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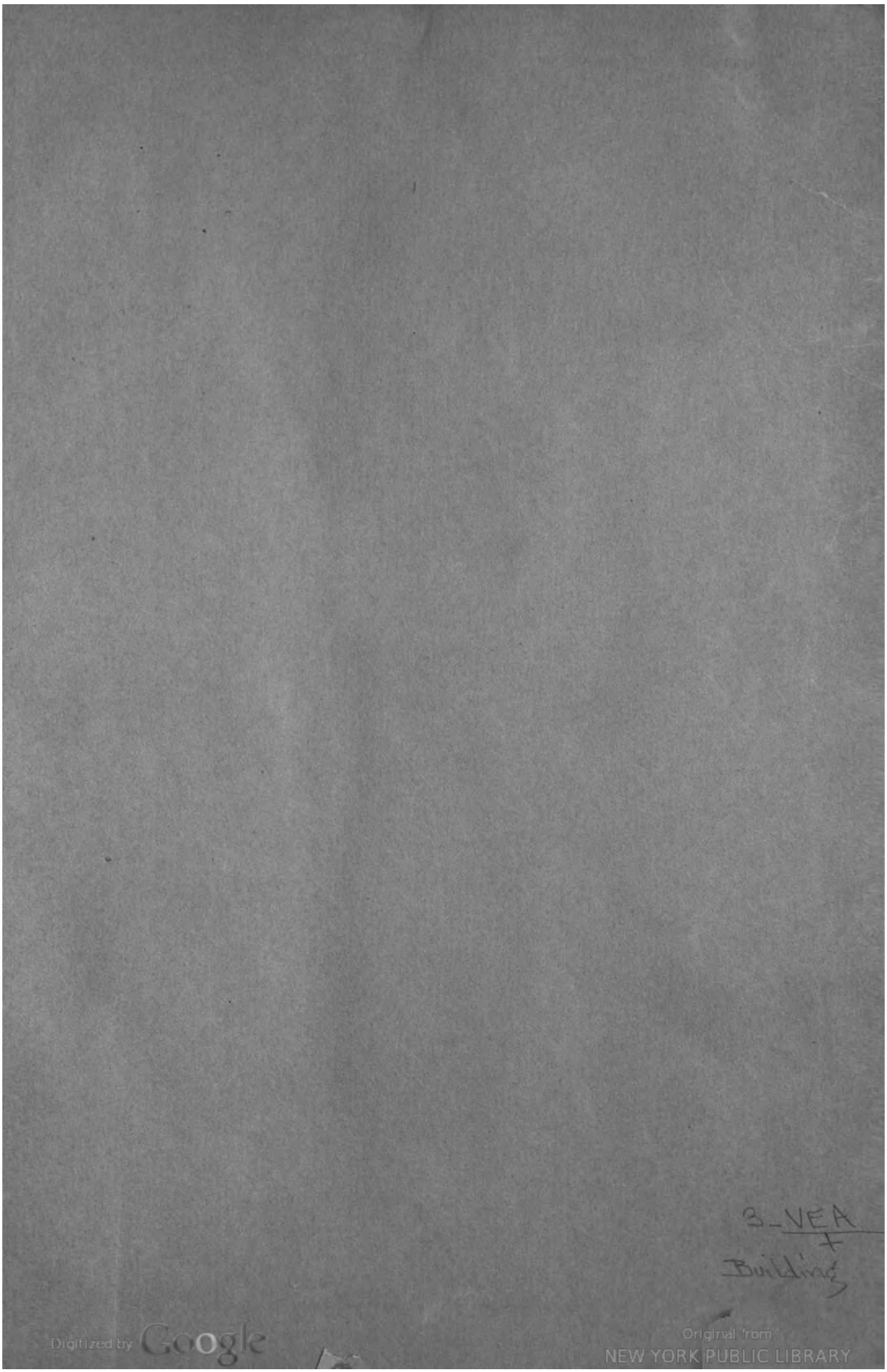
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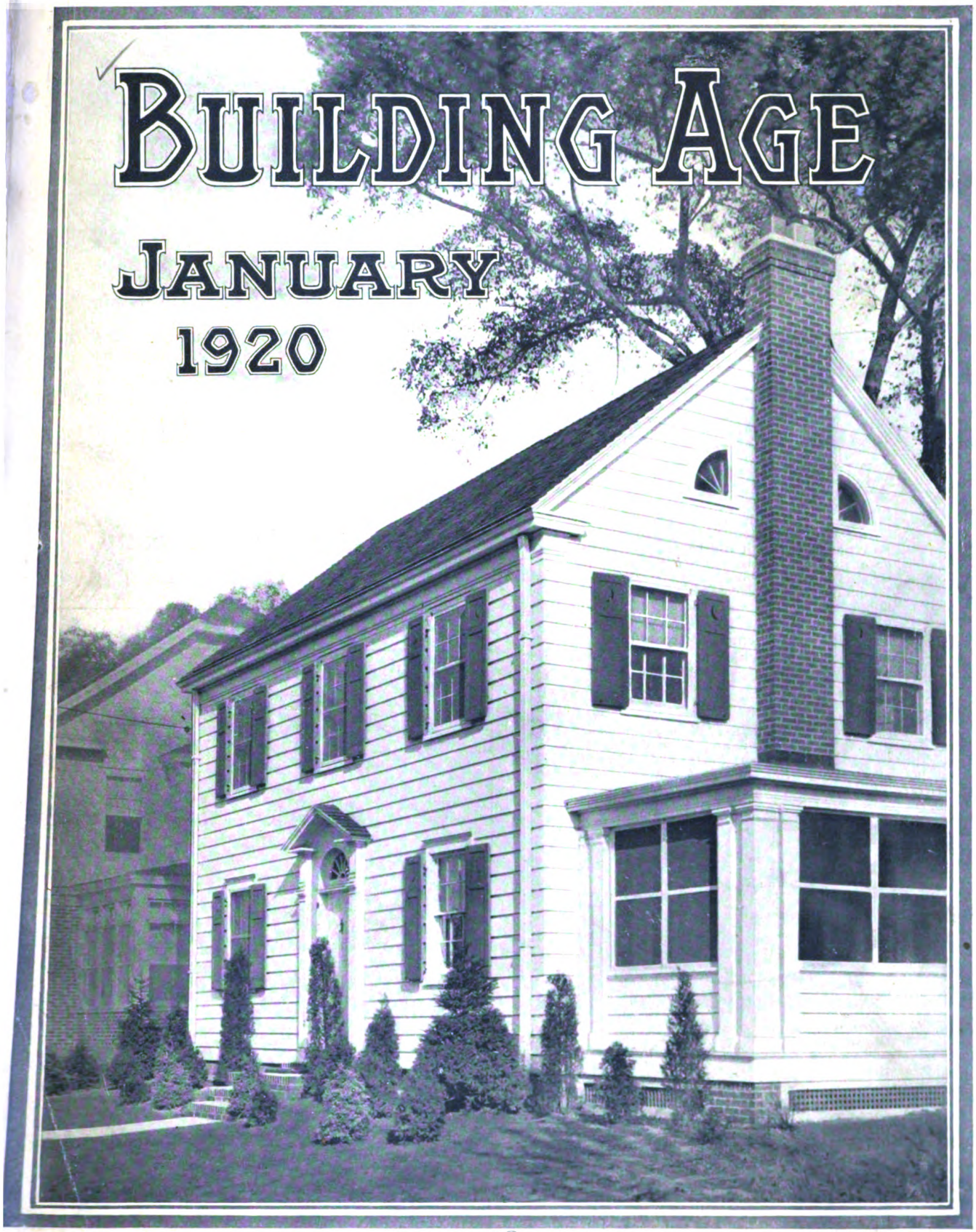

A House at Maplewood, N. J. Kenneth W. Dalzell, Architect

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January, 1920 Vol. XLII. No. 1

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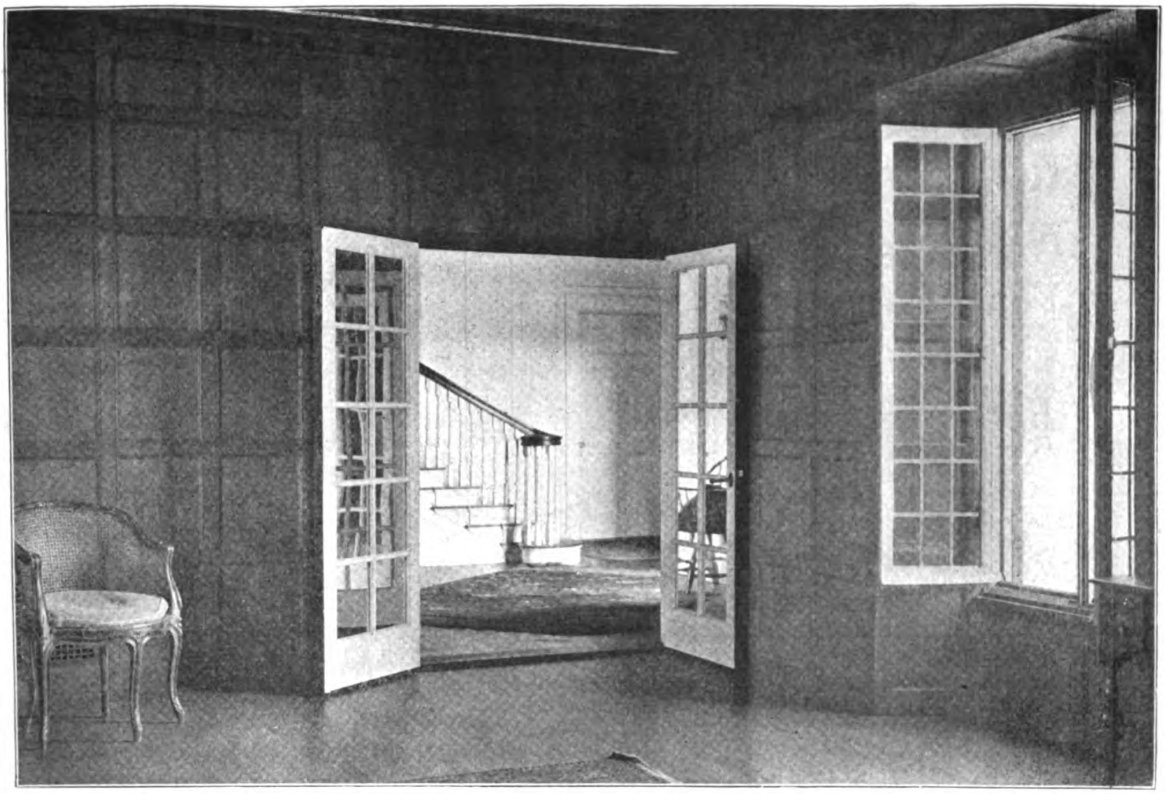

