" = 1'-0"$



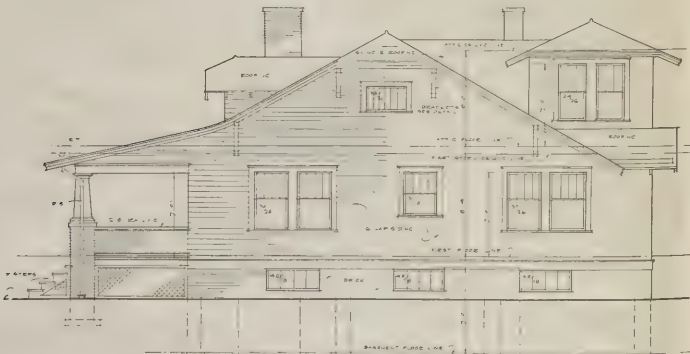
MANTEL AND BOOKCASES IN LIVING ROOM



COUNTER IN KITCHEN CABINET IN KITCHEN



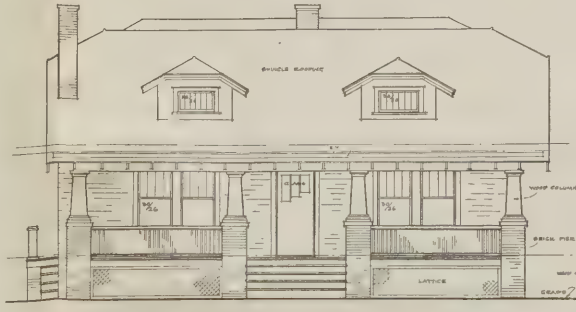
LEFT SIDE ELEVATION



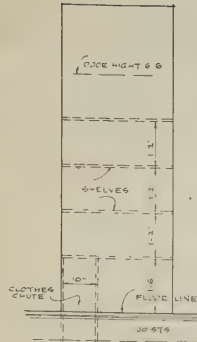
RIGHT SIDE ELEVATION



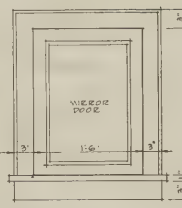
REAR ELEVATION



FRONT ELEVATION



CLOTHES CHUTE IN LINEN CLOSET



MEDICINE CABINET

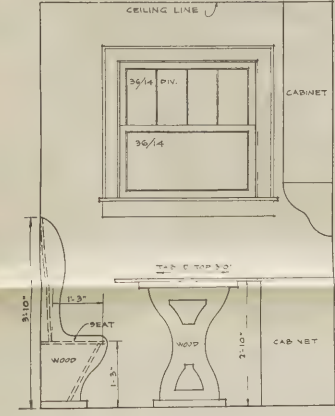
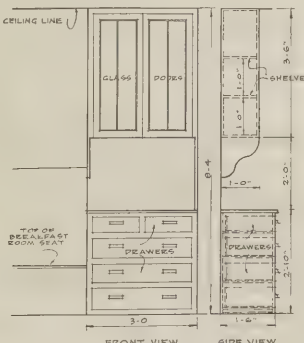
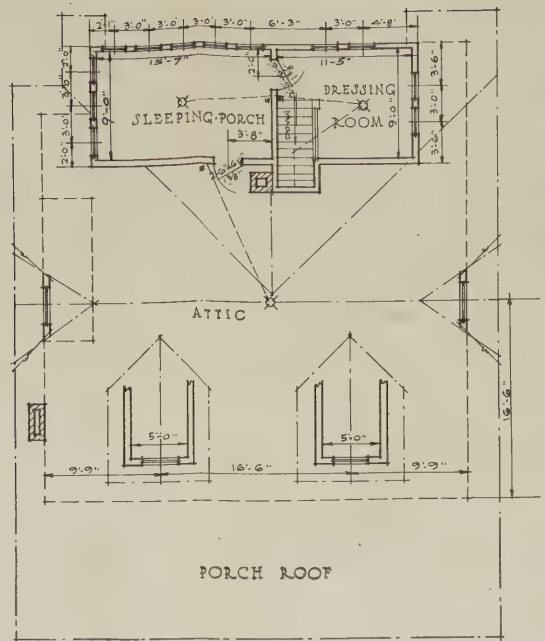


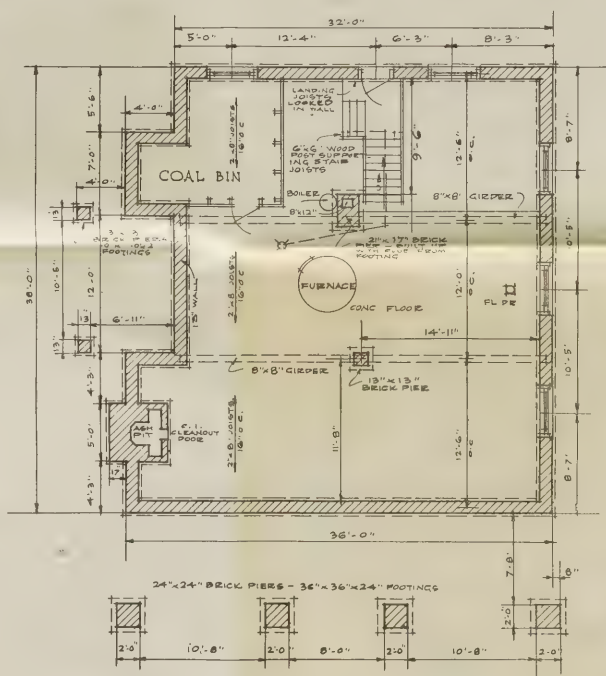
TABLE & SEATS IN BREAKFAST ROOM



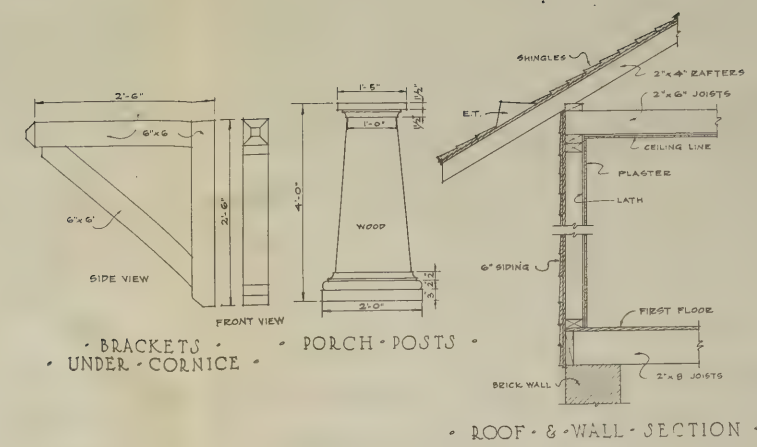
CABINET IN BREAKFAST ROOM



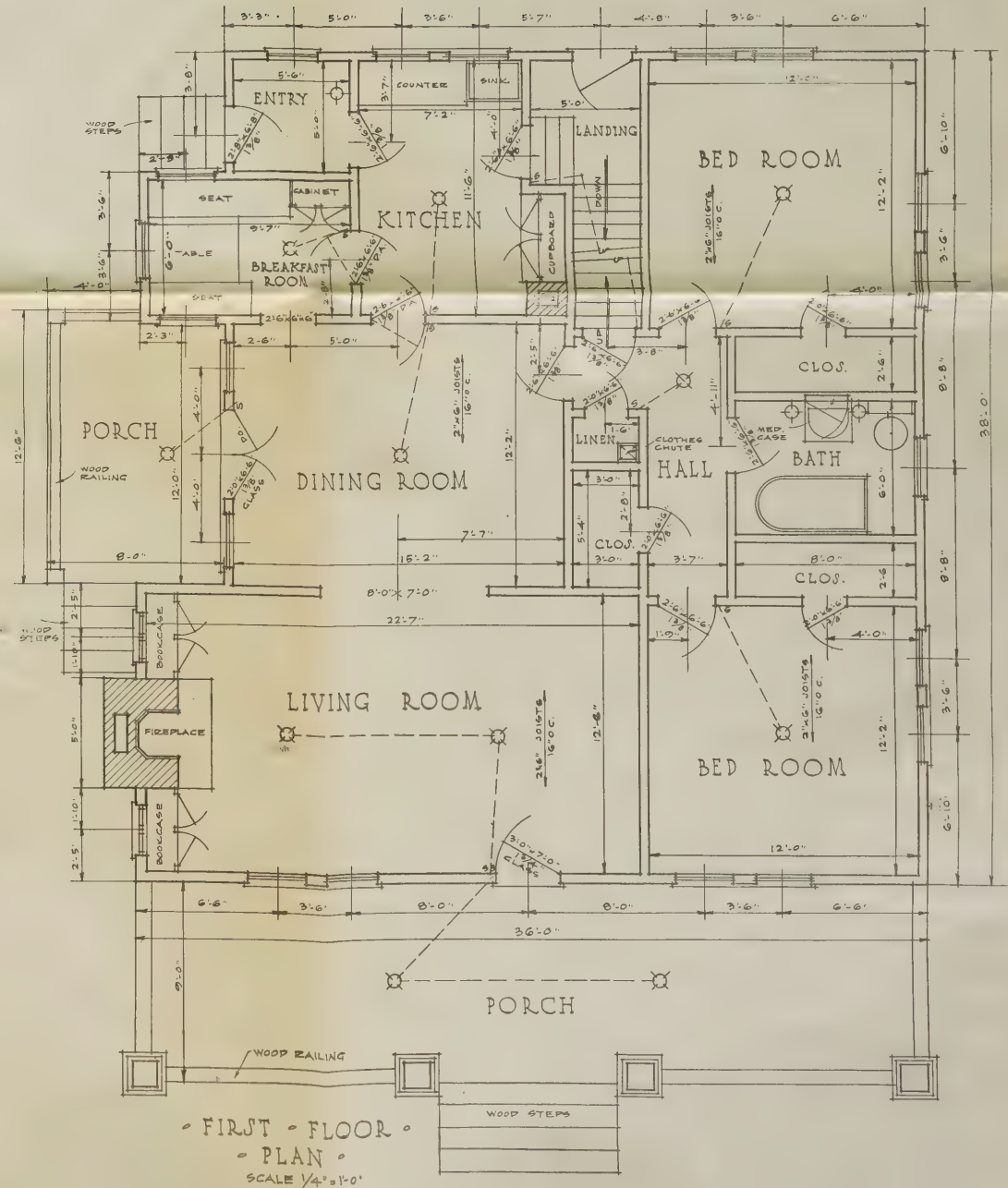
ATTIC PLAN
SCALE 1/8" = 1'-0"



BASEMENT PLAN
SCALE 1/8" = 1'-0"



ROOF & WALL SECTION



FIRST FLOOR PLAN
SCALE 1/4" = 1'-0"

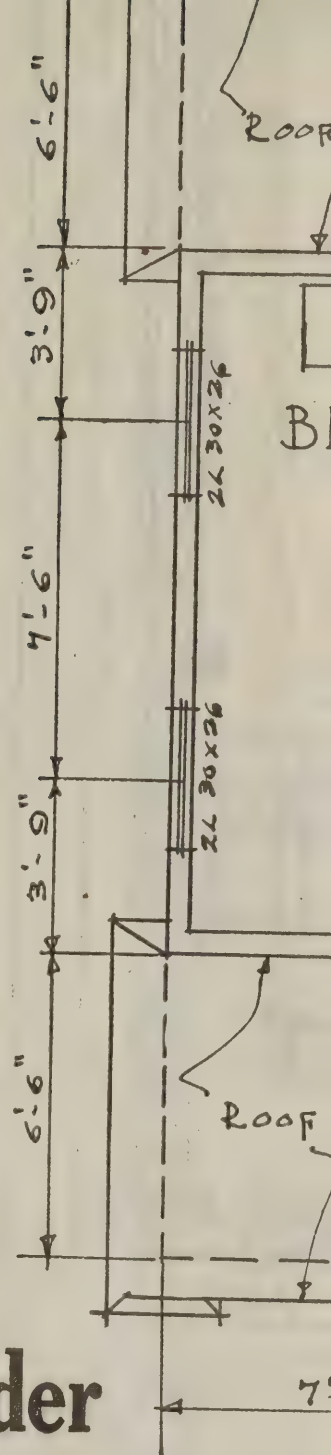
National Builder

February, 1922

A Popular
Kansas Bungalow

L. F. GARLINGHOUSE
Designer and Builder

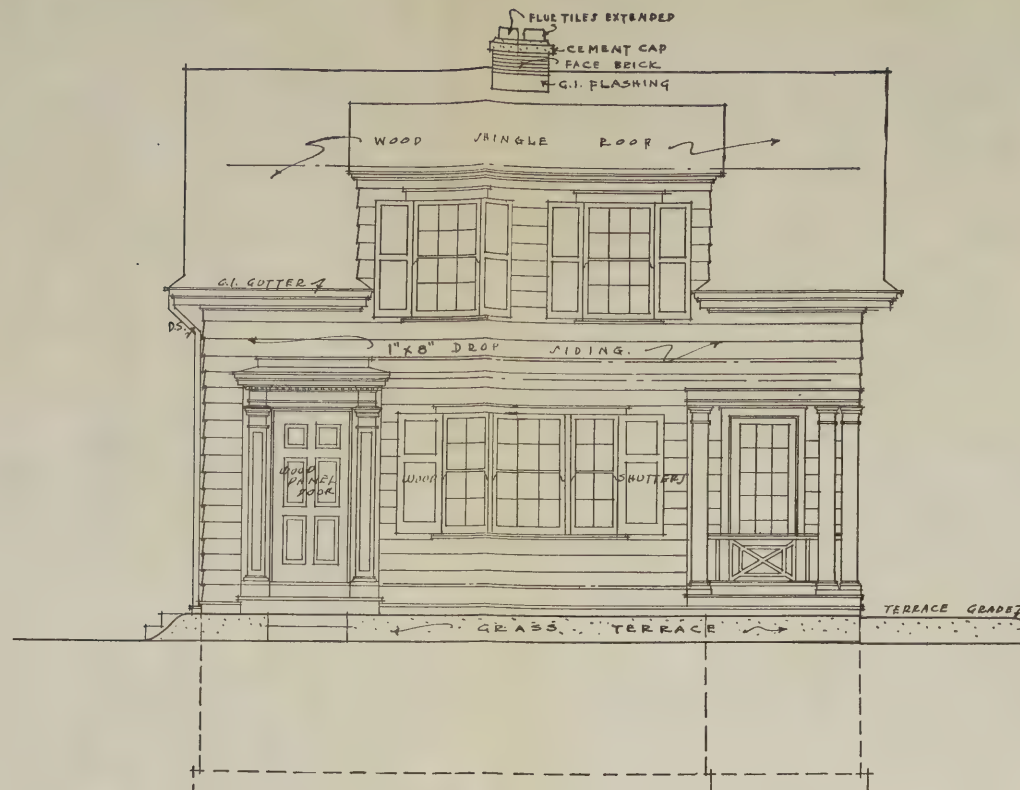
Scale: First floor plans, 1-4 inch equals 1 foot;
Basement and Attic plans, and Elevations,
1-8 inch equals 1 foot. Detail dimen-
sions as marked