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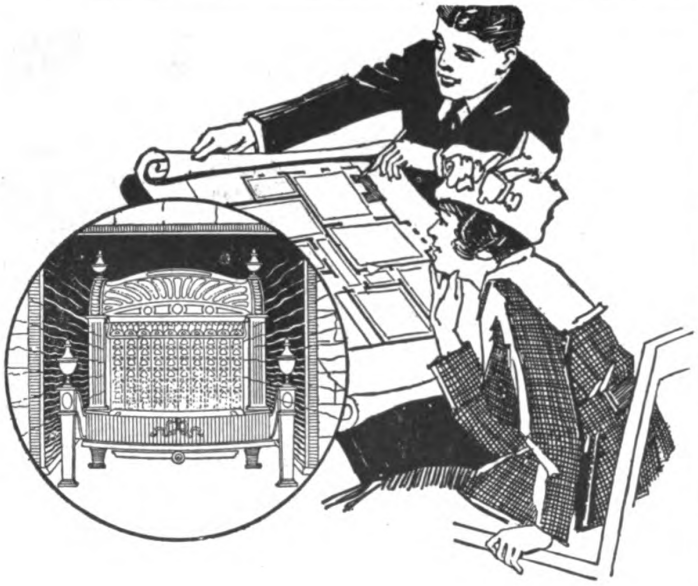

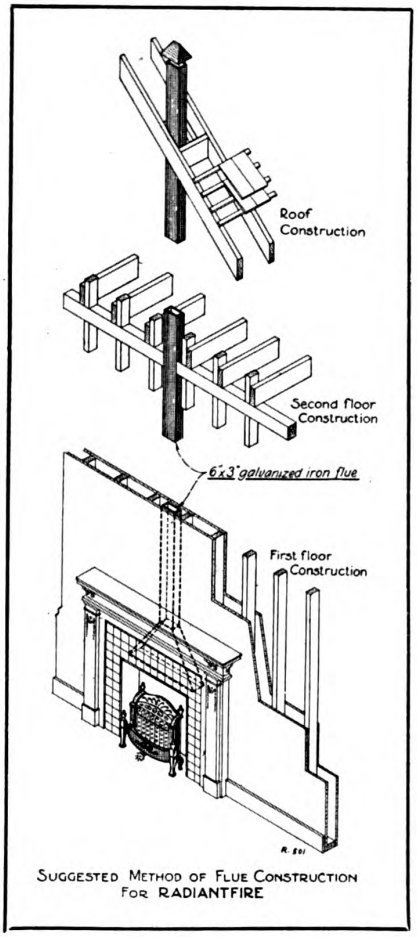

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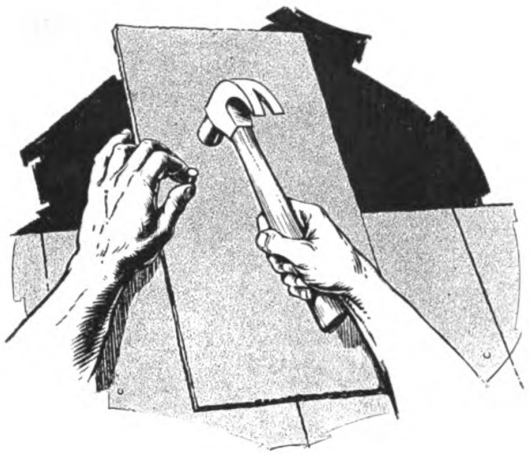

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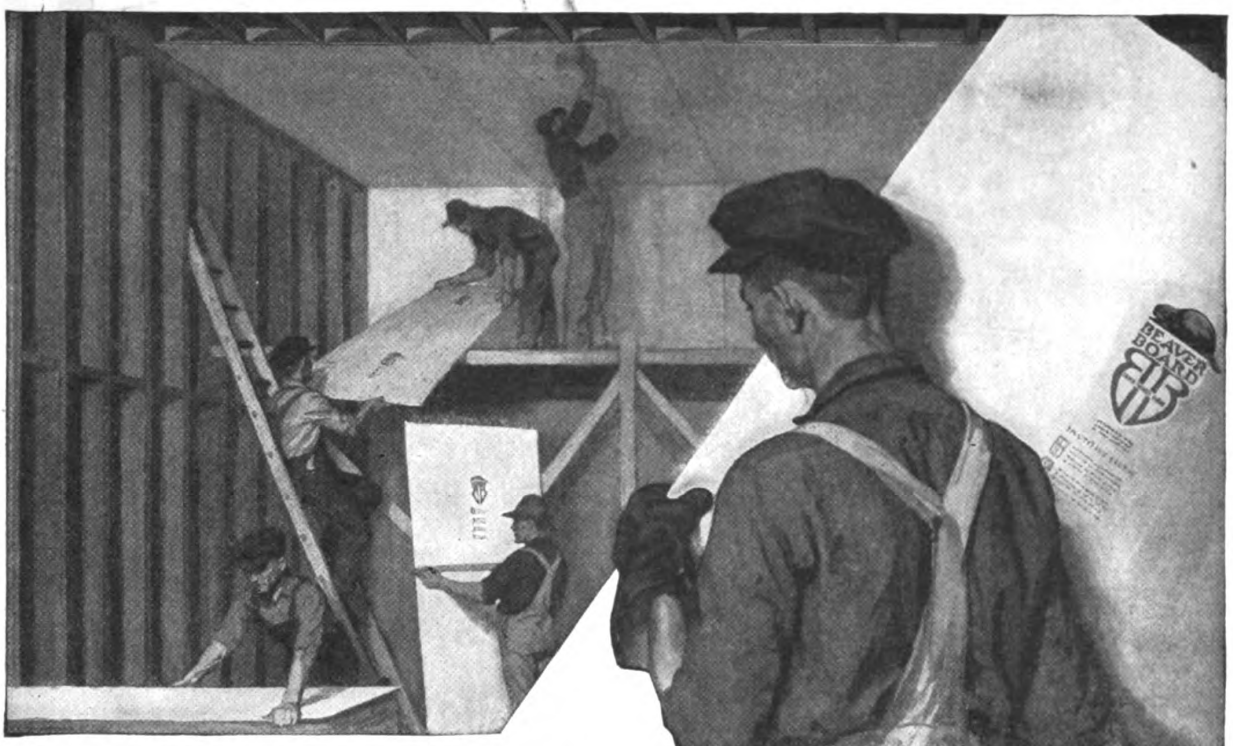

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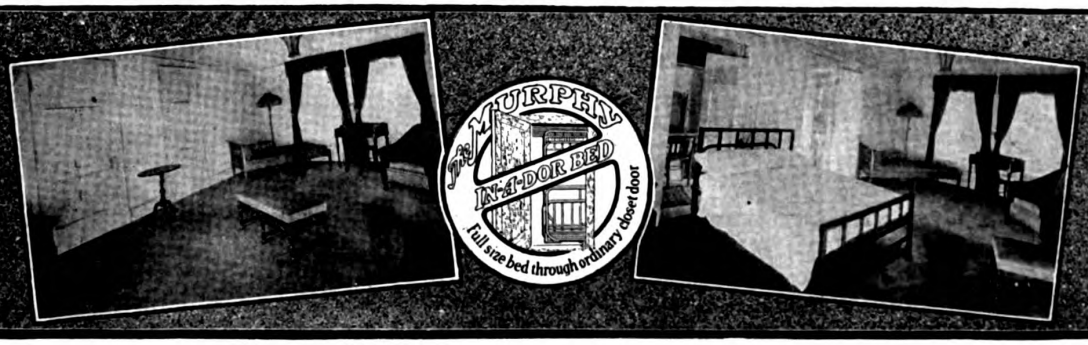

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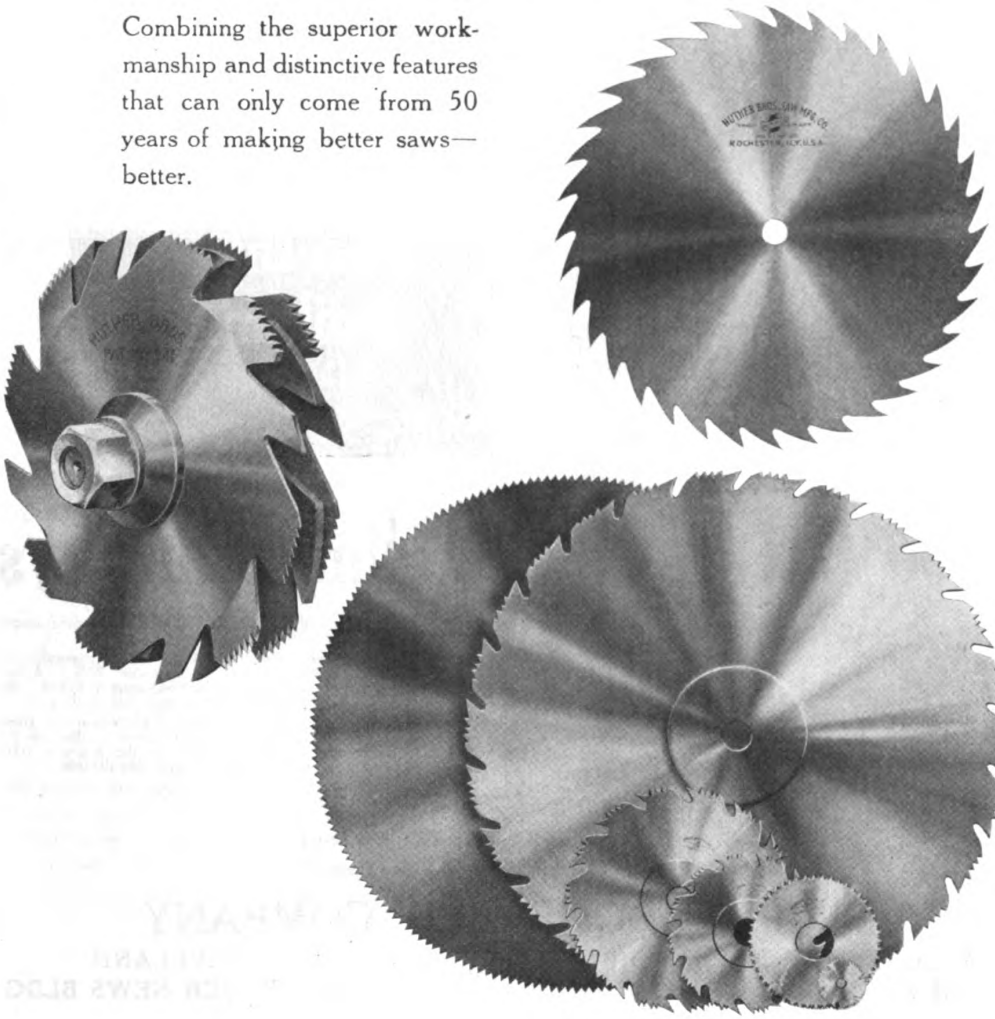

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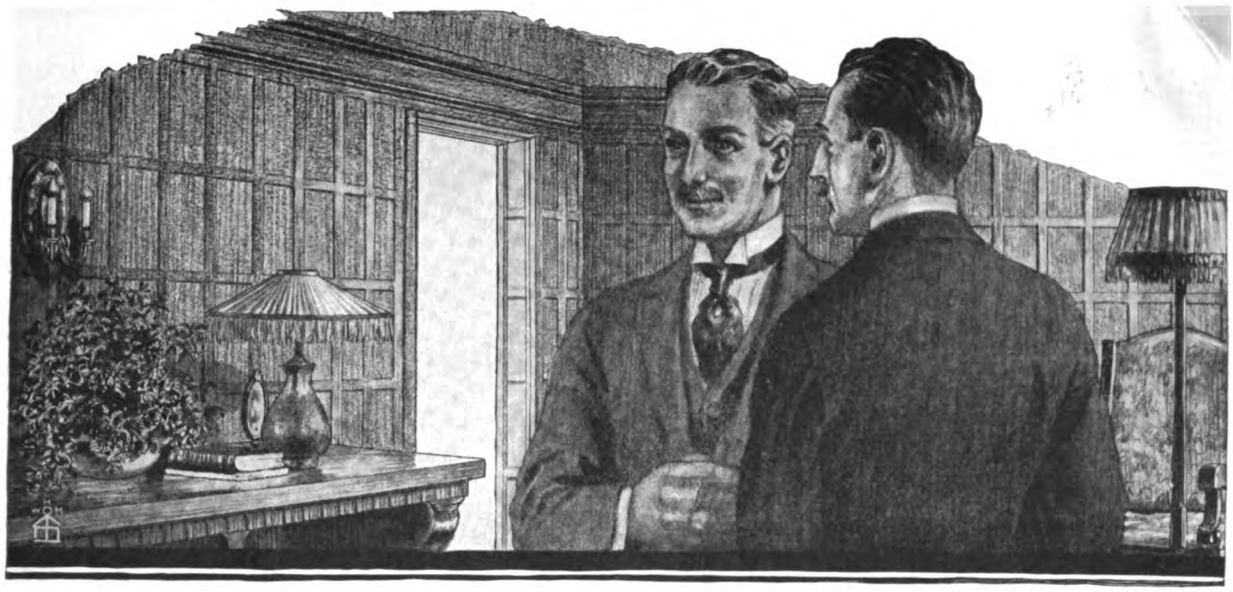

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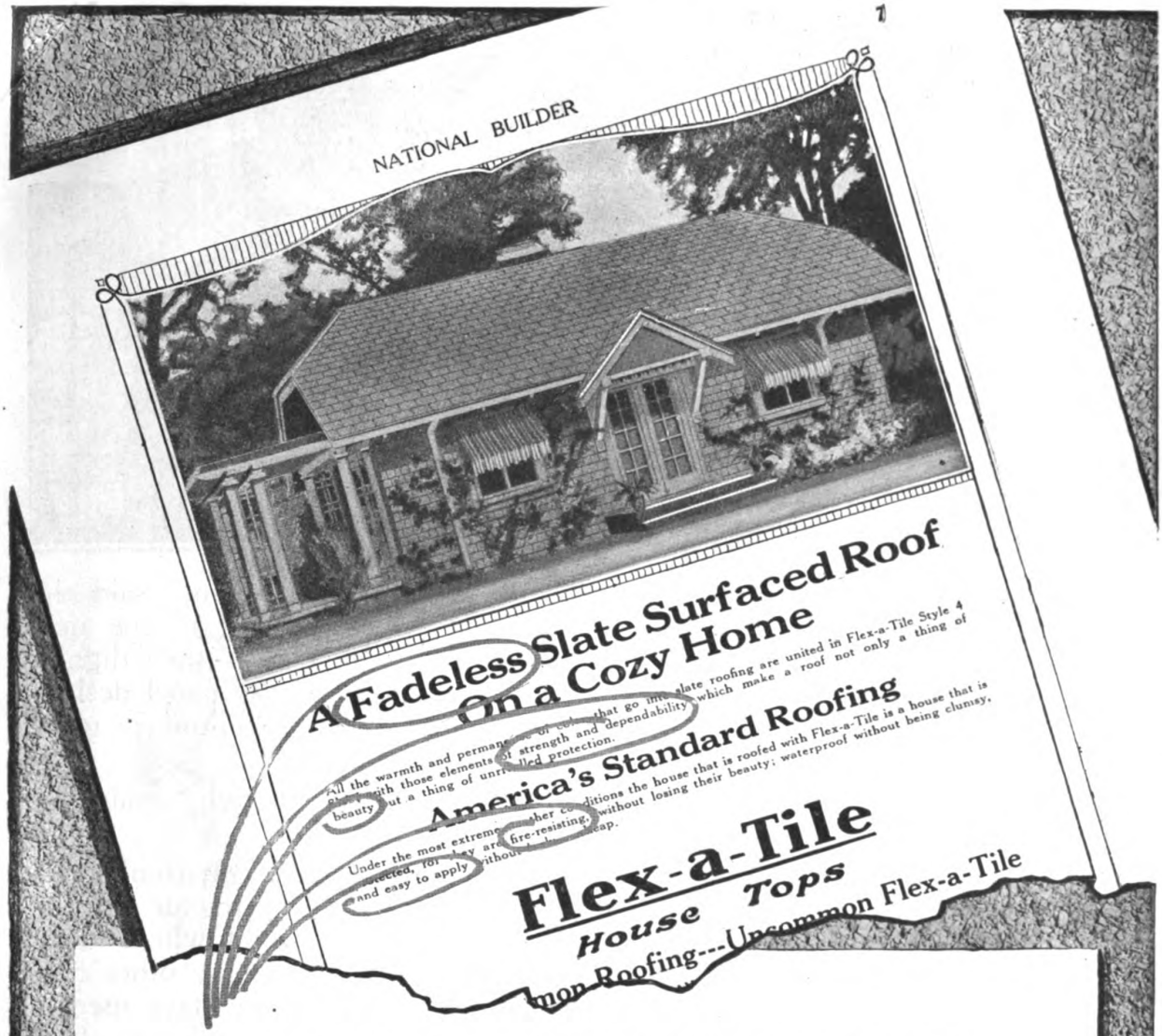

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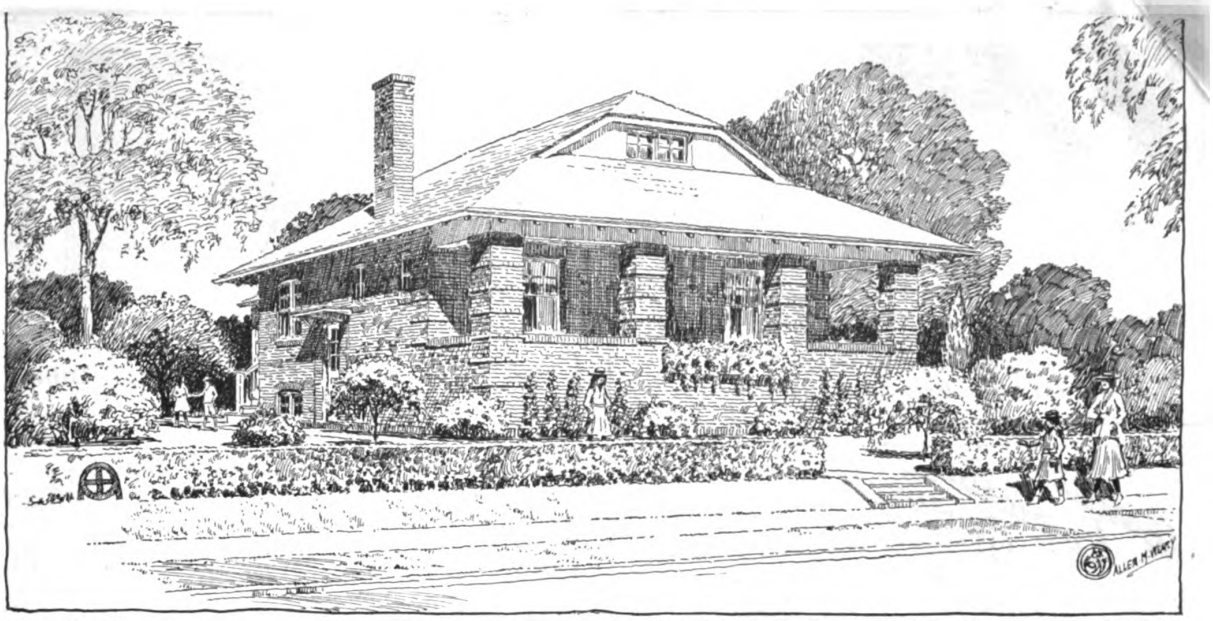

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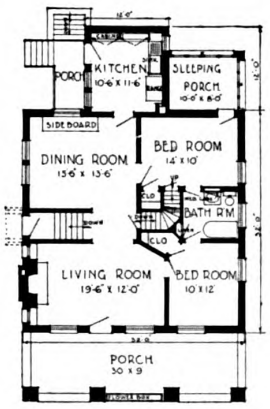

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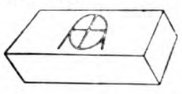

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Farm house of George Ade, the author, at Brook, Indiana, shingles, siding and timbers stained with Cabot's Creosote Stains

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BUILDING AGE

NEW YORK, JANUARY, 1920

A Well-Designed and Planned Six-room House at Maplewood, N. J.

KENNETH W. DALZELL,
Architect





PROBABLY the most complex problem that confronts the modern builder and prospective house owner today is to secure the size and kind of house desired within a certain well defined appropriation. The increased cost of labor and material has now made it necessary that the utmost foresight be used in every detail of material that enters into the modern house. The problem becomes one of exceeding difficulty and an opportunity is afforded to builders and architects to show by an accurate knowledge of costs and adaptability of materials how to achieve the best possible results.

An excellent solution of the low cost house is the subject of our cover illustration and is herewith further illustrated. This attractive house was designed by Kenneth W. Dalzell, architect, of Maplewood, N. J., in which suburban town this house is located. The house is one of the utmost simplicity of design, excellence of proportion and refinement of detail and it represents a fortunately rapidly increasing suburban type of small dwellings that are