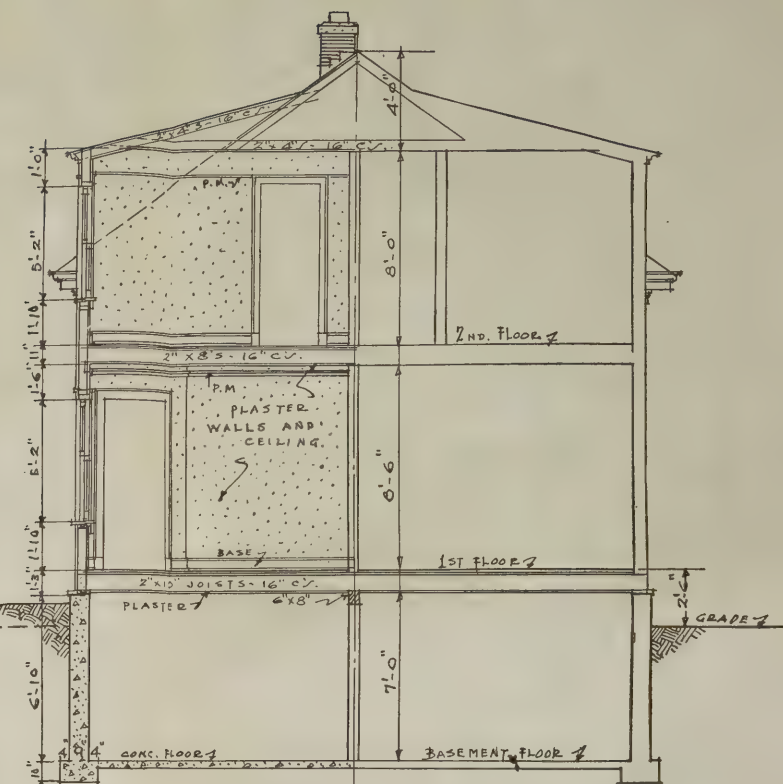
FLOOD PLAN
1/4" = 1'-0"



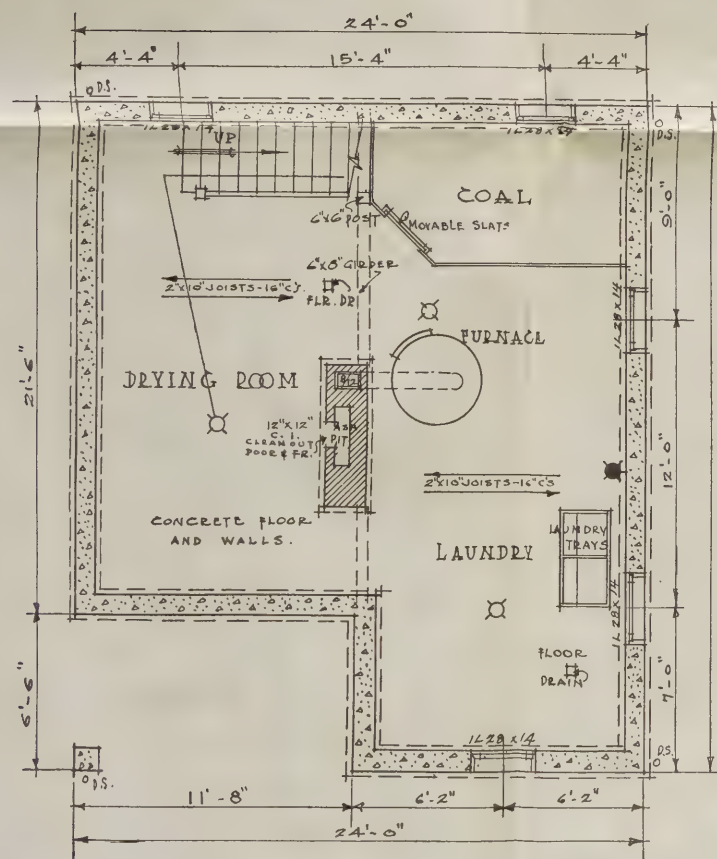
SIDE ELEVATION.
SCALE: $\frac{1}{4}" = 1'-0"$



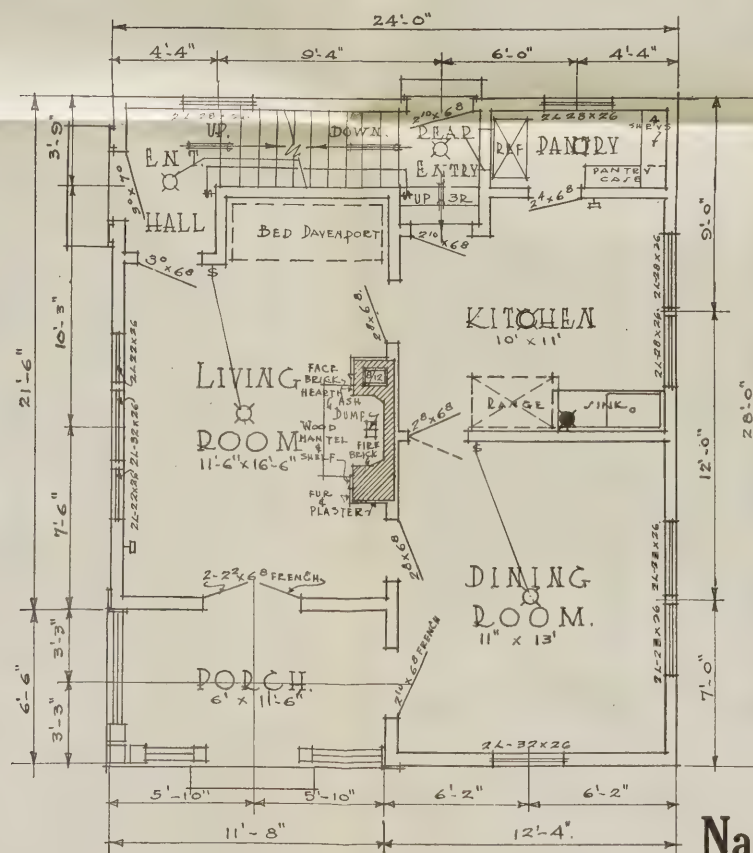
FRONT ELEVATION.
SCALE: $\frac{1}{4}" = 1'-0"$



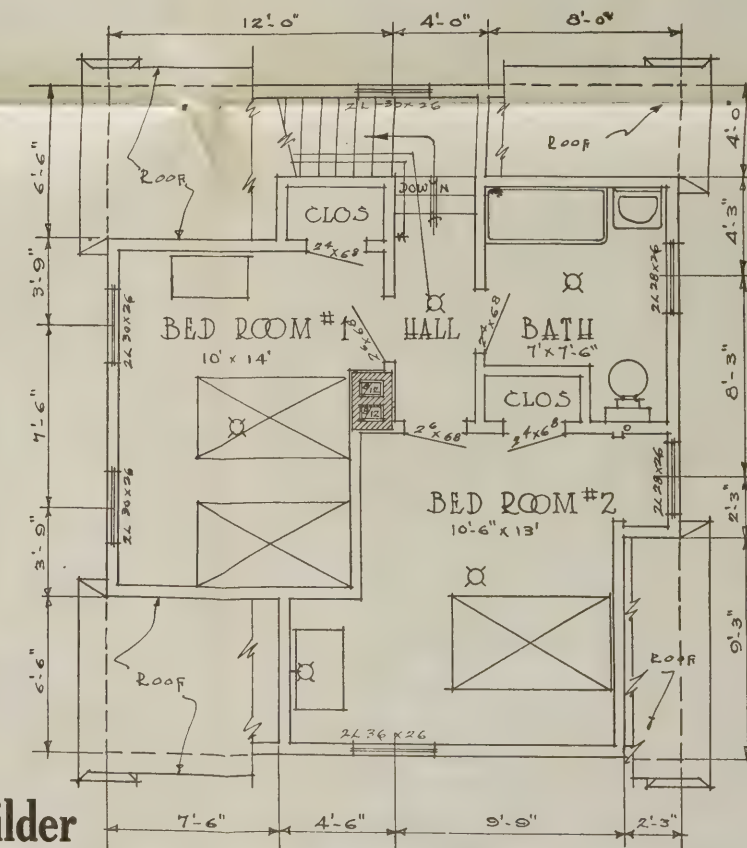
CROSS SECTION.
SCALE: $\frac{1}{4}" = 1'-0"$



BASEMENT PLAN.
SCALE: $\frac{1}{4}" = 1'-0"$



FIRST FLOOR PLAN
SCALE: $\frac{1}{4}" = 1'-0"$



SECOND FLOOR PLAN.
SCALE: $\frac{1}{4}" = 1'-0"$

National Builder

March, 1922

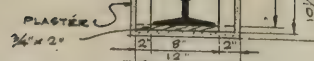
A FIVE ROOM HOUSE

BRAUN & NITSCH, ARCHITECTS
Chicago, Ill.

Plans Supplied National Builder by the National
Lumber Manufacturers' Association

See Perspective, Details, Description and
Quantities in Reading Pages

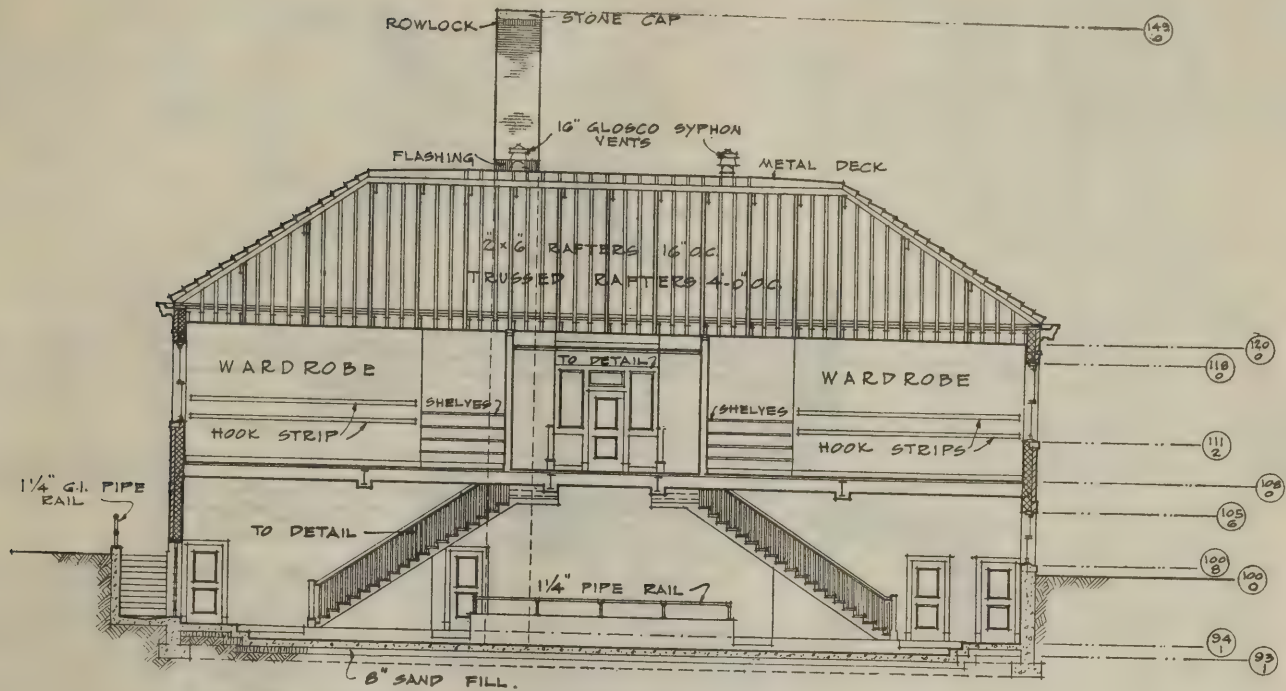
DETAIL OF FURRING STEEL BEAM
SCALE 1" = 1'-0"



1/4" x 3" LAG-SCREWS 18" O.C.
SCREWS COUNTERSUNK IN
THRESHOLD

2" x 4" BLOCKS BETWEEN
JOISTS

THRESHOLD SECTION



LONGITUDINAL SECTION "A-A".
SCALE 1/8" = 1'-0"

National Builder
ESTABLISHED 1864

April, 1922

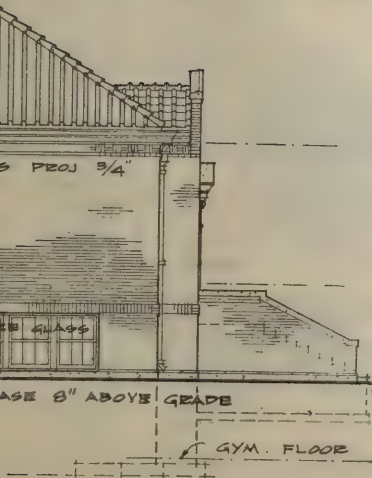
Construction Details

Grade School at Lyndon, Kan.