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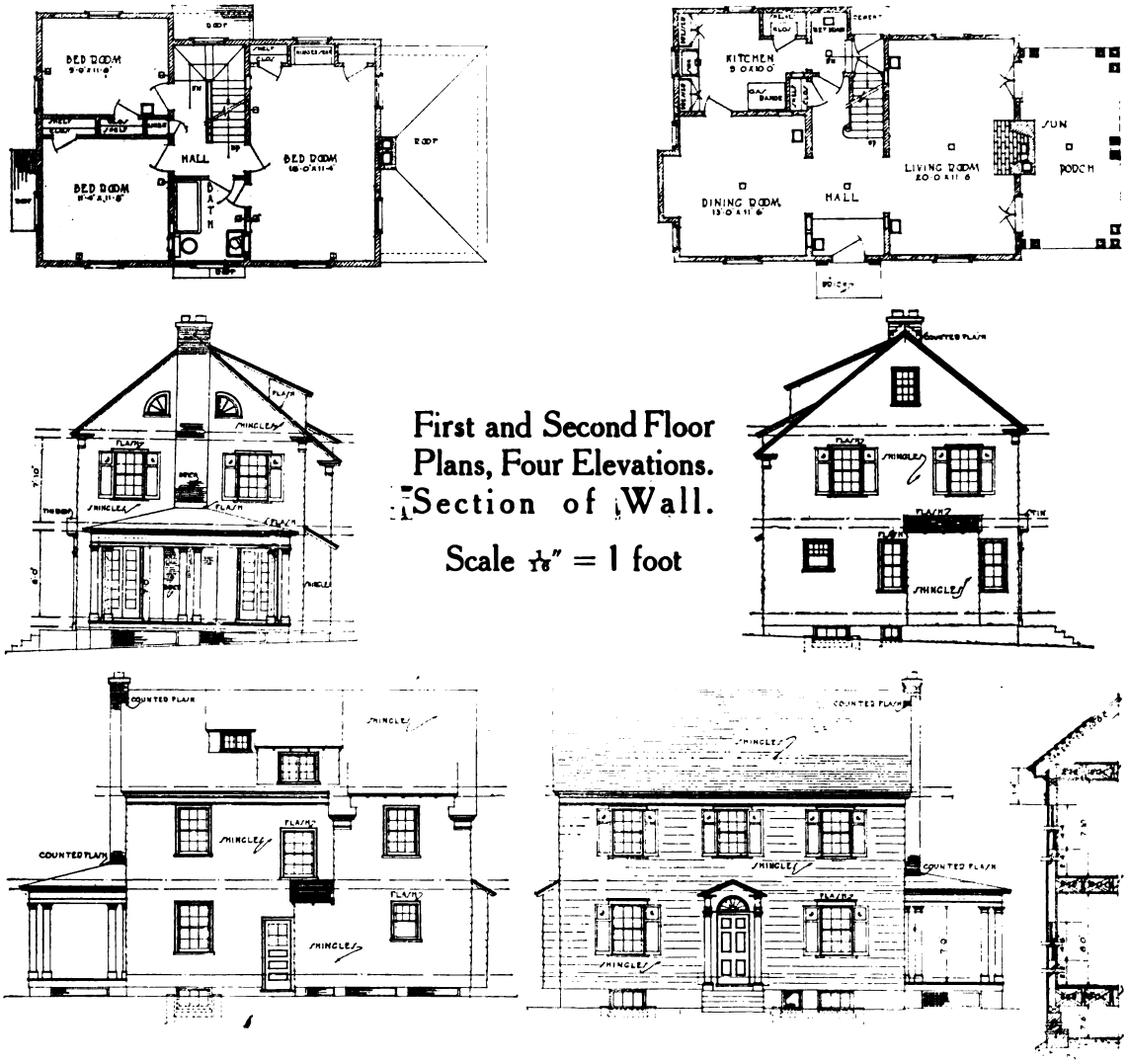
sermons in the well considered use of materials and their application to good design.

There is a certain air of domesticity in a house of this sort and every feature of its design and plan outside and in accents this. Particularly is the entrance porch well considered. It is a well-designed detail in keeping with the general exterior of the house and it shows in its motive the best elements of the Georgian or English colonial period with which its neighborhood during the early history of this country was prominently identified.

The plan shows a very well considered economy of space and an arrangement that adds largely to the livable qualities of the house. The large living room supplemented by the sun porch is in axis with the dining room directly across the hall, while the kitchen is planned with unusual facilities for expeditious service in the small family where the servant problem often becomes so acute as to compel the entire elimination of domestic help. There are three bedrooms on the second floor, each provided with ample closet space and all readily accessible to the bathroom in the center of this floor.

A feature of this house that should not go unnoticed is the relative size of the window openings, their accurate placing and the general simplicity that is a feature of their treatment.

The modern dweller in our suburban town finds not only recreation but a considerable amount of satisfaction in the development of such small landscape or garden effects as he may be able to command. In the present instance the owner has set out planting that eventually will lend a large measure of attractiveness to this house.



First and Second Floor Plans, Four Elevations. Section of Wall.

Scale $\frac{1}{16}$" = 1 foot

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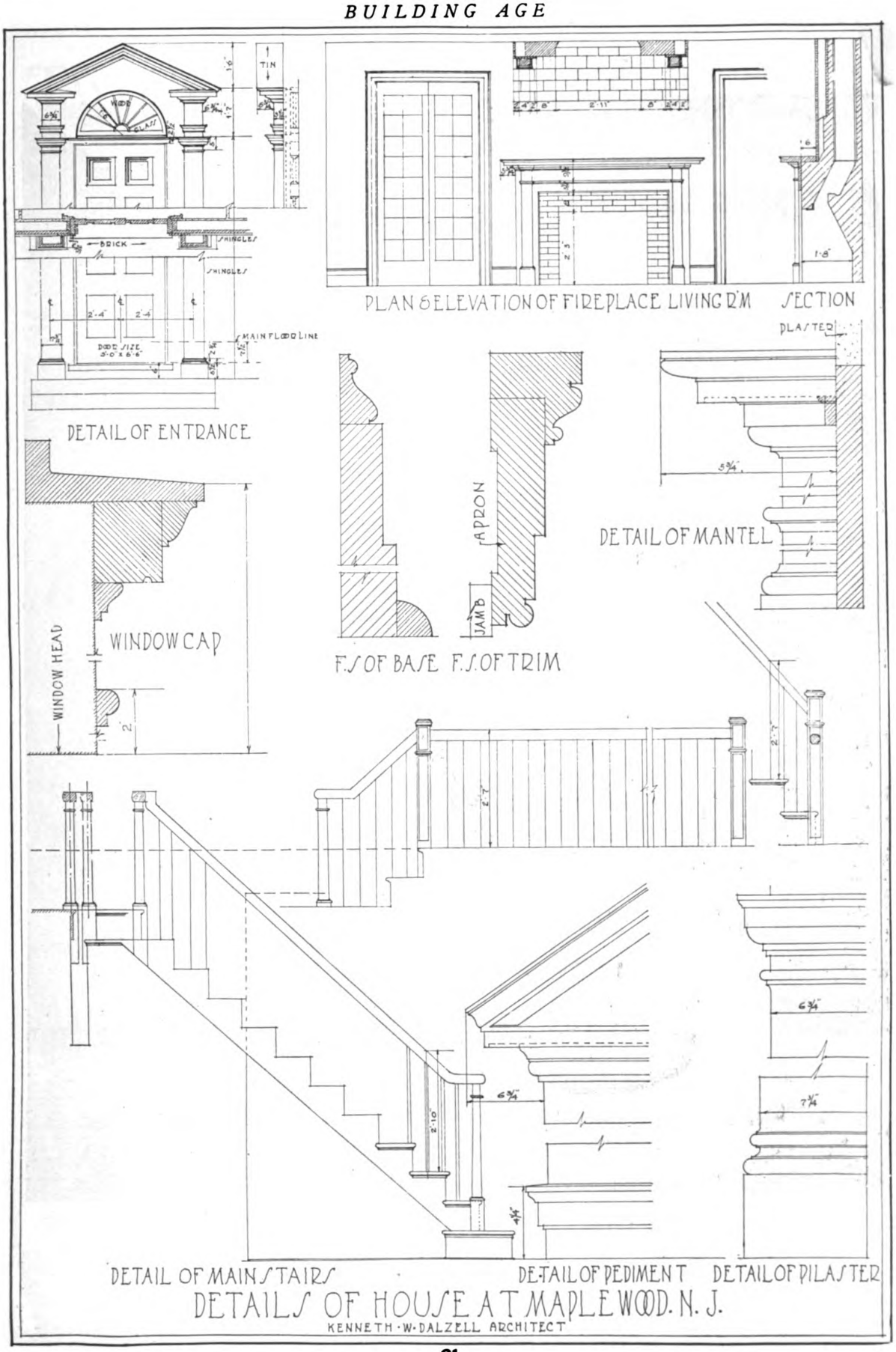

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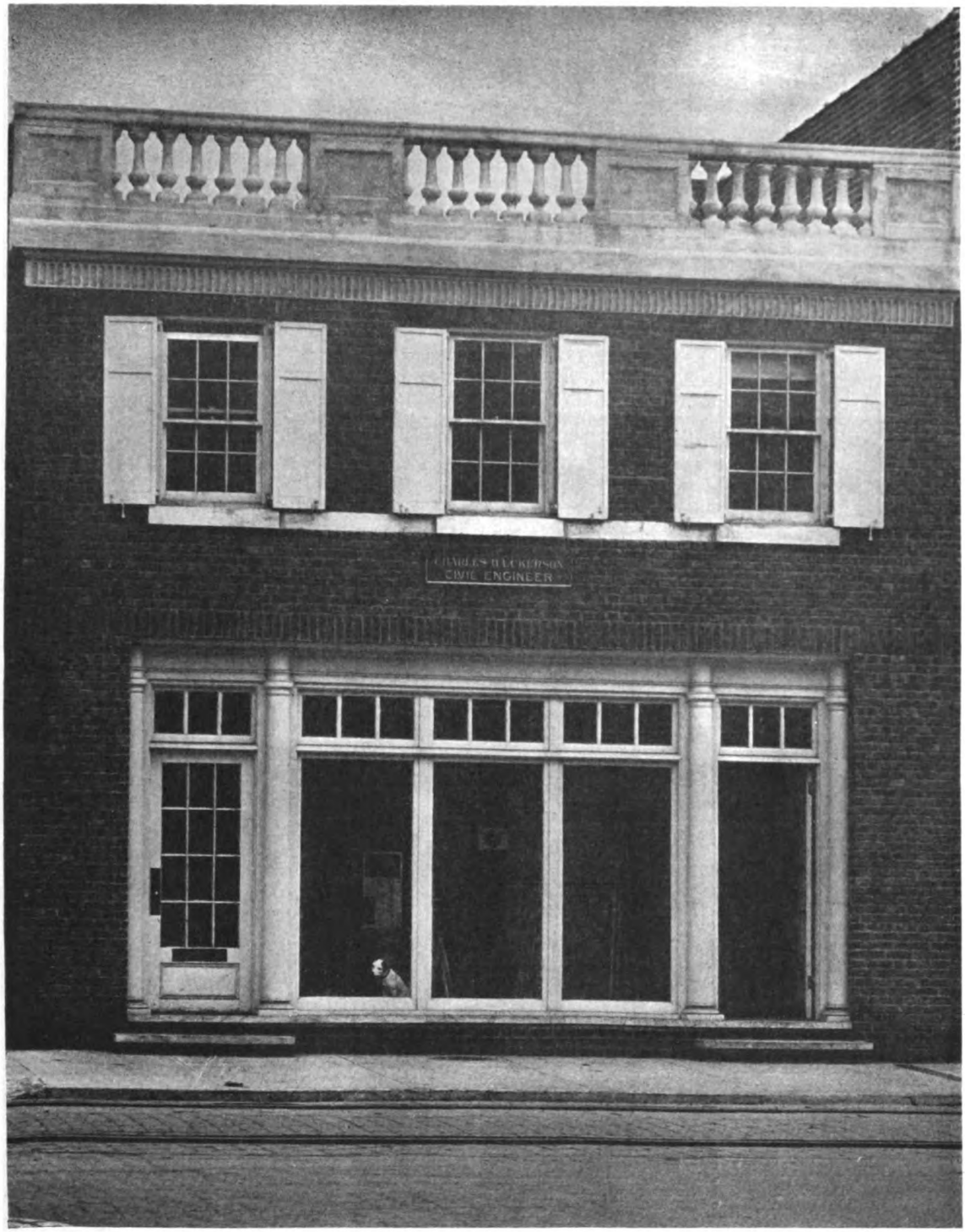

STORE AND OFFICE BUILDING, ENGLEWOOD, N. J.
AYMAR EMBURY, II, *ARCHITECT*

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Two-Story Store and Office Building at Englewood, New Jersey

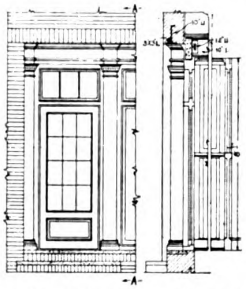
AYMAR EMBURY, II, *Architect*

A Carefully Designed Facade That is Reminiscent of the Colonial Traditions of Its Location

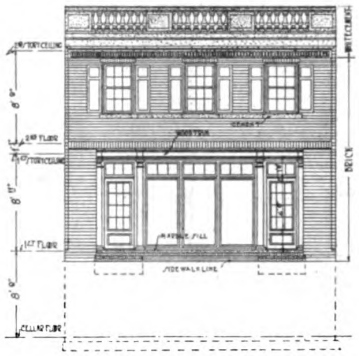
CIVIC pride in small communities has so greatly increased during the past decade that the dweller in the small town has become very critical in every phase of its development. He is insistent that his house shall be of good architectural aspect, he requires that his city government shall give due regard to the well-directed action of municipal improvement, and as a local merchant or real estate owner or developer he has come to know the value of good building and good building designs.