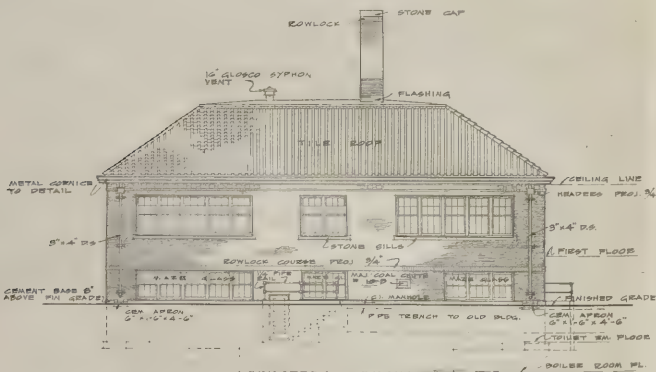
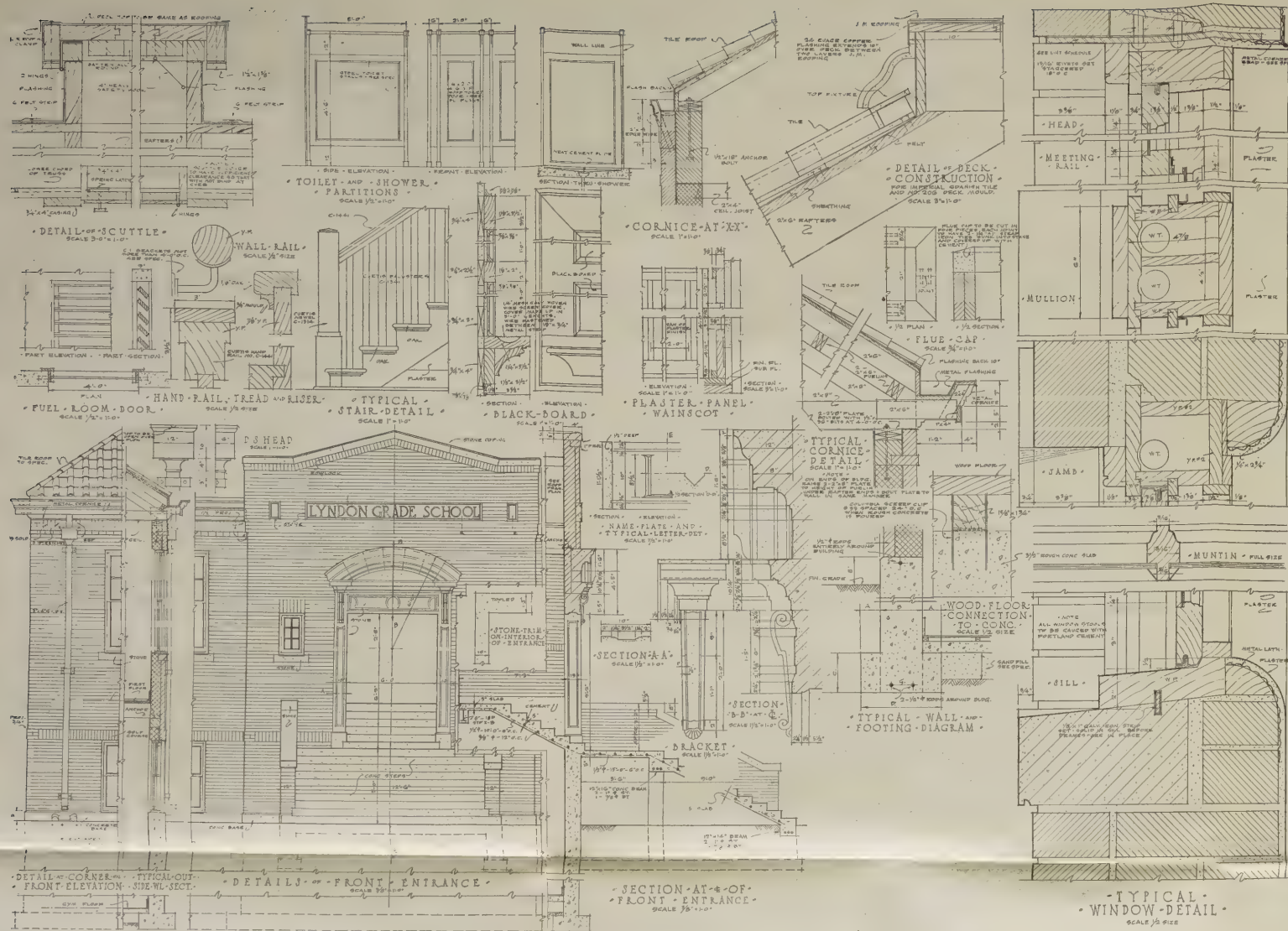
W. E. Hulse & Co., Architects

Hutchinson, Kan.

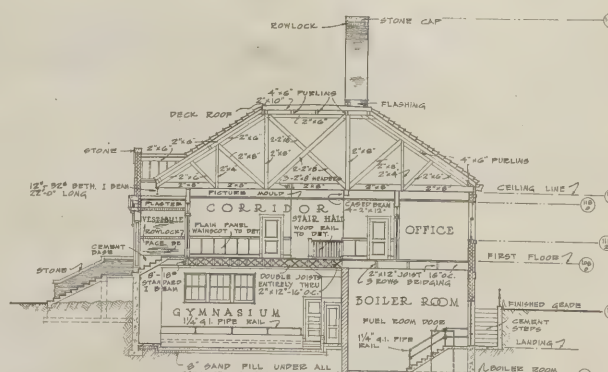
**Note—Indicated Scales are
Reduced One-Half**



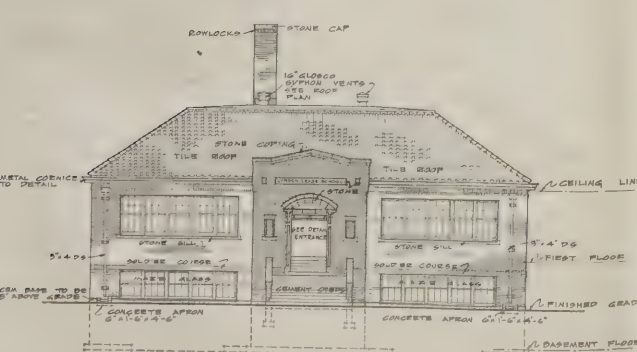
TION.



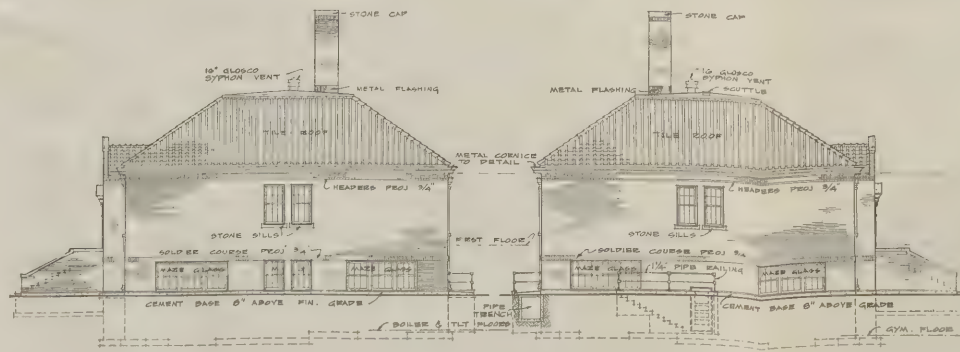
REAR - SOUTH - ELEVATION.
SCALE: 1/8" = 1'-0"



CROSS - SECTION "B-B".
SCALE: 1/8" = 1'-0"

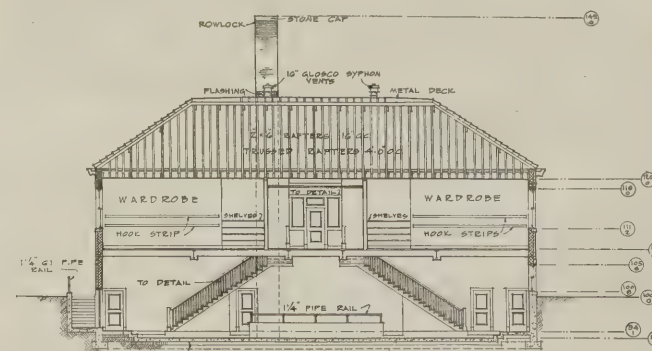


FRONT - NORTH - ELEVATION.
SCALE: 1/8" = 1'-0"

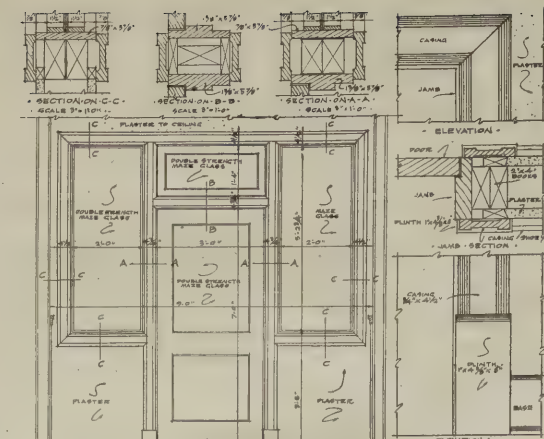


RIGHT - EAST - ELEVATION.
SCALE: 1/8" = 1'-0"

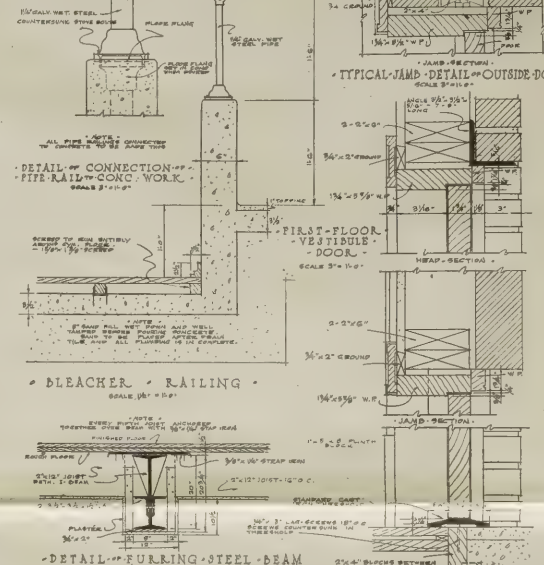
LEFT - WEST - ELEVATION.
SCALE: 1/8" = 1'-0"



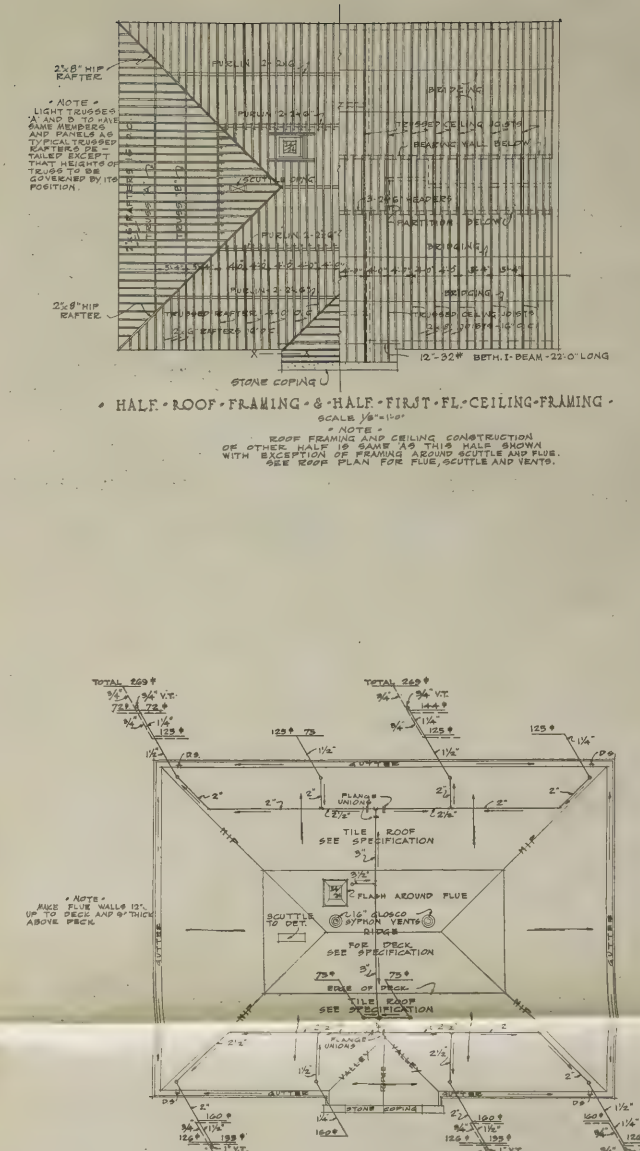
LONGITUDINAL - SECTION "A-A".
SCALE: 1/8" = 1'-0"



DETAILS - OF - GLASS - PARTITION.
SCALE: 1/8" = 1'-0"



DETAIL - OF - WINDOW - AND - DOOR.
SCALE: 1/8" = 1'-0"



ROOF - PLAN.
SCALE: 1/8" = 1'-0"

FOUNDATION - & - FOOTING - PLAN.
SCALE: 1/8" = 1'-0"

National Builder
ESTABLISHED 1864

April, 1922

Construction Details

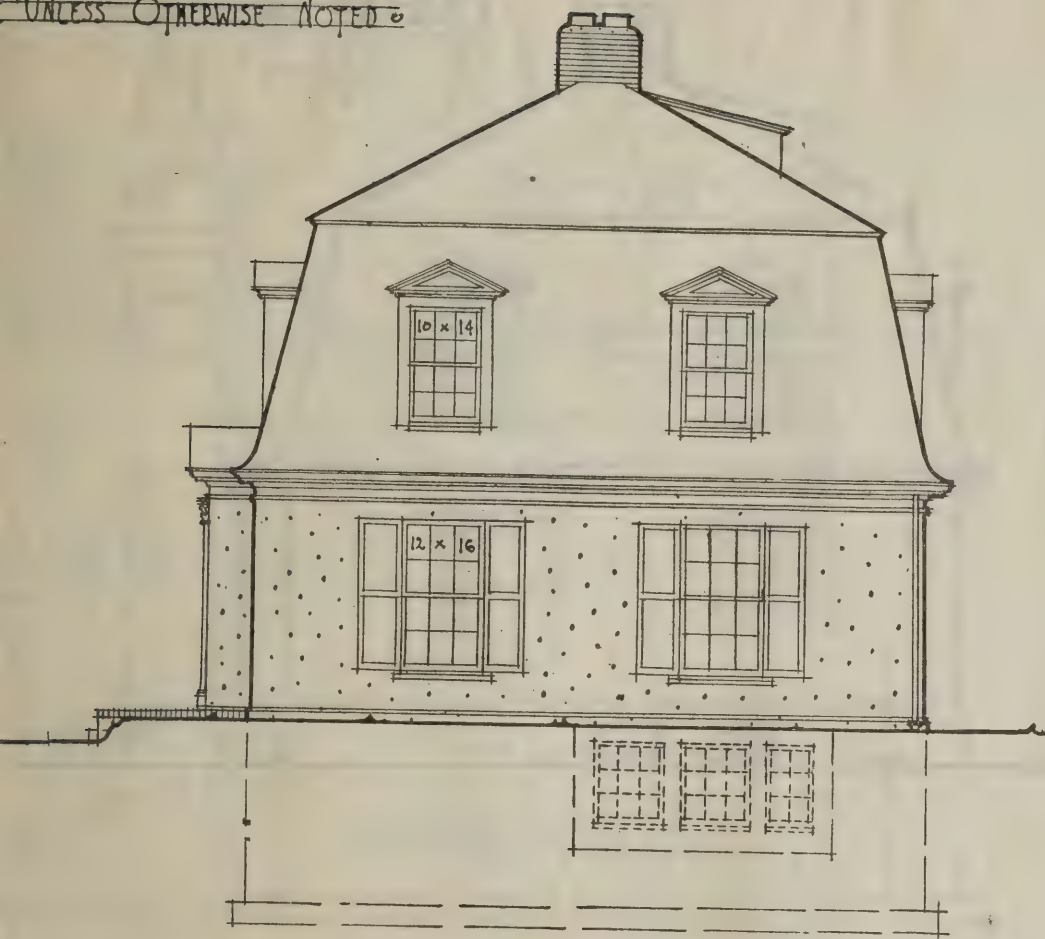
Grade School at Lyndon, Kan.

W. E. Hulse & Co., Architects

Hutchinson, Kan.

Note—Indicated Scales are Reduced One-Half

UNLESS OTHERWISE NOTED



RIGHT
SCALE

National Builder
ESTABLISHED 1864

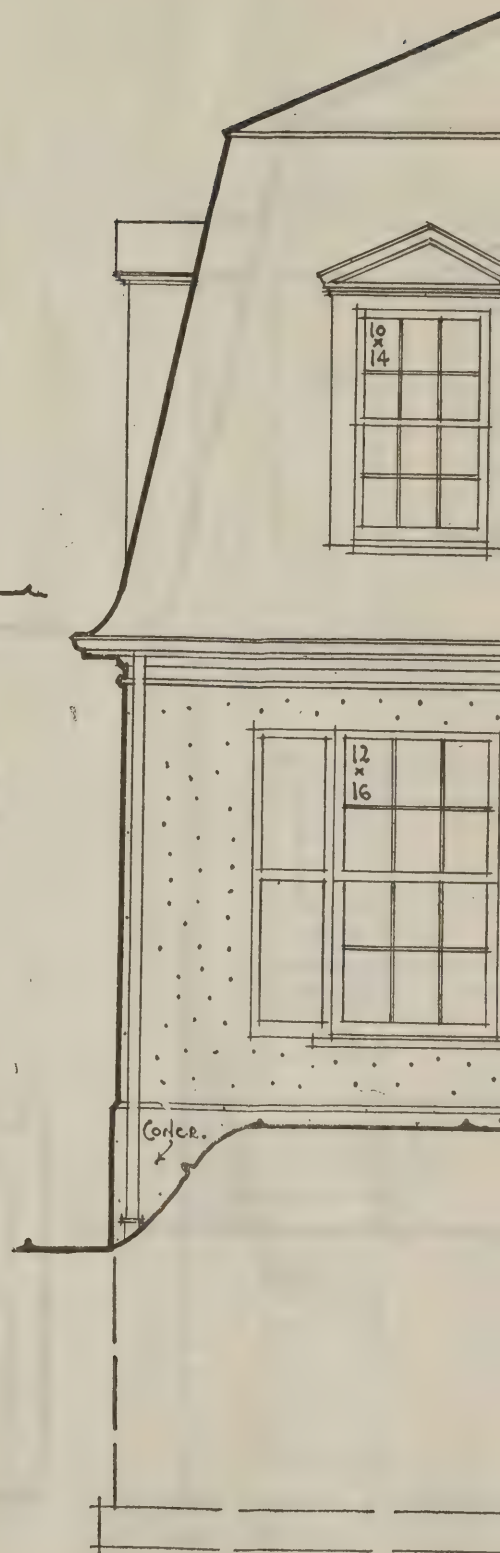
May, 1922

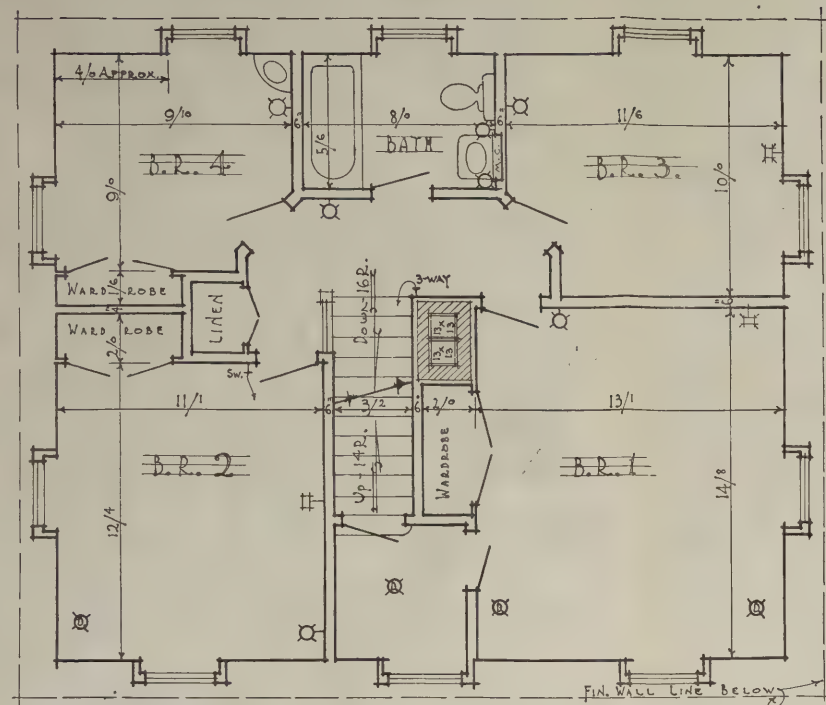
A House With a Mansard Roof

WALTER T. STOCKTON, Designer

Scale: 1-4 inch equals 1 foot, except as
otherwise marked

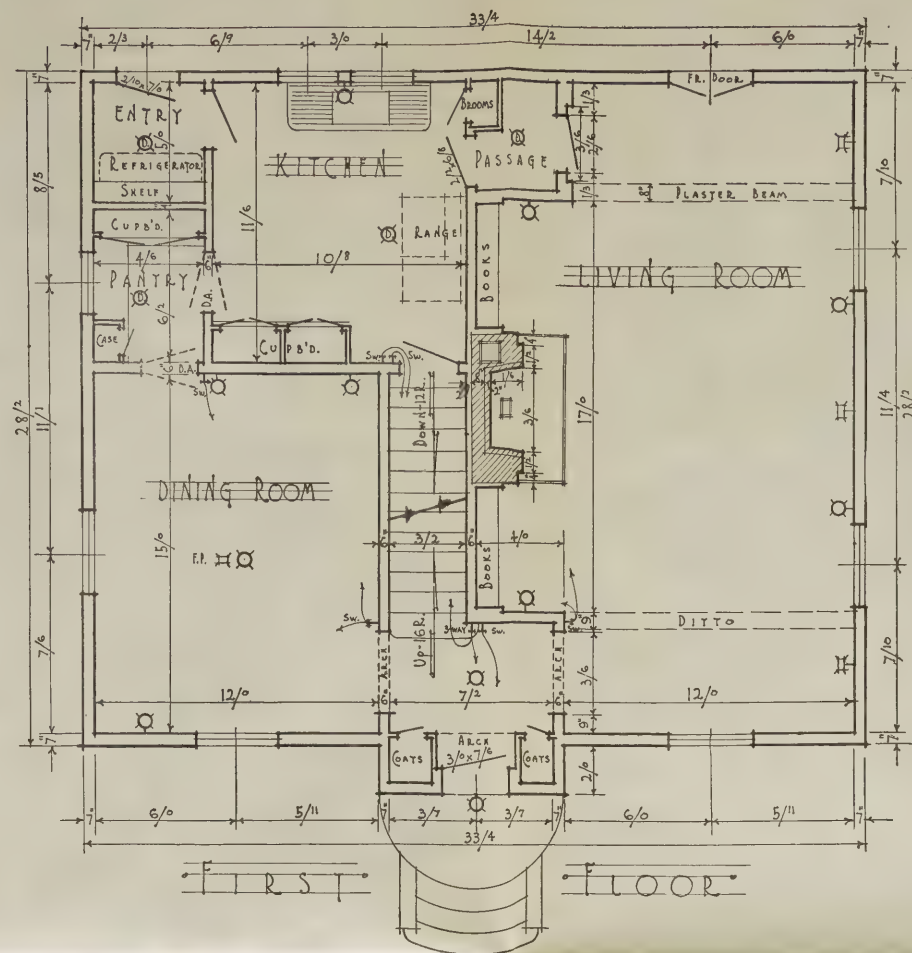
See Illustration and Description in Reading Pages



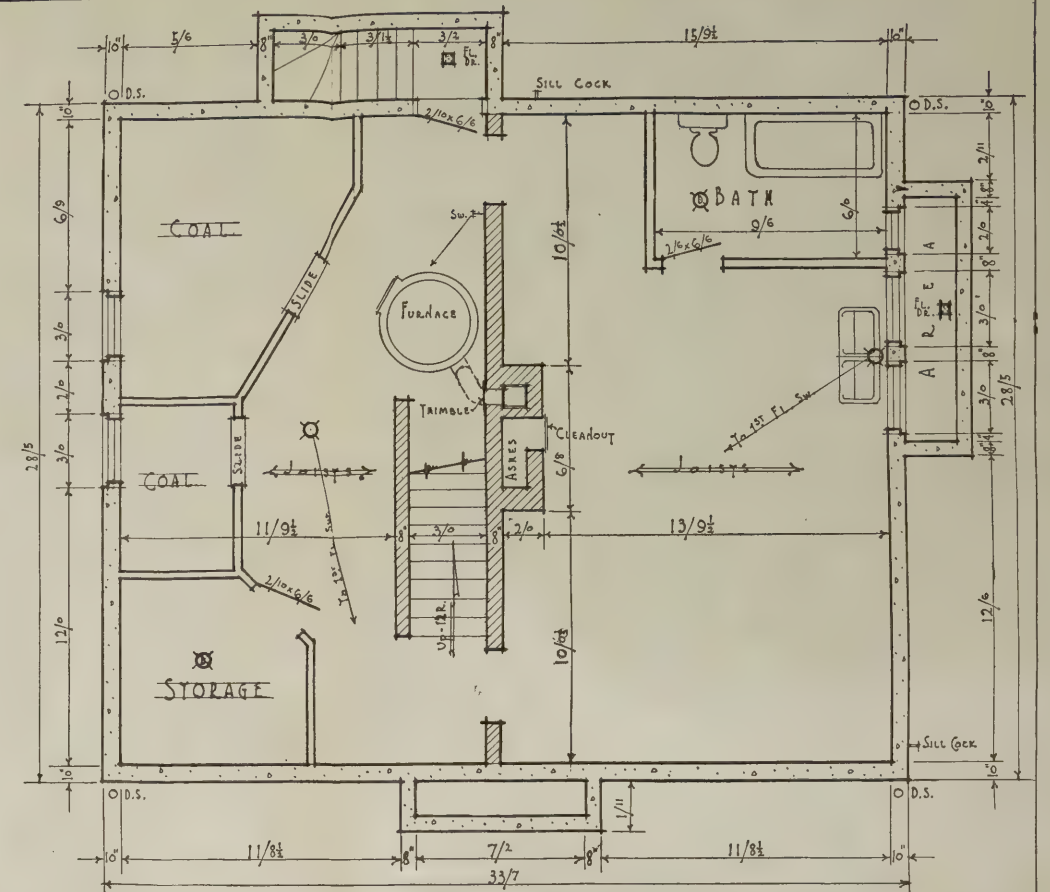


SECOND FLOOR

N.B.:
All Doors 2'0" x 6'8" Unless Otherwise Noted



FIRST FLOOR



BASEMENT

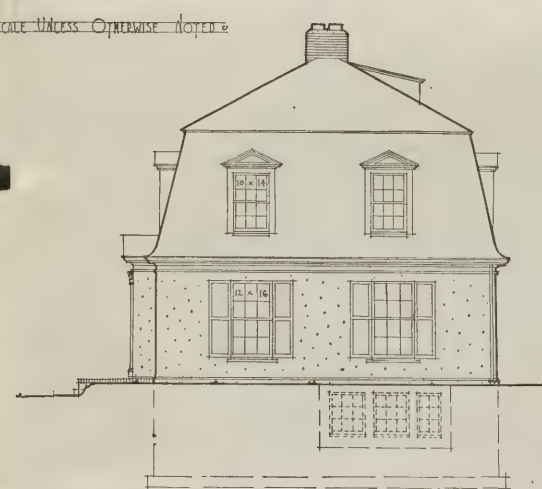
N.B. All Drawings Are 1/4" Inch Scale Unless Otherwise Noted