The illustration in this issue of the two-story business building at Englewood, New Jersey, designed by Aymar Embury, II, architect, has been selected to accent the desirability of a proper regard for good design in even a low-cost building.

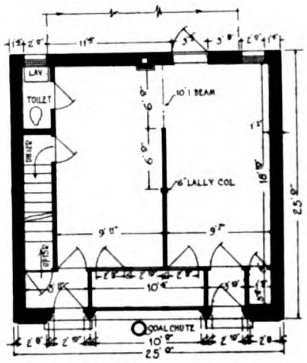
The brickwork of coarse texture has been handled in a manner that accentuates the artistic possibility of this material and the raked joints cast just the proper shadows to produce and carry forward the effect of the engaged column, the design of which is exceedingly simple and in exactly the right proportion.



DETAIL OF ENTRANCE & PART OF SHOW WINDOW. SECTION A-A



FRONT ELEVATION



FIRST FLOOR PLAN

The architect has designed a facade that in its well-proportioned dignity is worthy of a place among most pretentious neighbors.

Further, he has shown a fine regard for the early traditions of Englewood, a neighborhood that teems with Colonial historic association, and created a most correctly expressed example of the Georgian type. Undoubtedly this good example will exert a correct influence on all buildings in its neighborhood of later construction.

The characteristics of this building that contributed to its success are its correct proportion and the artistic method in the handling of the material used. Modern retailing has become a well-developed and standardized thing, and the first essential is an attractive store, inside and out. As good illumination is a first essential, the architect has provided a window and door space, so designed that the windows reach to the floor and enable a clear and unobstructed view from without of the entire interior. Within the building becomes thoroughly lighted, even on dull days, and the result is withal completely satisfactory.

The balustrade across the top of the facade is designed strictly in accordance with the period of the design and is a pleasing variation from the usual monotony of the cornice.

It will be noticed that its height is correctly proportioned to the rest of the facade.

The spacing of the windows in the second story has evidently been carefully studied, and their proportion as related to the whole facade is correct.

Evidently the architect of this small building has become impressed with the maxim that anything worth doing is worth doing well. He has presented a solution of the small town commercial building that may serve as an example worth following.

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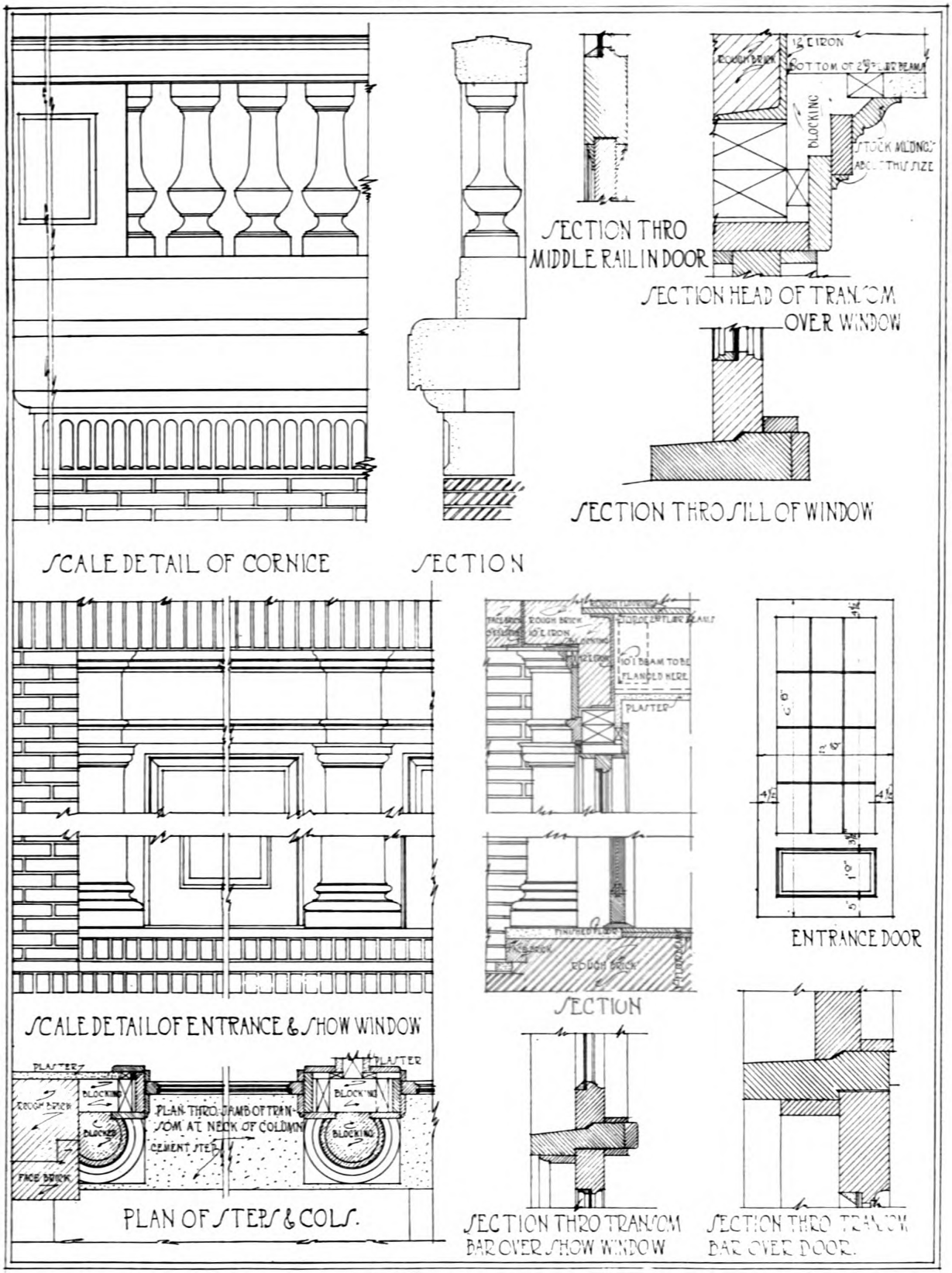

STORE AND OFFICE BUILDING AT ENGLEWOOD, N. J.
AYMAR EMBURY, II., *ARCHITECT*

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How to Lay Stone, Part III

By VICTOR D. ABEL, *Architect*

The Accompanying Illustrations Are Examples of Well-Executed Ledge-Stone Work in Suburban Philadelphia, by Architects Who Excel in This Type of Building.

WHILE good stone work has been practiced in the development of Colonial types of buildings, this does not of course mean that its use stops there. On the contrary its flexibility has been well demonstrated in its use in the half-timbered house which has been so popular. The further and deeper study of the modern house and the increase in the demands both for comfort and for the exterior aspect of the house with relation to its site, have resulted in many new and good wall surfaces. This, of course, is encouraged by the care with which may be secured the variation in laying or the difference in pointing which add so much to the satisfaction of working in stone.

The two half-timbered effects shown in Figs. 22 and 23, as well as Figs. 2 and 5 of Part I, are quite applicable to the specification for this type of work previously quoted. By a fortunate circumstance the rust color in stone is most in evidence in the seam side and the stones laid on edge throughout the wall and at the corners and opening are well contrasted to the grayer surface of the stones laid on their natural beds. The pointing is again white, somewhat broader than the majority of colonial work, and possibly with a little more of a ridge. The stones in such halls can vary more, as note the prevalence of small stones against the large stones on edge.

In Fig. 24 the stone work is more of the type used in Colonial work, although the stones are somewhat higher. The pointing is also somewhat more ridged. This is shown because of the interest in the contrast of the stone wall and the half timbering and plastering above it and showing the benefit of such a combination.

Fig. 25 shows a wall surface of contrasts. In this considerable use has been made of large stones, both at corners and openings and in the wall between. The wall is well broken up by buttresses and openings to heighten the effect and the small stones are only used in the few unbroken surfaces to fill between the large stones. The pointing has been done with natural cement and Jersey gravel, which is a coarse gravel yellow in color, which keeps the wall in general tone with the gray colored plaster and dark woodwork above.

Fig. 26 is an especially beautiful example of stone masonry. None of the stone are over five inches in height with the usual exceptions of corners and openings. The stone is a soft gray color, all being laid on natural beds, close together, without any dressing of the stones and the joints carefully racked out as deep as possible as the walls are laid, forming the finished pointing. The mortar is natural cement and gravel, giving a warm gray color not much lighter in tone than the stone itself.

The particular value of this type of wall is in its use as wall surface with the openings reduced in scale and size in keeping with the stone. With the exception of the cut stone trimmings which are lighter in the reproduction than they are in actuality, the wall over the heads of the openings is carried on long thin pieces of slate stone, even the usual arches or head stones being omitted in the reduction in scale.

Fig. 27, reproduced as a photograph taken immediately after completion and before the shrubbery has had a chance to grow, is used for the value of the detail in the stone work. It is a rather unusual house, both in design and treatment of wall surface, use being made of the large rusty stone laid on edge, somewhat as in Fig. 25, but with the contrast carried to a greater extent. Special attention is called to the detail in the arches, the use of the long thin stone contrasting with the large stone in the buttresses and in the openings. Note the building up of the round columns of the porch, the large stone and the small stone fitted together into a perfect round and yet with very little actual cutting of stone on the ground.

The next illustration, Fig. 28, is of a stable built of Pennsylvania blue marble, a hard stone, grayish blue in color. It is interesting as showing a result often obtained in the old days without any cutting of stone, the jointing being extremely irregular with the coursing. Pointing is pure white to show up against the very light gray color of the stone.

In Fig. 29 the architects have secured a wonderfully successful result in both the design and texture of wall surface by the use of small stone. Note the extreme irregularity of the wall, the large corner stones and the seeming indiscriminate use of stones

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Ledge Stone Work in Suburban Philadelphia, Pa.