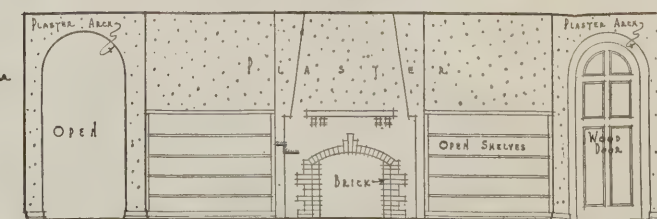
REAR



LEFT
1/4" SCALE



RIGHT
1/4" SCALE



FIREPLACE SIDE OF LIVING ROOM

National Builder
ESTABLISHED 1884

May, 1922

**A House With a
Mansard Roof**

WALTER T. STOCKTON, Designer

Scale: 1/4 inch equals 1 foot, except as
otherwise marked

See Illustration and Description in Reading Pages



FRONT



NATIONAL BUILDER

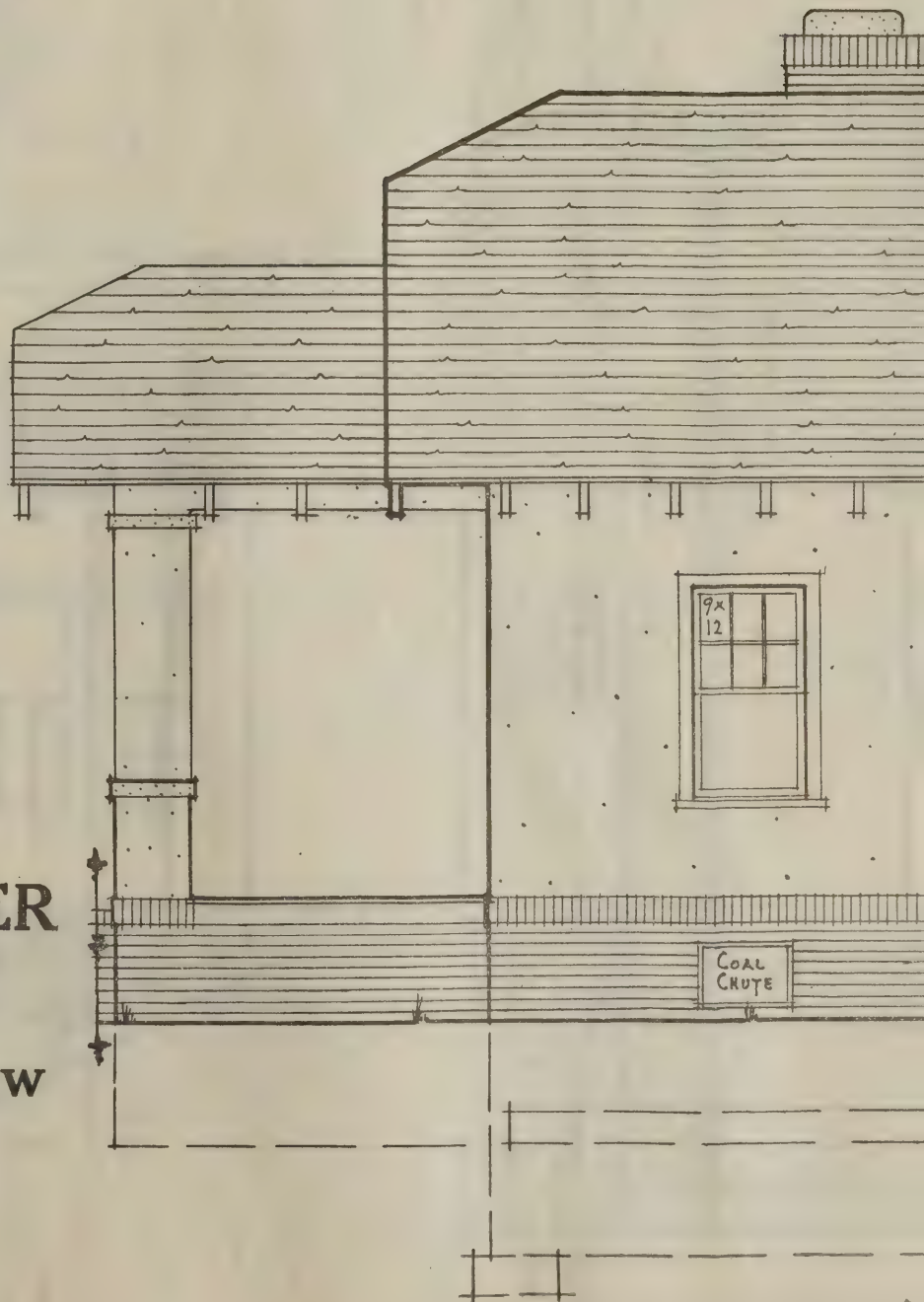
June, 1922

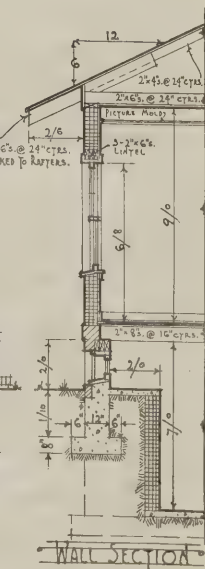
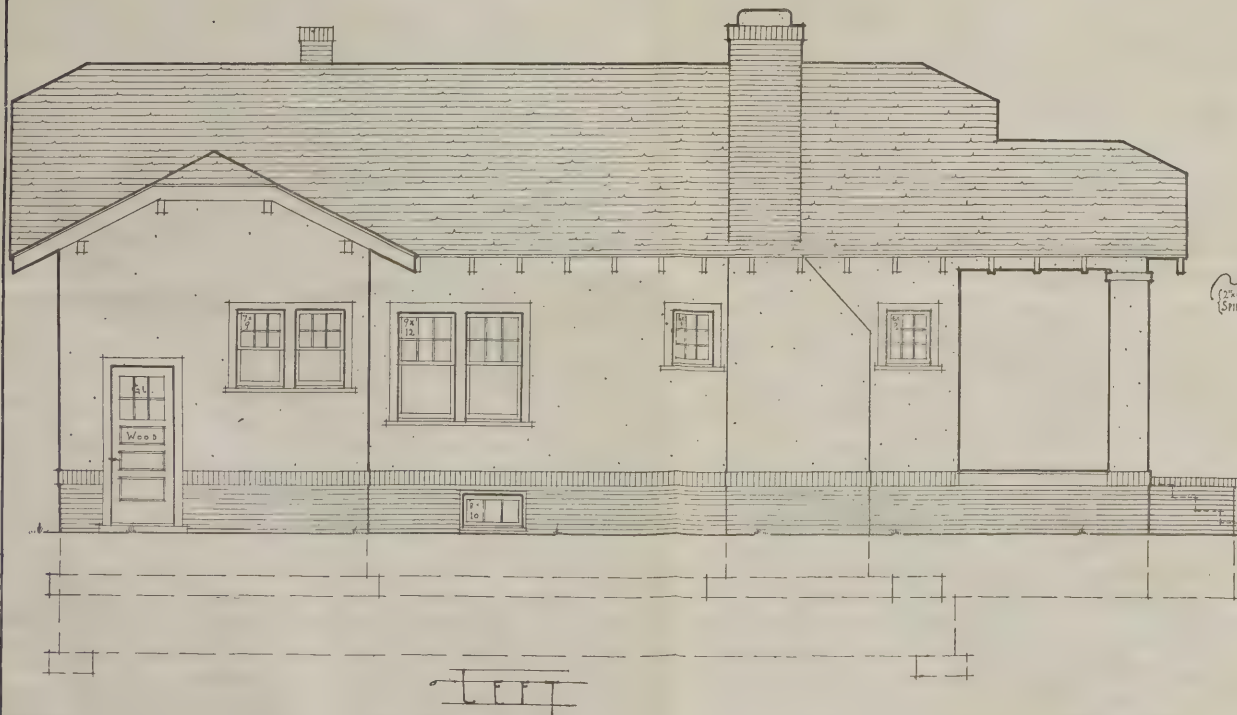
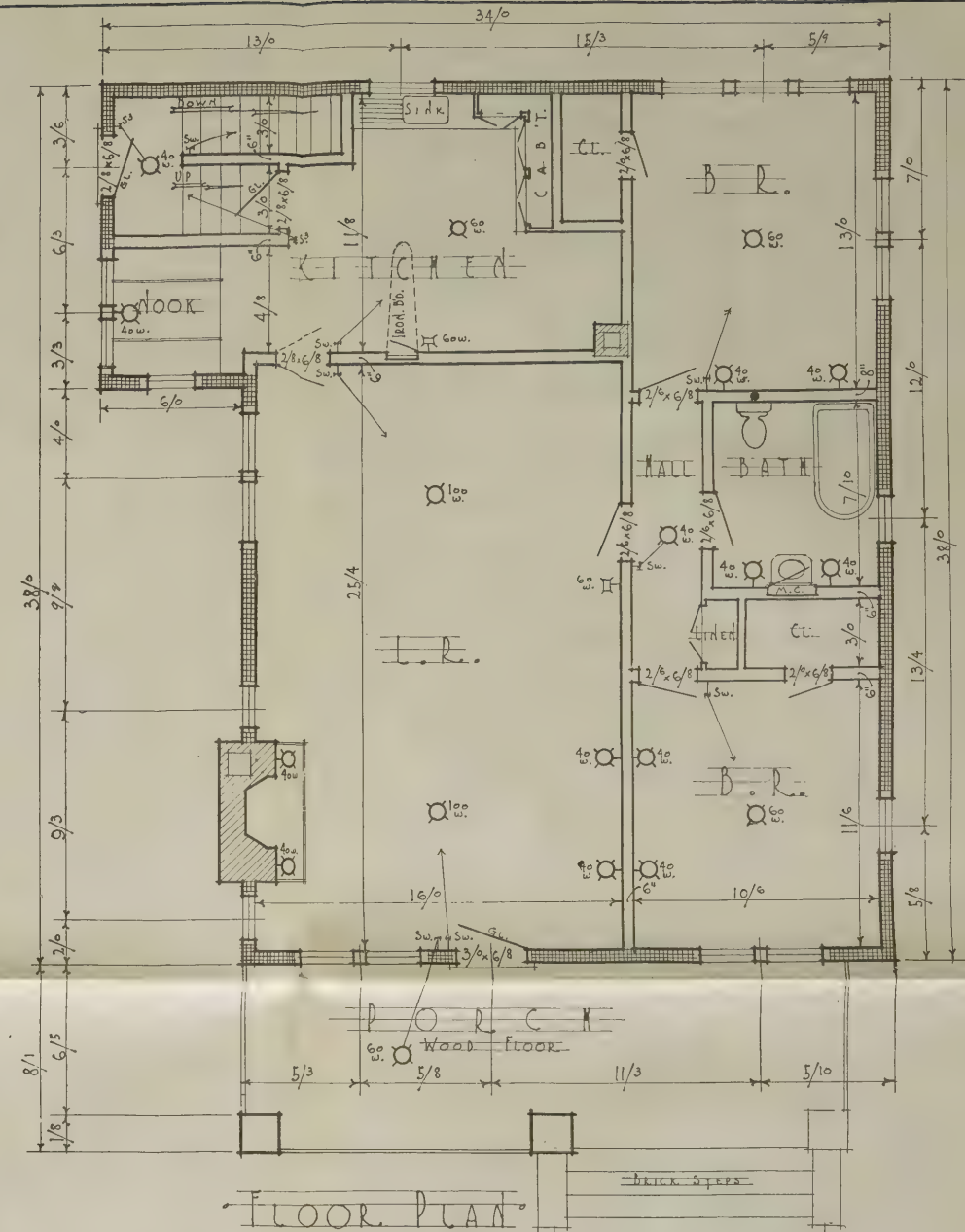
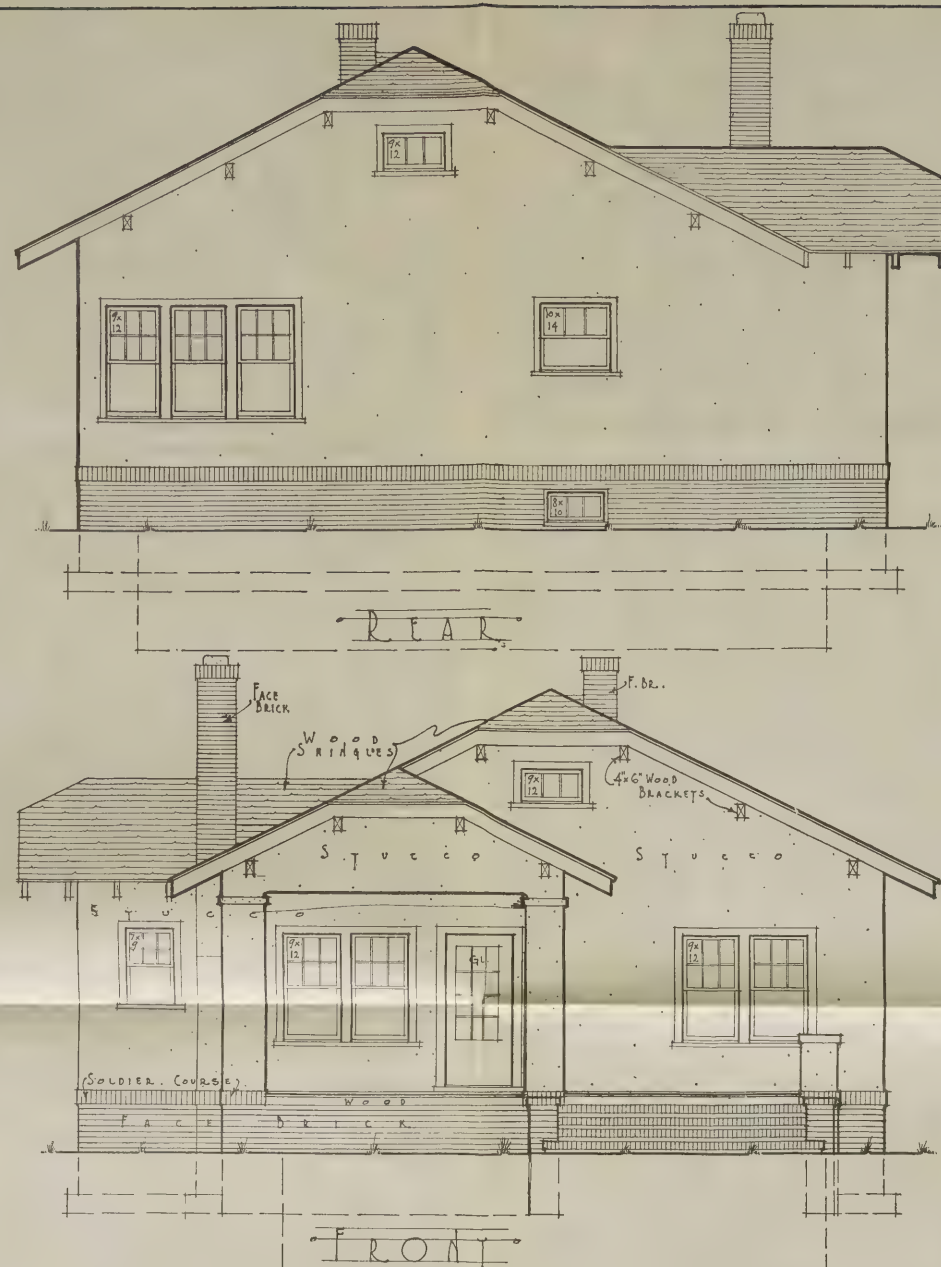
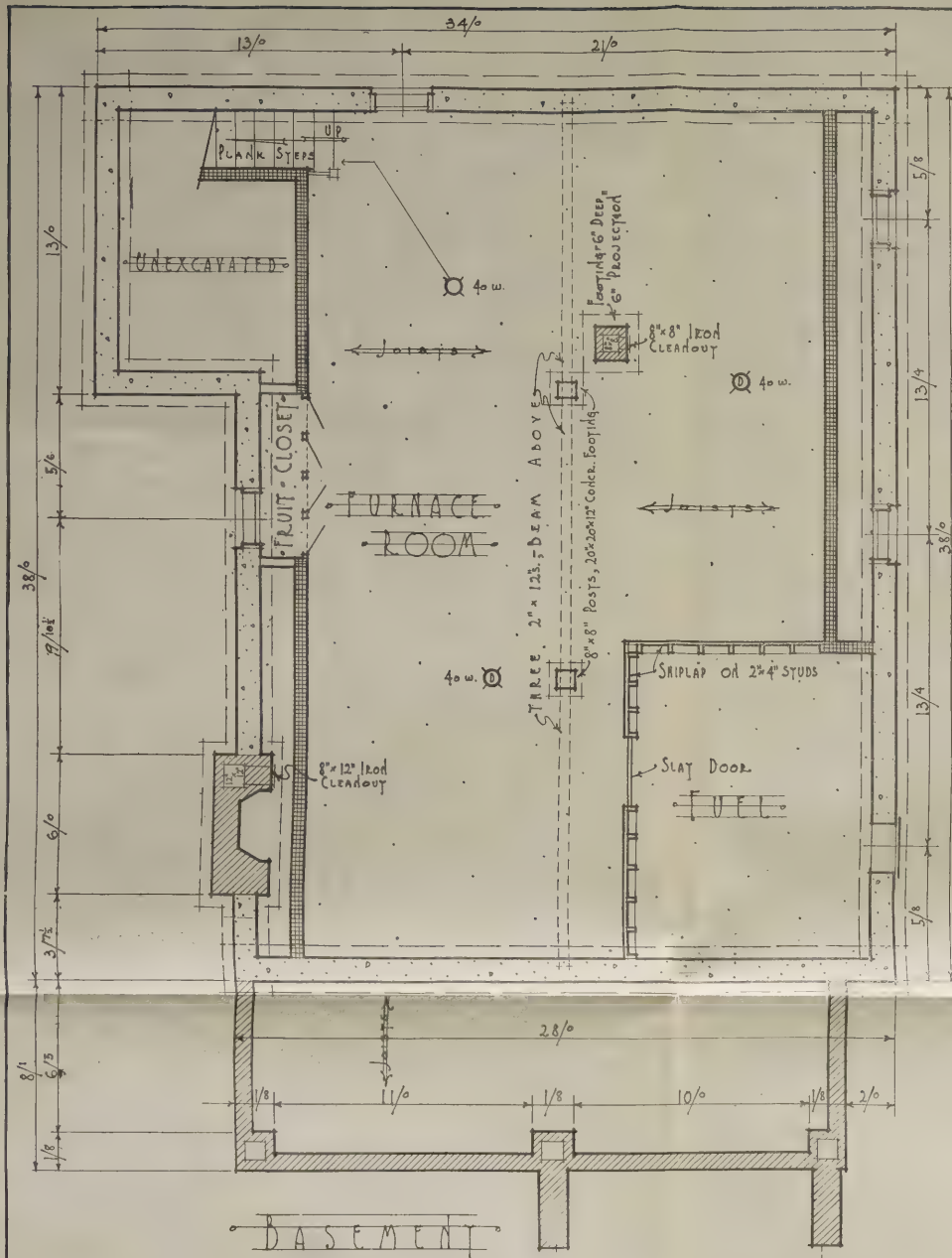
Hollow-Tile Bungalow

SUBURBAN INVESTMENT CO.
Hutchinson, Kan.

Scale: $\frac{1}{4}$ inch equals 1 foot

See photographs and description in reading pages



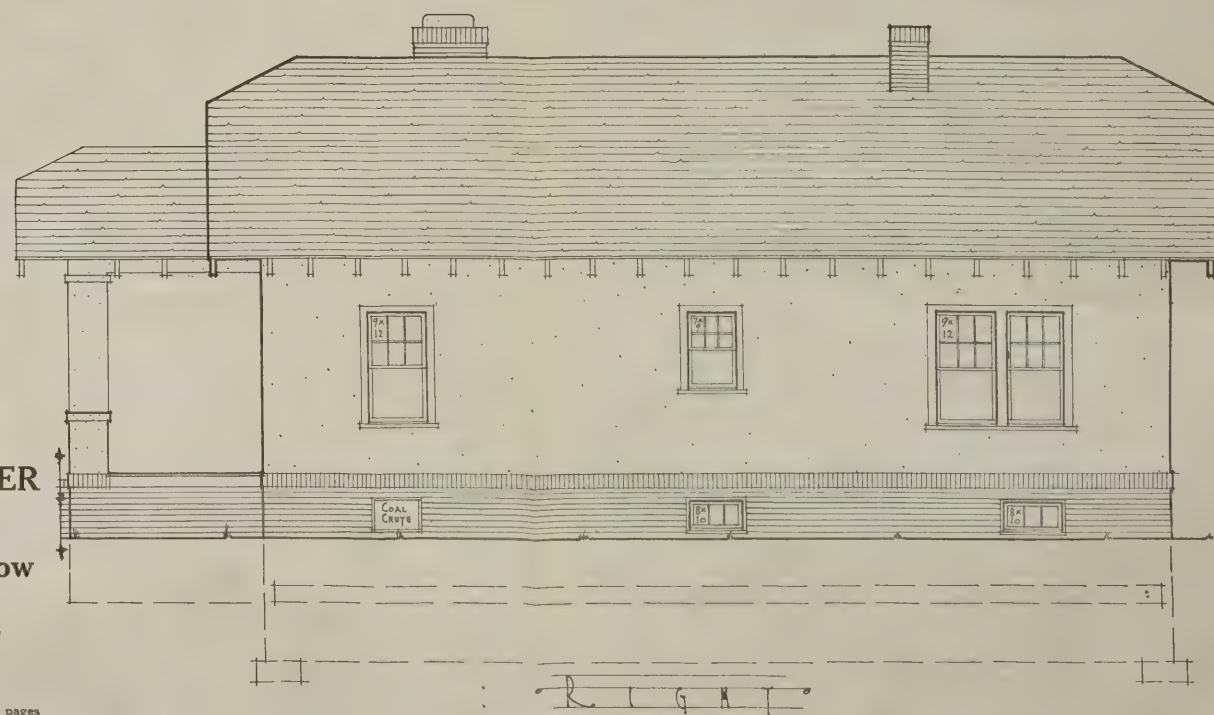


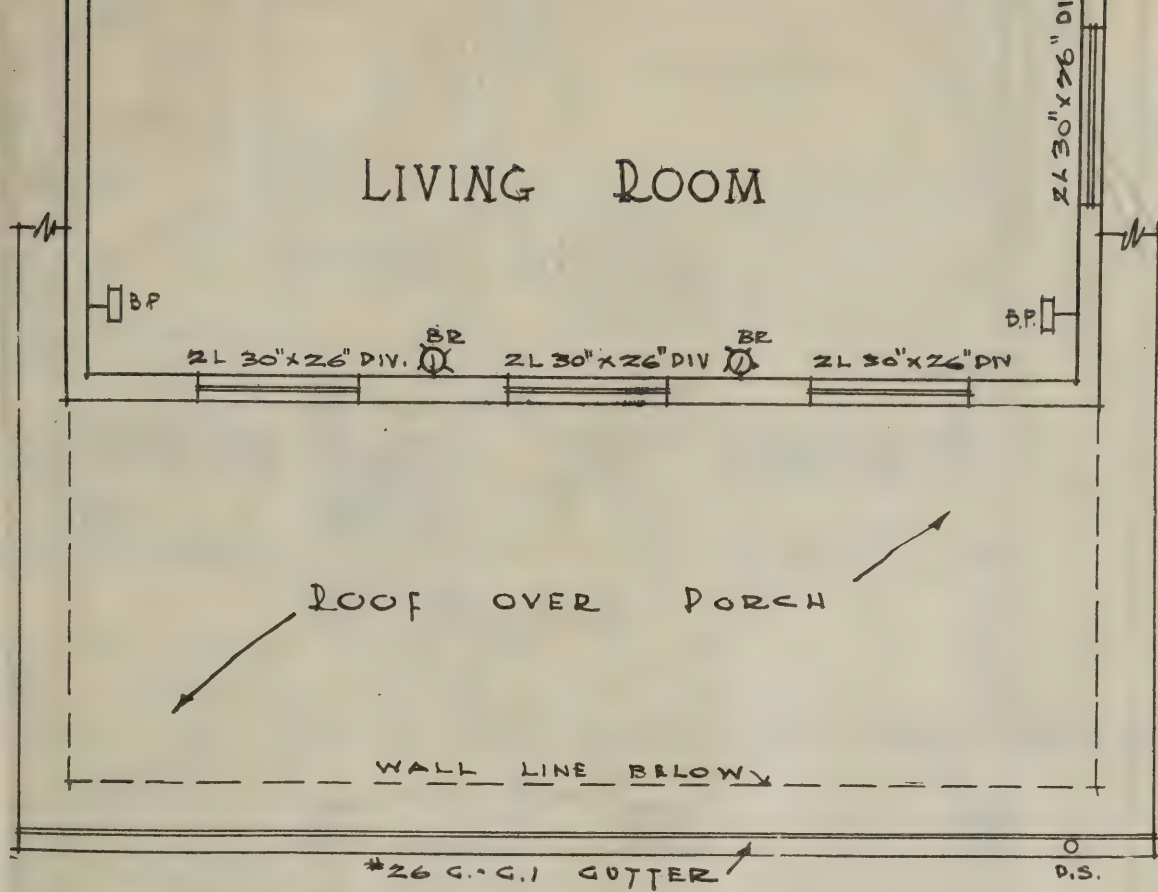
NATIONAL BUILDER June, 1922 Hollow-Tile Bungalow

SUBURBAN INVESTMENT CO.
Hutchinson, Kan.

Scale: 3/4 inch equals 1 foot

See photographs and description in reading pages





SECOND FLOOR PLAN.
 SCALE: $\frac{1}{4}" = 1'-0"$
 (DIMENSIONS ETC: SIMILAR TO 1ST. FLR)



July, 1922

Two Flat Building of Frame

Plans Supplied by the

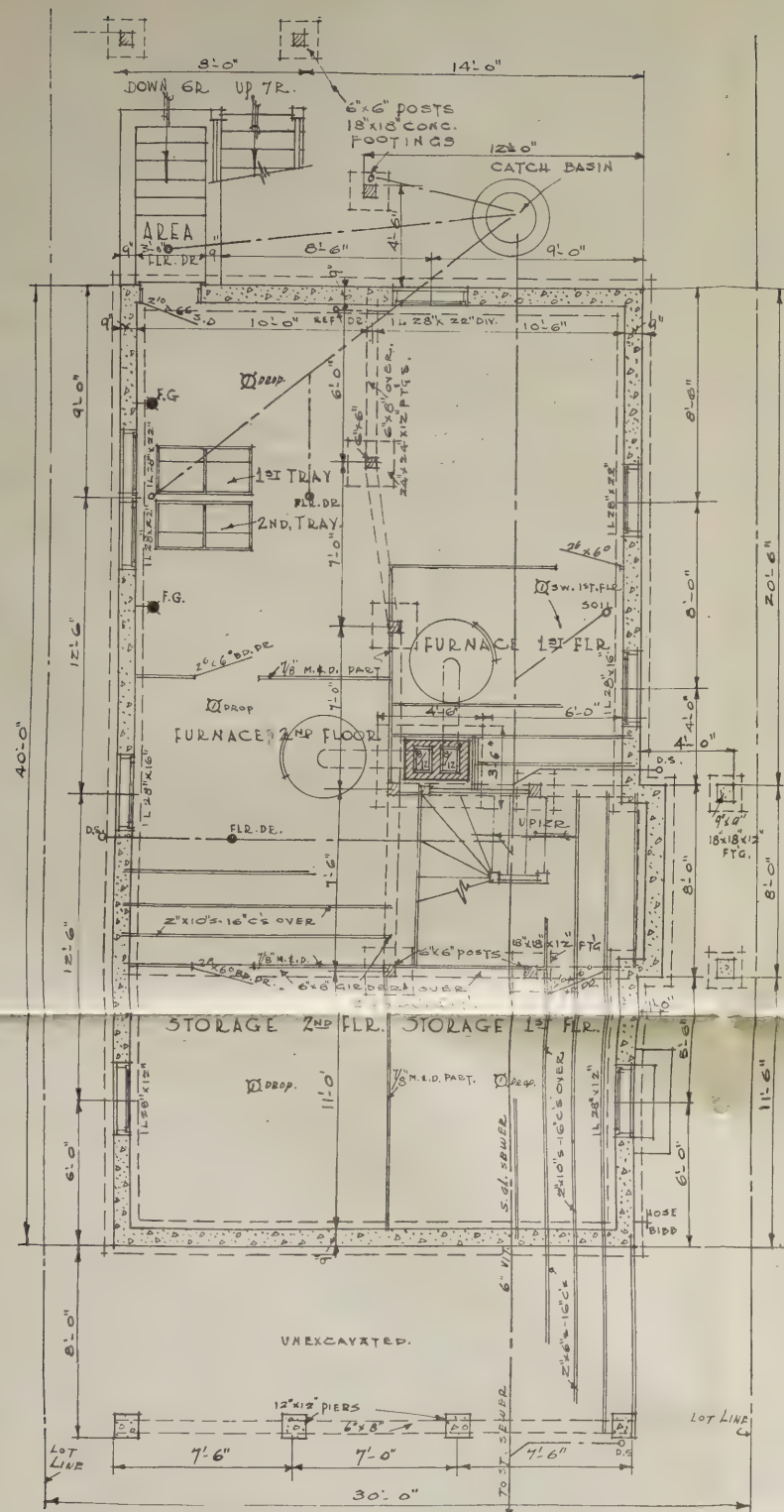
**National Lumber Manufacturers
 Association**

Washington, D. C.
 International Bldg.