Interesting and carefully studied details, as referred to in "How to Lay Stone," by Victor D. Abel, in this issue.



AT RIGHT: FIG. 23—DOORWAY OF A HOUSE AT MERION, PA.
D. KNICKERBACKER BOYD, *ARCHITECT*

IN CENTER: FIG. 24—HOUSE IN GERMANTOWN, PHILA., PA.
FRANCIS A. GUGERT, *ARCHITECT*





ABOVE: FIG. 22—A GARAGE DOORWAY, MERION, PA.



AT RIGHT: FIG. 25—HOUSE AT MERION, PA.
D. KNICKERBACKER BOYD, *ARCHITECT*

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forming the wall and yet selected, as the result shows, with nice care for the final completed effect. The stones themselves vary in color from the seam faces of the corners to the gray of the smaller pieces. The treatment of the openings is especially interesting, as is that of the band courses, which are of dressed rather than cut stone. The flat surfaces and copings are evidently sand rubbed or tool dressed. The corners of openings where they tie into the rough stone wall are of the same stone as the wall and dressed with the hammer with square beds and edges. Note especially the heads and courses over the bay in the foreground, with its rain spout of the same stone.

The pointing is also worthy of mention. It is of the natural cement and gravel of which the wall has been laid and has been raked out as deep as possible with the wide trowel as the wall was built. The entire result obtained, even though stone from chimney cap to path in the grass, is such as to avoid monotony.

On occasion it is also desirable to build stone walls, but for garden or terrace treatment only, without any mortar at all. This is shown in Fig. 30, where the natural rock of the field has been used to form dry wall terraces from a brick house to the garden. The stones are carefully laid on top of each other and fitted together with smaller pieces of broken stone in the interstices instead of mortar. It is also well to use some earth in laying the stone, particularly if it will be filled against the wall on completion. Here the same stone is roughly split into strips to form the steps, with smaller stones forming the risers.

Two other examples of the use of stone in garden treatments are shown in Figs. 31 and 32, the first being of a most unusual type of stone work not often used in the East. This will be more fully described later. The other shows an opening in the stone wall connecting a house and garage and forming the end of a garden. The type is probably more formal than is ordinarily used for garden treatment, but in this case required by carrying the work of the house to the rest of the buildings. The stone and pointing is similar to that described under Fig. 22.

Fig. 33 is the unusual type of stone wall just referred to above. This was developed because of an entirely new departure, not only in the stone work, but also in the architecture of the buildings on this estate. The owner desired to follow in general the design of the mission buildings of California and Mexico, but with the necessary modifications to conform to our Eastern climate. To secure the same general texture of the adobe walls of the missions, a number of different methods of laying walls were tried out. The wall shown in the reproduction was finally determined upon. The result is interesting, not only for the buildings actually erected, but also as showing the possibilities of the use of this type of wall in other cases as since used, notably for the stone work of log cabins.

The wall was laid in the same manner as whitewashed walls, except that the final pointing was done after the wall was laid and the cleaning done after the pointing instead of before. The pointing consisted of natural cement and coarse gravel and was applied with the large trowel and raked over, not smoothed. Smaller stones were completely covered and the larger ones partly so, showing only the projecting faces and giving the appearance of a weathered wall in which the plaster coating has begun to peel off. Note the use of rough dressed, natural seam faced cut stone, and the use of brick trimmings.

Mention should be made of a curious stone found in one of the outlying sections of Philadelphia, known as honeycomb stone. The surface of this stone, which is found on top of the ground in the fields, resembled nothing more than an old piece of wood full of worm holes, except for the rough surface. It is interesting in its use in such special cases as fireplace illustrated in Fig. 34.

The foregoing illustrations have been taken entirely from examples of domestic architecture. That the use of stone should not end with this is conceded. Emphasis has been placed on houses merely because of the great possibilities for the use of stone in this class of building. The article would not be complete without showing the beauty of natural stone in church work, as shown in Fig. 35. Note the building in of the arches and keystone, accentuating the Gothic arch of the opening. Also the same stone roughly dressed to form the wash under the sill of the window. The pointing is ridged, not too broad, but just sufficient to fill the joints, and the bottom has been carefully cut with the aid of a straight edge, adding a touch of formality missing in the usual house wall.

While emphasis has been laid all through this article upon the stone work surrounding Philadelphia and all of the examples have been taken from there, they have been selected with care so as to show not only what can be built here because of the particular fortune which exists in the amount and character of the stone but also wherever stone can be obtained. It is so near at hand and can be had with such ease that we are prone to forget that in other sections the same condition does not exist. As soon as this article was well started the writer realized the necessity of showing the results which could with care be obtained under other conditions.

He has endeavored to show that the man wanting a Colonial house need not be discouraged by the non-existence in his neighborhood of such stone

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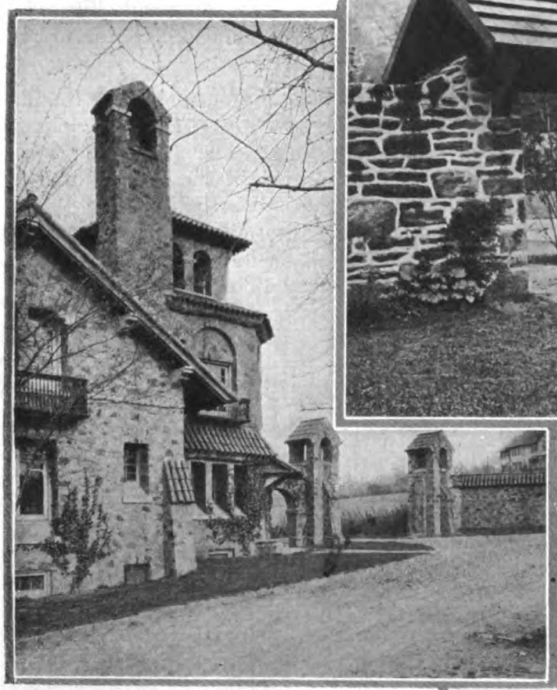
AT RIGHT: FIG. 31—VIEW IN PATIO, OF A HOUSE AT ST. DAVID'S, PA.

BELOW, IN CENTER: DETAIL OF A HOOD

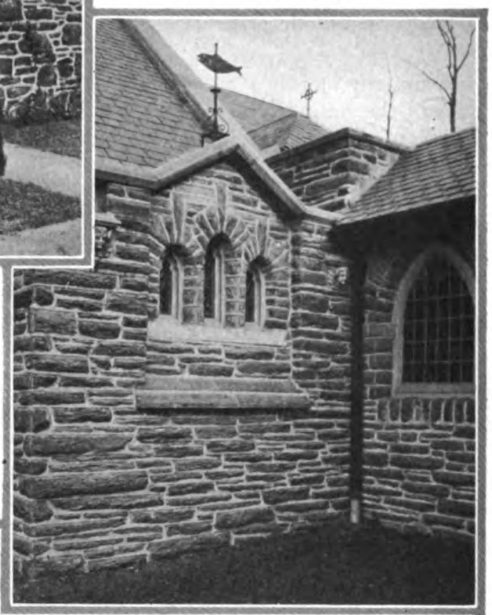


BELOW AT LEFT: FIG. 32 DETAIL OF A GATE LODGE, ST. DAVID'S, PA.
D. KNICKERBACKER BOYD, *ARCHITECT*





BELOW: FIG. 35—DETAIL OF A CHURCH AT OGONTZ, PA.
LAWRENCE VISSCHER BOYD, *ARCHITECT*



AT RIGHT, FIG. 34—DETAIL OF A STONE FIRE-PLACE IN A LOG CABIN, DESIGNED FOR MERION CRICKET CLUB, HAVERFORD, PA.

D. KNICKERBACKER BOYD, *ARCHITECT*



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AT LEFT: FIG. 26
HOUSE OF MR. W. M. C. KIMBER, PHILADELPHIA, PA.

EDMUND B. GILCHRIST,
ARCHITECT



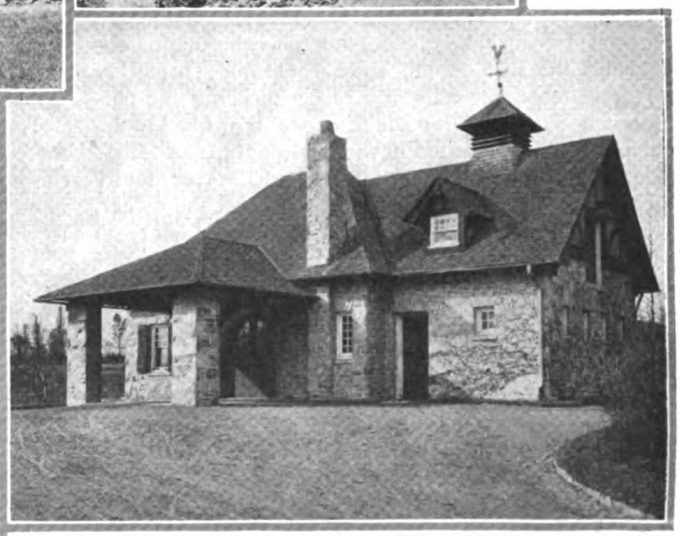
FIG. 30
HOUSE AT HAVERFORD, PA.

D. KNICKERBACKER BOYD,
ARCHITECT



FIG. 27
DETAIL OF A HOUSE AT NARBERTH, PA.

D. KNICKERBACKER BOYD,
ARCHITECT



ABOVE: FIG. 28—A STABLE AT WAYNE, PA.
FRANCIS A. GUGERT, *ARCHITECT*



AT LEFT: FIG. 29—DETAIL OF "HUNTING HILL," NEAR MEDIA, PA.
WILSON EYRE & McILVAINE,
ARCHITECTS

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as is shown in Old St. David's Church. Figs. 17, 18 and 20 alone show a satisfactory result under totally different conditions. The whitewashed house required no particular kind of stone, simply care in the laying of the wall.

And what could be more pleasing than the detail in Fig. 29, or the houses in Figs. 26 and 34, each of a distinct type, yet each in excellent taste?

Effort has been made to show that it is in the careful selection and use of the natural material at hand that the success of the stone wall in each of the types lies. If such feasibility has been shown without the necessity of artificial effects to secure a forced and therefore unnatural result, and has thereby increased the use of stone in its natural element, then the purpose of this paper will have been attained. But there is no attempt to try to force the use of stone out of its natural element as an artificial material, nor where custom and precedent have already established the use of brick or plaster, each of which reign in their respective spheres as does stone in its own circle.

Does Plate Glass Fade?

SEVERAL years ago a contract was taken to supply a vertical installation of prisms in a store front of a haberdasher's in the main business thoroughfare of Indianapolis, Ind. To install the prisms properly it was found necessary to cut off five feet from the top part of the plate glass, which had been in position for a number of years and exposed to the sun's rays during much of the time.