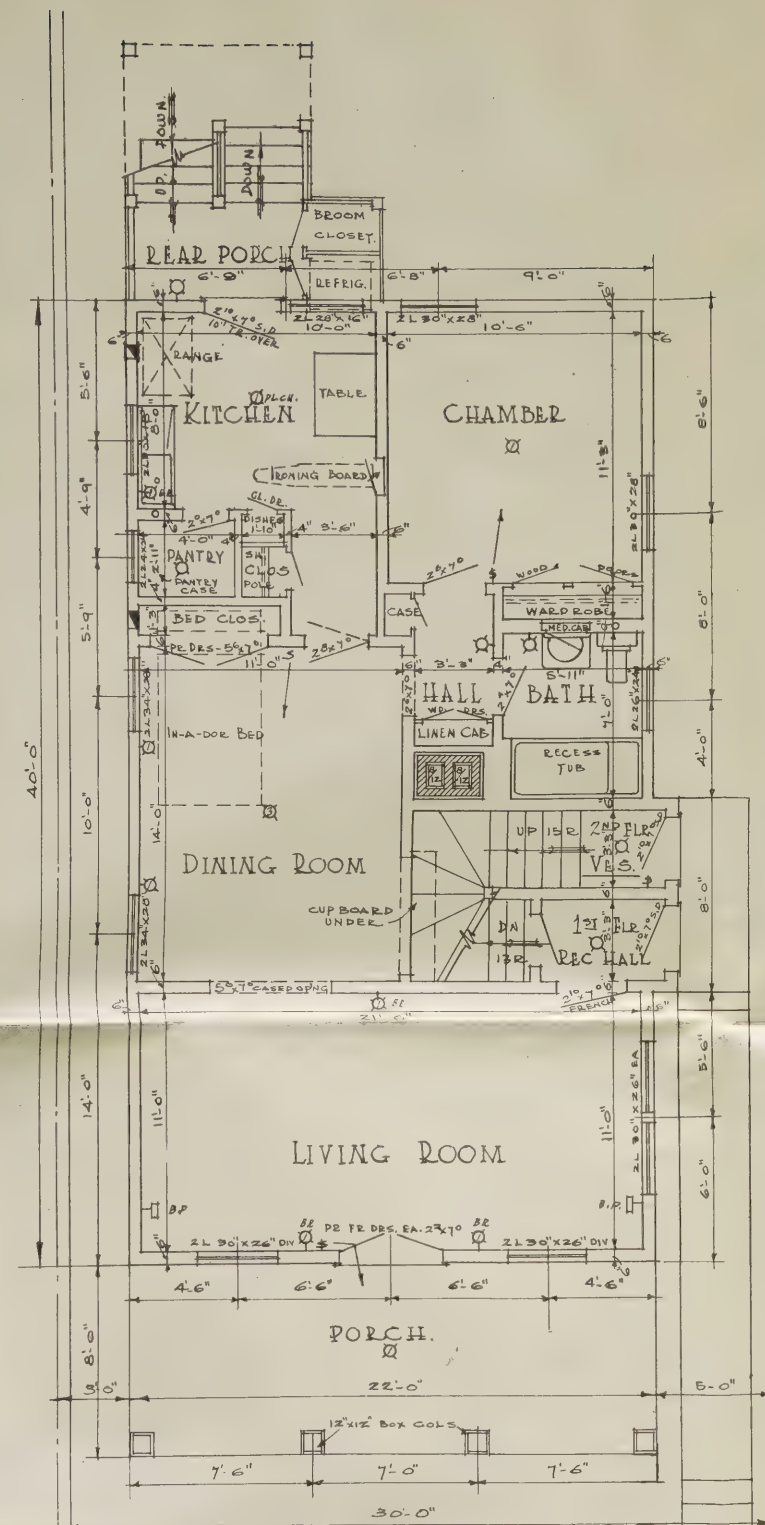
Chicago, Ill.
 Harris Trust Bldg.

Designed by Theodore F. Laist, Architect
 Chicago, Illinois

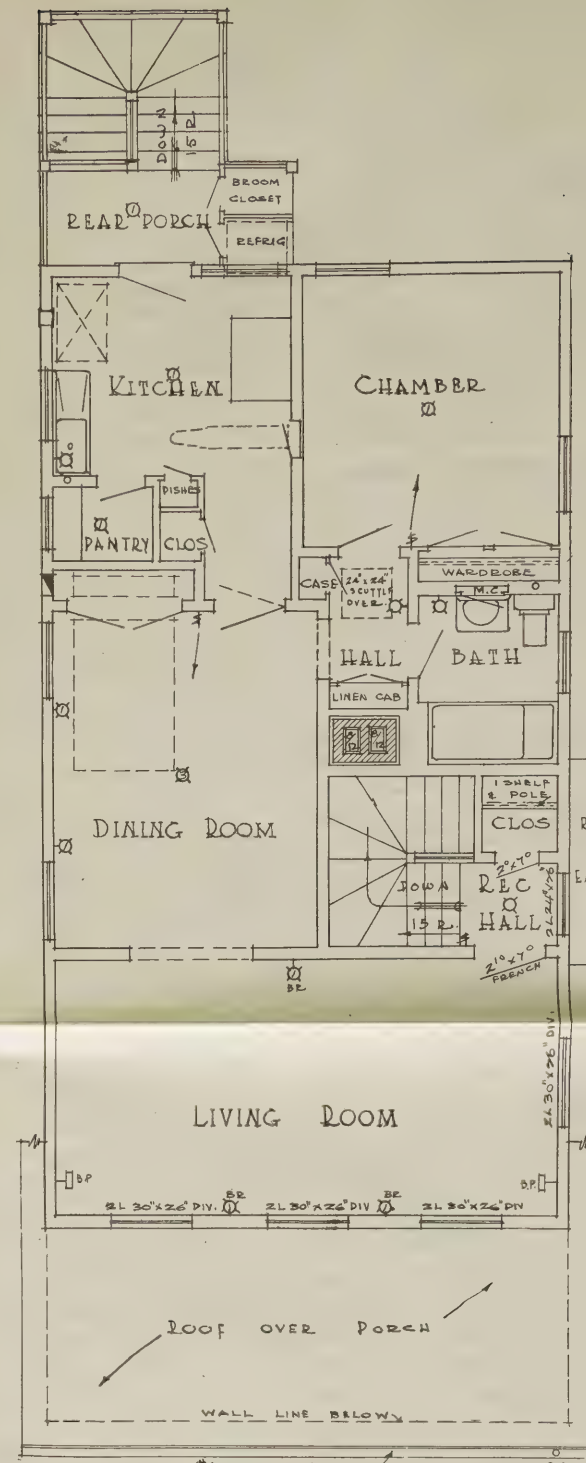
See Perspective Details, Description, etc., on Page 14



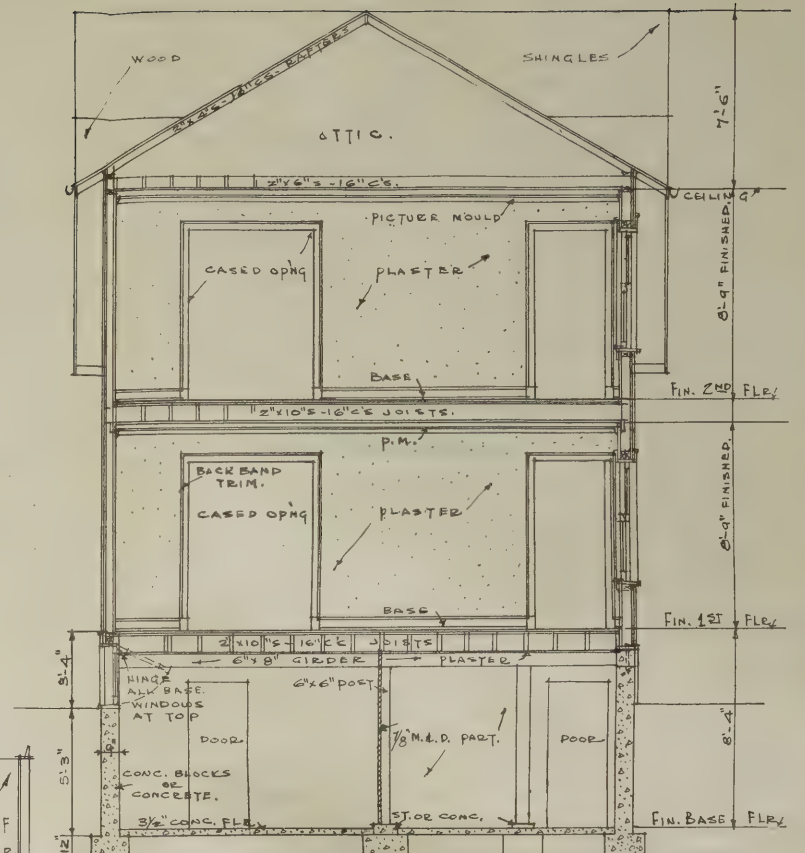
BASEMENT & FOUNDATION PLAN.
SCALE: 1/4" = 1'-0".



FIRST FLOOR PLAN.
SCALE: 1/4" = 1'-0".



SECOND FLOOR PLAN.
SCALE: 1/4" = 1'-0".
(DIMENSIONS ETC. SIMILAR TO 1ST. FLR.)



CROSS SECTION.
SCALE: 1/4" = 1'-0".



National Builder
ESTABLISHED 1884

July, 1922

Two Flat Building of Frame

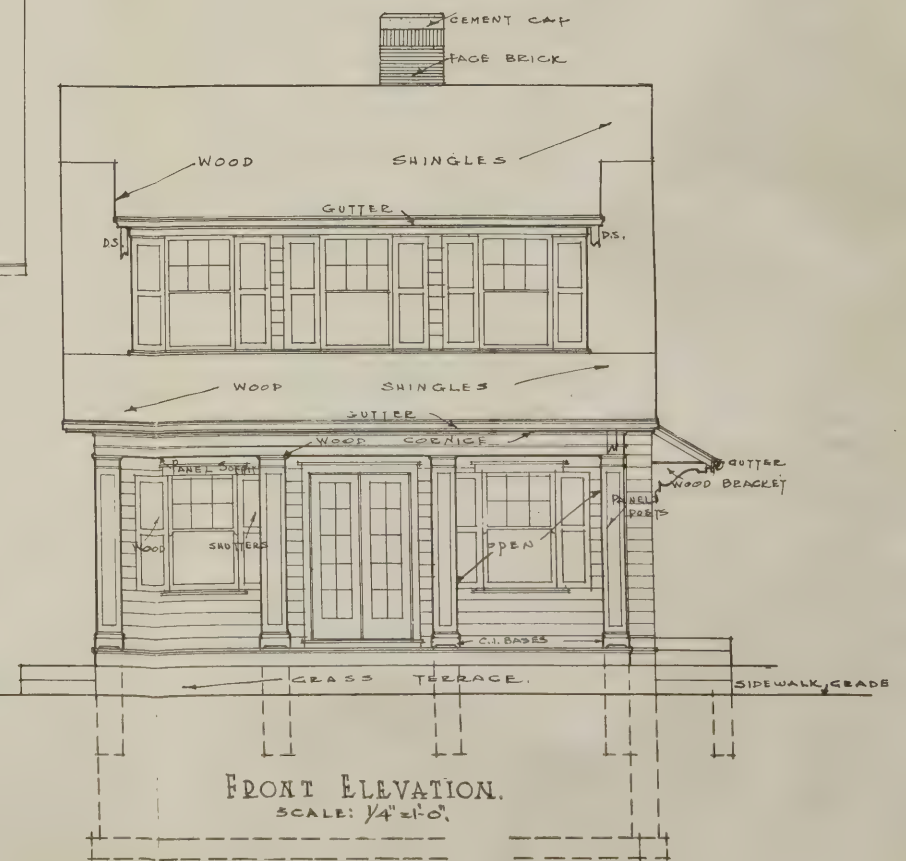
Plans Supplied by the

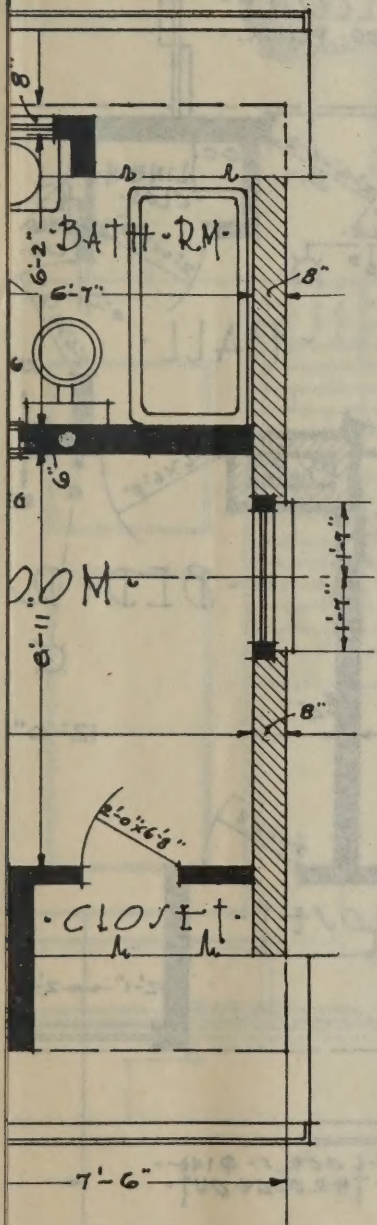
National Lumber Manufacturers Association

Washington, D. C. International Bldg. Chicago, Ill. Harris Trust Bldg.