After the prisms had been installed the five-foot piece of plate glass salvaged was thoroughly cleaned and polished and consigned to stock for resale. In the course of time this salvaged piece was sold, to be used in a front window of a new residence in one of the principal streets in the fashionable residence section. The house was completed and the owner, having taken possession, was thoroughly enjoying the new home, when the family began to receive telephone calls of a rather puzzling and perplexing nature, asking the price and how quickly delivery could be effected in various quantities of Shirts Made to Order! A certain wag in the community called up the owner complaining that he, the owner, had made a mistake in building a shirt factory in that neighborhood, and that if he persisted in operating a factory in his residence, in all fairness and consideration to his new neighbors he should at least remove all advertising from his front window.

The daughter of the house becoming thoroughly provoked and annoyed at what she presumed was a practical joke of some sort, proceeded to make an investigation on her own account, which resulted in the writer's being requested to call at the house. He was greeted at the front door by Mr. Owner and asked whether the plate glass furnished was really first grade or second-hand. To the reply that, from a close inspection at that moment, it was a beautifully polished high-grade piece of plate, and to all appearances absolutely without blemish, he assumed a knowing smile and asked me to walk down the street with him a short distance, when, turning abruptly at perhaps fifty paces, he asked me to look at the window. To my astonishment, plainly legible at the particular angle at which we stood were the words: John Doe—Shirts Made to Order.

What seemed to be a phenomenon was easily explained. Previous to the plate glass being removed from the show window of the haberdasher, there had been pasted to it white enameled letters, "John Doe—Shirts Made to Order." These letters being subject to the direct rays of the sun for a period of years had prevented the fading of the glass (originally green) to a clear white, as was the case with that portion which was not immediately back of the opaque enameled letters. The unfaded portion consequently stood out in contrast in its original green, but was not discernible except at a certain angle.

Better to Keep Homes

THE high prices of real estate have led many people who are comfortably established and who had neither intention nor necessity for selling to part with their homes, states a daily paper in Baker, Ore.

The real estate agent rings the door bell and tells the owner of the house he can get him double what the house cost. The man, suddenly dazzled by the money prospect, agrees to sell without taking time to consider the facts.

The deal is closed, the price named is forthcoming, and then the man who had a perfectly comfortable, pleasant home begins to look for a place to which he can move. After a distracted hunt of some days or weeks, the truth dawns on him. If he could sell his place for twice what it cost, so can everybody else, and everybody expects to. To build anything like as comfortable a place as the one he sold may cost more than twice as much. Rents are raised in proportion to purchasing prices and rented property is very scarce. Finally he realizes just what it is that he has done, and hates himself for a fool.

This is happening nearly every day in every town in this country, and it will keep right on happening until the home owners begin to realize that the depreciated value of a dollar extends to real estate just as to everything else. When they wake up to this fact the people who own good homes are going to stay in them and let the fellow who doesn't own his home assume the burden of getting comfortably located.

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Financing Building Operations

PART I

By G. P. WOODRUFF

A Timely Discussion of the Proposed Home Loan Banks in the Federal Reserve System

AT THE beginning of this discussion attention should be directed to a bill which, if passed, will accomplish for the realty man and builder what the Federal Reserve system has accomplished for the business man or the Federal Land Bank system for the farmer. This is the proposal for the establishment of a Federal Home Loan Bank system. It is sponsored by the United States League of Building and Loan Associations, and is endorsed by the Department of Labor.

Briefly the plan calls for the establishment of Home Loan Banks in each district of the Federal Reserve system. The Building and Loan Associations which now have their funds tied up on long-term mortgage loans will be able to pledge the mortgages they own with the Home Loan Banks. These in turn will issue tax exempt debentures against them. The proceeds from the sale of the debentures would be available to the depositing Building and Loan Associations and in this way increase greatly their ability to take care of expanding demands for building funds.

The importance of such a system will at once be evident to builders everywhere. It is estimated that Building and Loan Associations throughout the country have approximately $2,000,000,000 outstanding in mortgage loans. This money is now available for further loans only as the individual mortgages are paid off. Given an arrangement whereby the associations are enabled to raise money on their mortgages in the way that a bank raises money on its commercial paper, and the builder then has a banking system to turn to that should be able satisfactorily to satisfy his needs.

Such a system will also bring the Building and Loan Associations into a much stronger position in the realty field than it has ever held. One important factor in this is the impetus given toward systematic amortization of mortgage loans by the real estate corporations, which loan on a lower scale and put out bonds against the mortgages they hold. The Building and Loan Association provides an automatic amortization plan for all who borrow from it on mortgage security and for this reason it is particularly valuable for the man who is both builder and operator on a small scale.

The plan of operation of the associations is probably fairly well known. Formed under uniform state laws and subject to state regulation, they are hedged about with practically all the safeguards of a bank. The membership is local and the loans are made in territory with which the officers are entirely familiar. Membership is obtained through subscription to any number of shares and on each share monthly dues, usually of one dollar, are paid. Dividends declared at the end of each fiscal year are added to the installment dues already paid and the payments accordingly continue to accumulate at compound interest until the par of usually $200 is reached. The time required to reach par for a share depends upon the volume and profitableness of the association's business and the dividend rate it can afford to pay. The time usually runs between eleven and twelve years.

Once a shareholder, a member may borrow on mortgage in an amount equal to the par value of his shares. If he has ten shares, par $200, he is entitled to borrow up to $2,000 on mortgage. Once the loan is effected, the borrower will then pay $2.00 per month for each share. One dollar of this payment is for interest on the mortgage and the other the regular monthly payment on the shares owned, only this time the monthly due on account of shares is really an amortization payment—a payment on account of the principal of the mortgage and so a constant reduction of it, for at the end of the time for which the shares run the paid-up stock automatically cancels the mortgage loan and the borrower has his property free and clear.

The importance of amortizing mortgage loans has been referred to. Every loan on improved real estate is a loan both on the building and the land. Regardless of whether the land increases in value or not, the building depreciates in course of time for a number of reasons—physical wear and tear, growth of more modern buildings around it and depreciation sometimes amounting to obsolescence of various fixtures, heating apparatus, etc., within. Supposing property is worth $18,000 and has a mortgage of $12,000 against it. At the end of twelve years, let the building have depreciated $1,500. With no change in the value of the land in

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the meantime, the owner, who had an equity of $6,000 at the start, has only a real equity of $4,500. His principal has shrunk that amount.

An increase in the land value, due to improvement in the character of the neighborhood would offset this, of course, but such increase of land value is not a thing that can be accurately estimated. In the above position, with an amortized loan such as Building and Loan Associations offer, the principal of the mortgage would be discharged at the end of the twelve years, and instead of having a shrinkage of $1,500 in his equity, the owner would have an increase of $10,500—that is, he would own his $16,500 property free and clear, whereas he had but a $6,000 interest in it at the start.

The Building and Loan mortgage used in this way is useful chiefly for the man who builds and holds property and manages it for the income. It is not a popular form of financing for the man who builds to sell quickly. Aside from borrowing directly on the basis of shares owned and carrying the loan to the maturity of the shares, a variation adopted sometimes is that of borrowing at the start through the medium of a Building and Loan Association and carrying the shares for a number of years. Then when the shares have reached one-third, one-half or some other fixed proportion of their maturity value, the plan is followed of cashing in the shares at their withdrawal value, borrowing from an outside source a sufficient amount to pay off the remaining two-thirds of the mortgage and continuing with the smaller or straight mortgage. This plan has a two-fold advantage. Not only has part of the original loan been amortized, but on account of the fact that the new mortgage is for a considerably smaller amount and the new mortgagee has a greater margin of safety in the property, it is often possible to arrange for the new loan at a slightly lower rate of interest. In localities where the ratio of the loan to the value of the property has a direct relation to the rate of interest asked the advantages are apparent. In such a locality, take a property worth $10,000, carrying a Building and Loan mortgage for $5,000, bearing interest at 6 per cent. If the Building and Loan shares are carried to a time when they are worth $2,000, and then retired with the aid of a new mortgage for $3,000, the saving in interest is $120 yearly if the new mortgage is at the same rate. If it can be procured at 5½ per cent, since it is for less than two-thirds the value of the property whereas the original mortgage was for 50 per cent of the value, so much the better.

One more use of the Building and Loan Association may be mentioned in passing. It is a plan followed by some people to carry various amounts of Building and Loan shares, not borrowing from the association, but securing mortgages from other sources. If the person owns a number of properties the money received from his shares at maturity may be devoted toward paying off or reducing whichever mortgage or mortgages it seems most advisable to reduce at the time.

Reference has been made to companies which lend on bond and mortgage and sell bonds based on these mortgages to investors. The only difference between such a plan and the ordinary bond and mortgage is that while in the individual case there is but one bond holder, in the other the bond is split up among a number of individual investors. These companies operate in the largest cities and their loans are usually for large amounts. Mortgages for $25,000 and $30,000, however, are not out of the way with such companies. Provision is made for payments which gradually amortize the mortgage, say at the rate of about 5 per cent of the principal annually. Such companies are valuable sources for the builder-owner who intends to operate his property and they do not conflict with the field of the Building and Loan Associations, since they lend amounts larger than the Building and Loan Association undertakes.

The man who builds in anticipation of quick sales, however, and who is not an operator, is not so much interested in looking years ahead and planning to reduce his loan by degrees. He wishes his money to come from a source which will cost him the least and his concern is more with present than with future financing. The sources are varying—the individual investor, the savings bank, the trust company, the life insurance company and the title company all have their places. In some instances one of these sources of funds may be preferable to the others and in other cases the reverse would be true. Only one matter of general observation may be made. The desirability of any of the above named for a mortgagee depends upon the nature of the business carried on by that particular individual or company. A loan from an individual who makes a practice of putting out his money on land and buildings is better than one from a bank which does not as a rule take mortgages unless it has a large surplus on hand, part of which it wishes, for the time being, to have earn a good rate of interest on a real estate mortgage. Conversely, a savings bank which always lends large amounts on realty, or a trust company which takes an active interest in realty loans, is a better source from which to borrow than a man who does not make a practice of loaning on realty and who may be making this particular loan as a side line investment while he looks about for some other way in which to invest his money when the mortgage falls due.

(To be continued)

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The Design of Hot Water Heating Systems, Part I

By WILLIAM EHRLICH

Practical Methods for Proportioning the Radiators and Sizing the Mains and Branches to Insure Successful Installation

HOT-WATER, like any other heating system, has its particular field of application. With keen competition existing in trade to-day, it is the contractor who can turn over a complete installation which will work satisfactorily and can do this at a figure attractive to the customer, who will get more trade. It is really a question of the "survival of the fittest," and necessitates a good job at a fair profit. Without the profit, the business would soon fail, no matter how many heating systems were installed or how satisfactory they proved in service. Careful estimating, not only in the sizes of radiators and piping, but also in the cost is essential to the managing of a volume of business at a fair profit.

HIT-OR-MISS RULE OF FIGURING PIPE SIZES UNSATISFACTORY

Too often the sizes of the radiators are merely guessed at or perhaps some inaccurate thumb rule is used, resulting in a heating unit that is either too small or too large. In the one case, the cost would be too low and in the other too high. The operation in both instances could hardly be satisfactory.

The other item affecting the operation of the heating system, that, exclusive of labor, makes up the cost, is the piping. With the hit-or-miss rule or the cut-and-try method so commonly used for proportioning the pipe sizes, the system may or may not work and the total cost may figure high or low. There is general dissatisfaction all around.