Designed by Theodore F. Laist, Architect
Chicago, Illinois

See Perspective Details, Description, etc., on Page 14





National Builder
ESTABLISHED 1864

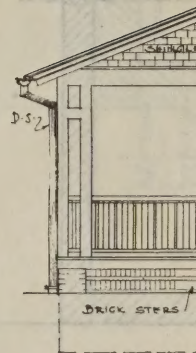
August, 1922

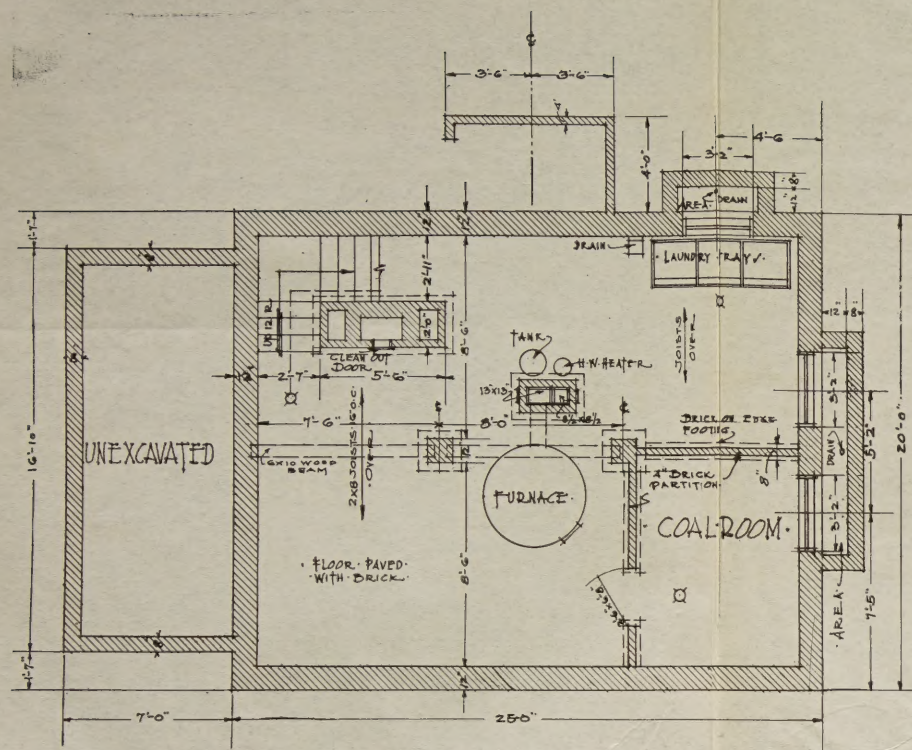
**A Small Dutch Colonial
House of Brick**

Wm. Carver, Architect

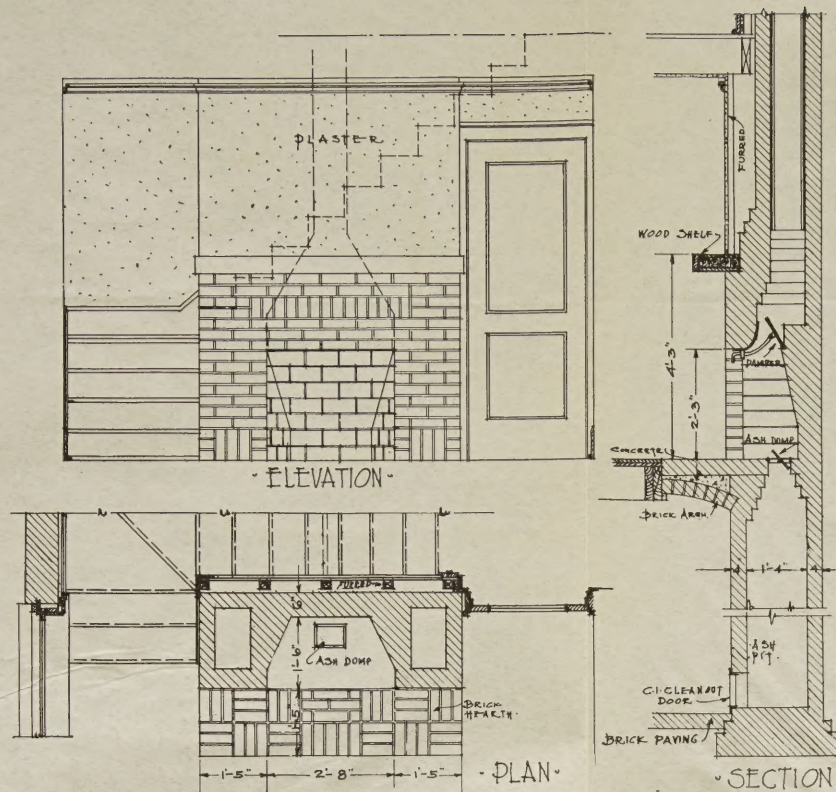
The Common Brick Manufacturers' Association
of America

See photographic reproduction of elevation and descrip-
tive article in reading pages

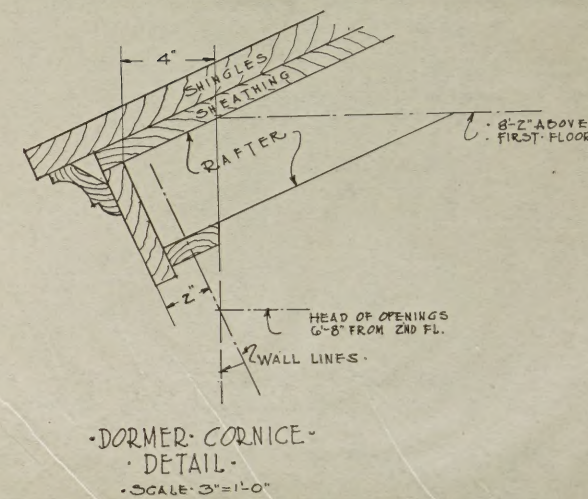
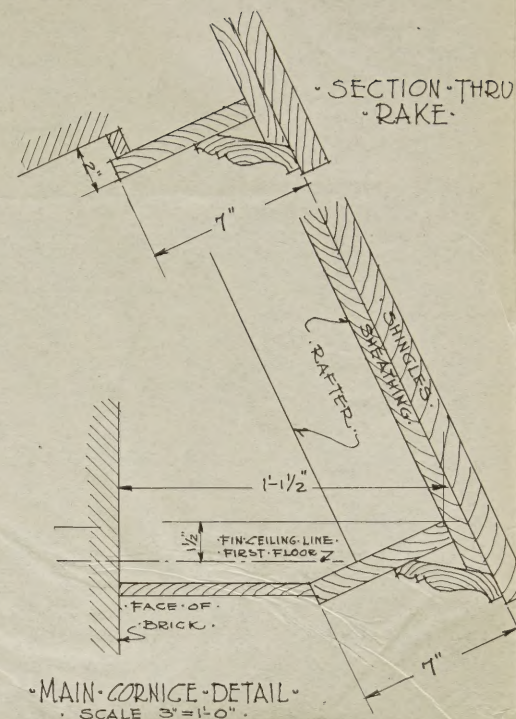




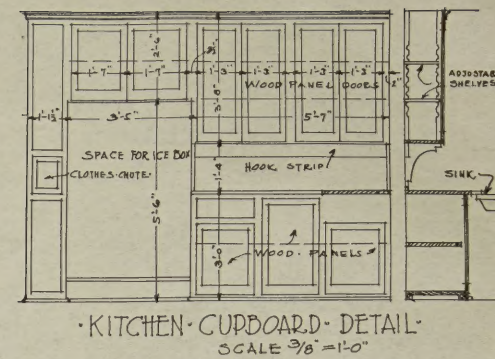
BASEMENT PLAN
SCALE 1/4" = 1'-0"



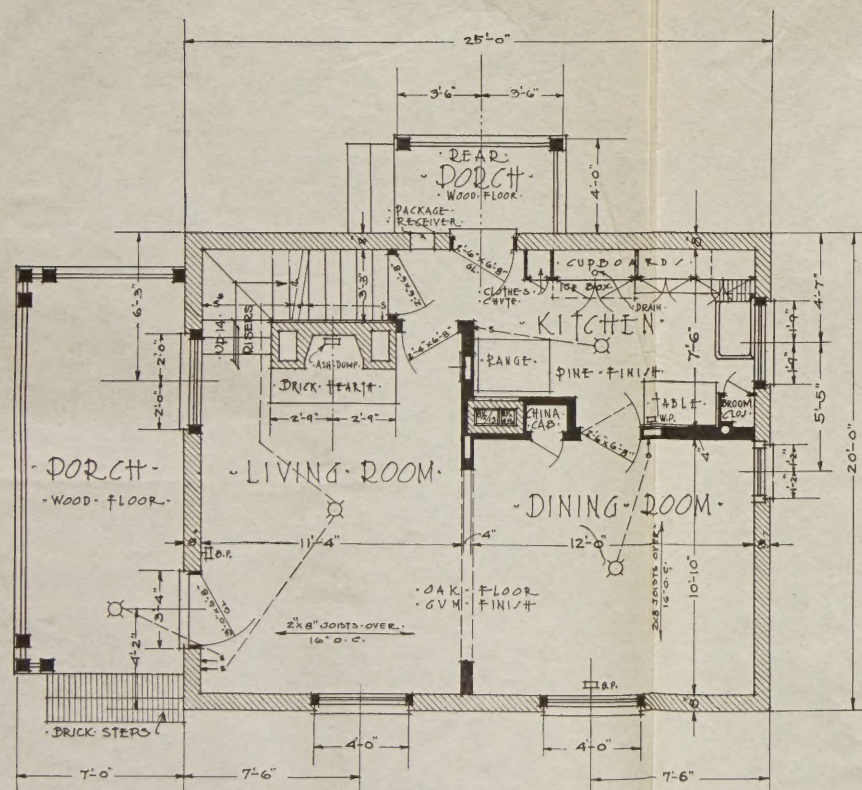
LIVING ROOM MANTLE DETAIL
SCALE 1/2" = 1'-0"



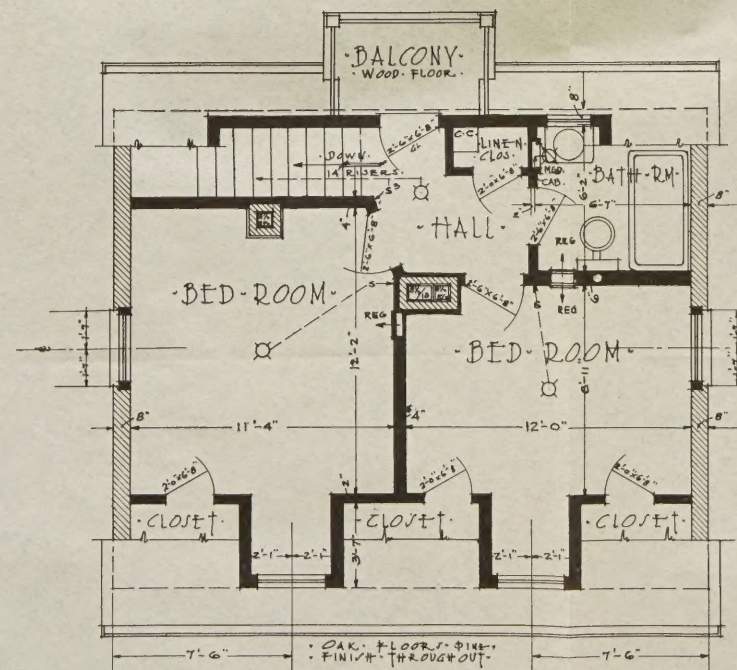
DORMER CORNICE DETAIL
SCALE 3/8" = 1'-0"



KITCHEN CUPBOARD DETAIL
SCALE 3/8" = 1'-0"



FIRST FLOOR PLAN
SCALE 1/4" = 1'-0"



SECOND FLOOR PLAN
SCALE 1/4" = 1'-0"

National Builder

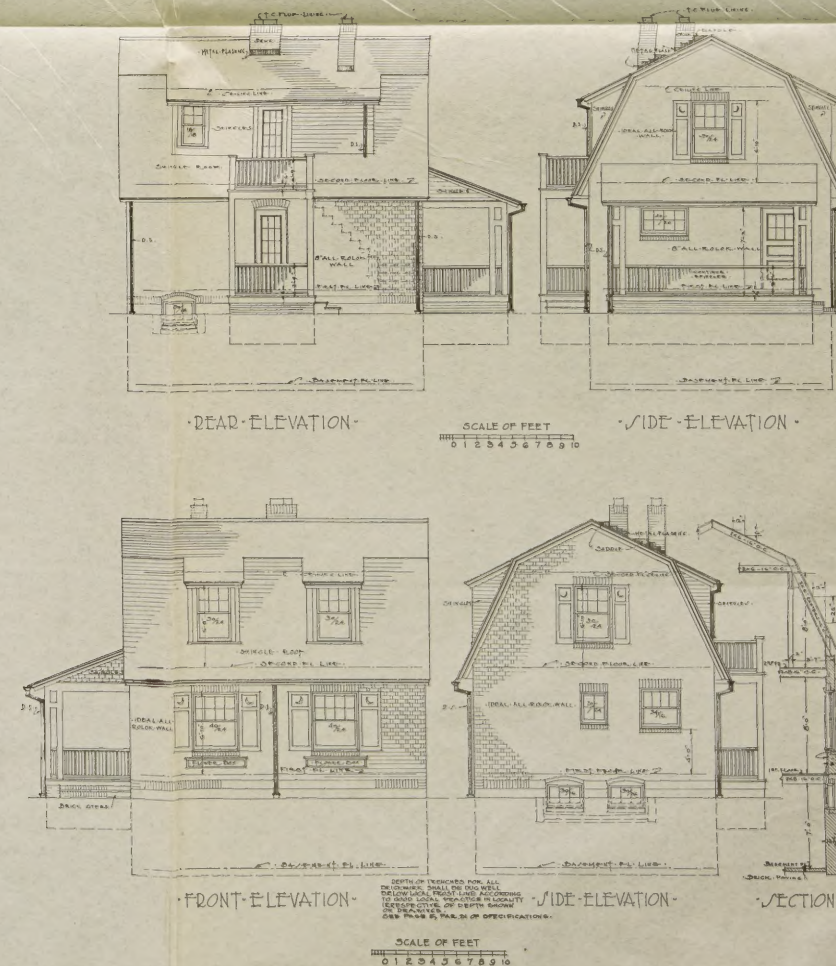
August, 1922

A Small Dutch Colonial House of Brick

Wm. Carver, Architect

The Common Brick Manufacturers' Association of America

See photographic reproduction of elevation and descriptive article in reading pages



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