The contractor who figures carefully on the design and the cost knows that the system will work, that his sizes are economically proportioned, that the cost is a minimum for the conditions. If he gets the contract he knows there will be a fair profit and that he is not taking the job at some other man's figure.

It is the practice of such uncertain methods that makes possible the unfair competition so popularly known. Suppose several contractors are asked to figure on a hot-water installation. The estimated results show considerable variation. Basing the average on instances that have occurred at different times, it may run in the relation of from 500 to 350 sq. ft. of direct radiation. This would also mean main piping ranging from 4 in. to 2½ in. for the larger installation and 3 in. to 2 in. for the smaller equipment. Each man figures up his cost of labor and material and submits his bid. The customer is puzzled. Taken at an average unit cost of 95 cts. a square foot for the complete job, the difference between 500 and 350 sq. ft. is $142.50. This represents "unfair competition." Further, it sets up an indelible impression in the customer's mind of the sort that hurts the trade. The result is that the low bidder gets the job, probably finds out after completion that he made no profit, while the owner discovers that the operation and heating are not all that was expected.

Careful figuring on a scientific basis will help to eliminate some of the troublesome factors that enter into the making up of the bids. A simple method of finding radiator sizes with little figuring has been worked out and is presented to the trade at its face value. After determining the exposed surfaces of any room to be heated, it is only necessary to read that area on the chart, Fig. 1, the answer to which is in square feet of direct hot water radiation. The figures given are based on the heat loss through building materials for a condition of zero weather outside and a 70-deg. temperature in the rooms.

FINDING THE SIZE OF THE RADIATOR

Exposed surfaces are taken to mean all walls, glass, roof and other parts that have a colder temperature on one side than on the other. In figuring radiator sizes on this basis, all doors that are exposed are taken the same as glass, because opening and closing the door admits cold air, and it is necessary to compensate for this loss. Ordinarily, one air change an hour is allowed for air leakage, and this is equal to the cubic feet contents of the space to be heated. Where ventilation is required, or if the construction is leaky or the space exposed to severe winds, which will cause a greater air leakage, then more than one air change must be figured, according to the dictates of judgment.

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It is necessary that the thickness of wall be taken into consideration, for the loss of heat varies according to this dimension. One hundred square feet of 4-in. wall will require 25 sq. ft. of radiation while the same amount of 20-in. wall will need only 9 sq. ft. of radiating surface, according to the diagram, Fig. 1. Ordinary double-hung windows, French windows and others with a single thickness of glass are considered as "single glass." Storm windows and similar constructions with two lights separated by an air space are figured as "double glass." Roofs that have no attics over them must be taken into consideration. These exposed surfaces are classed in the diagram, Fig. 1, as "ordinary" and "country house" roofs. Brick and stone buildings of the city type have "ordinary" roofs, while frame houses and cottages have "country house" roofs.

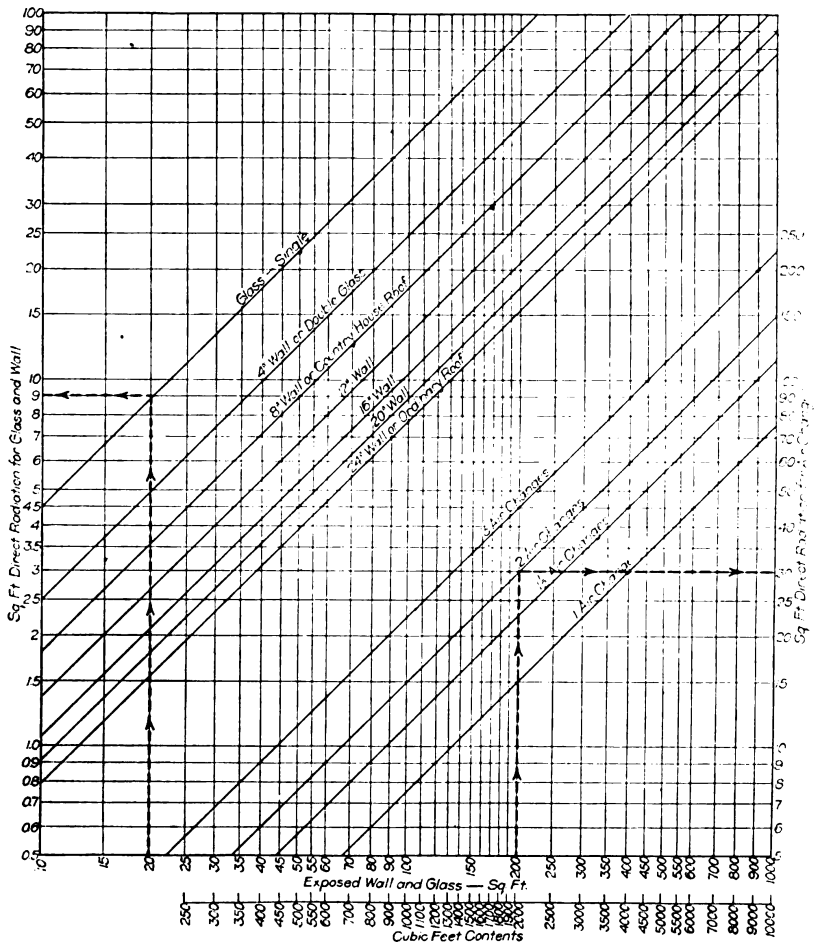

FIG. 1—CHART FOR APPORTIONING RADIATION FOR DIRECT HOT-WATER HEATING SYSTEMS

The chart has a left-hand scale which gives the radiation required to compensate for heat losses through glass and wall and a right-hand scale which gives the radiation necessary to take care of air leakage or ventilation. The bottom of the diagram has two scales; the upper one is used for the wall and glass, and the lower for the cubic contents, reading respectively to the left and right scales of the chart for the corresponding answers. Then for 20 sq. ft. of single glass read from the upper bottom scale to the intersection of the diagonal line marked "single glass," and then to the left-hand scale, where the answer is found as 9 sq. ft. of direct hot-water radiation, all as shown in Fig. 1 by the arrows and dotted line. For 2000 cu. ft. of contents and two air changes read from the lower bottom scale, as indicated by the arrows on the dotted line to the intersection at the diagonal line marked "2 air changes," and find the answer on the right-hand scale which gives 30 sq. ft. of direct hot-water radiation.

For the practical use of the radiation chart, Fig. 1, take a room on the top floor of a city apartment house with 12-in. walls and no attic above. The room is 14 x 15 ft. and 9 ft. high. The 14-ft. side is on a party wall of an adjoining building, while the 15-ft. side has two windows, each 3 x 5 ft., and faces the street to the south. Under the conditions one and a half air changes are deemed probable. The cubic contents of the room is 9 x 14 x 15 = 1890 cu. ft. Find this number on lower scale of the diagram marked cubic feet contents, then read up the line of one and a half air changes and across from the point of intersection to the answer on the right, which is 21.5 sq. ft. of radiation. The exposed glass is 2 x 3 x 5 = 30 sq. ft. Reading from the upper bottom scale at 30 to the intersection of the line marked single glass and then to the left scale gives 13.5 sq. ft. radiation

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required. The exposed wall has a gross area of 9 x 15 = 135 sq. ft. and deducting the window area leaves 135 — 30 = 105 sq. ft. net of 12-in. wall exposed to the weather. Following the same method of reading the diagram from the bottom to the intersection of the line for 12-in. wall and then to the left scale gives 14 sq. ft. of radiation. The roof in this case is also an exposed surface; the area is the width times the length, or 14 x 15 = 210 sq. ft. of "ordinary" roof. For this exposure the diagram gives 16.3 sq. ft. of radiation. Adding the radiation required to compensate for these different losses gives 21.5 + 13.5 + 14.0 + 16.3 = 65.3 sq. ft. of heating surface, which is the size direct hot-water radiator required for a room exposed on top and side with one and a half air changes an hour for a content of 1890 cu. ft. This gives a ratio of about 29 cu. ft. for 1 sq. ft. of radiation.

For comparison, consider a room similarly situated, but in a country house, with 4-in. walls and an attic over the space. All the dimensions of size of wall and glass are the same. The 14-ft. wall is also exposed and has two windows. The size of radiator required is found on the chart as follows: Cubic feet contents or 1890 cu. ft. at one and a half changes of air an hour is 21.5 sq ft. radiation. Glass of 60 sq. ft. area is 27 sq. ft. Net exposed wall is 201 sq. ft. of 4-in. wall requiring 50 sq. ft. radiation. No exposure for the roof. The radiator size required is the sum of the individual factors which compensate for the heat losses, or 21.5 + 27 + 50 = 98.5 sq. ft.

The conditions in both cases are practically alike. The city and country house each have the equivalent of two exposures, the room volume and air change is the same, but the construction is different. The result shows that about 50 per cent. more radiation is required for the frame house. The ratio for the country dwelling figures 1 sq. ft. for 19 cu. ft. of space as compared with 1 to 29 in the city home.

(In Part II the method of correctly proportioning pipe sizes will be described, and practical examples worked out.)

National Conference on Construction and Annual Meeting of the Associated General Contractors

THE Annual Meeting of the Associated General Contractors of America and Affiliated Organizations will be held at Chicago, January 21, 22, 23, 1920. Coincident with the business sessions of the Association, a two-day national conference on construction problems will be held to which all general contractors whether members of the A. G. C. or not, will be invited.

The first day of the Conference will be devoted to a consideration of the two most important problems before the construction industry: Industrial Relations and Means of Greater Production. On the second day the Conference will divide into four large groups representing (1) Building Contractors, (2) Highway Contractors, (3) Railroad Contractors, and (4) Public Works Contractors to discuss problems of interest to their particular groups.

Strikes Frequent on Building Work

STRIKES occurred with greater frequency in the building trades during the three months of April, May and June, 1919, than in any other industry, according to data reported by the Bureau of Labor Statistics. For the preceding quarter—when construction is comparatively inactive—the building trades were third in the list numerically, with 62 out of a total of 584 strikes.

During the second quarter of 1919, 200 out of a total of 974 strikes took place in the building trades, while in the industry there were 4 lockouts from a total of 42.

Metal trades are next on the list with 176 strikes and 13 lockouts; textiles and clothing number 78 and 57 respectively, with one lockout each.

In 480 strikes for which the number of persons on strike was reported, nearly 500,000 strikers were involved, an average of over 1,000 per strike. In about three-fourths the question of wages and hours was prominent and in nearly one-fourth the question of union recognition or existence was involved. Of 367 strikes, 22 were settled in favor of the employers, 129 in favor of employes and 112 were compromised. The average duration of 210 strikes was 29 days.

Building Age Index For 1919

The BUILDING AGE Index for 1919 is now ready and will be sent to subscribers who request it.

This Index is extensively cross-indexed so that articles can readily be found. Due to the wealth of practical material appearing in BUILDING AGE during a year, a large number of our subscribers have found it advisable to have their copies bound, realizing that the bound volumes of BUILDING AGE embracing a few years are one of the most valuable sources from which construction data may be secured.

A limited number only of this Index is being printed, so if you desire one your request should reach us very soon.

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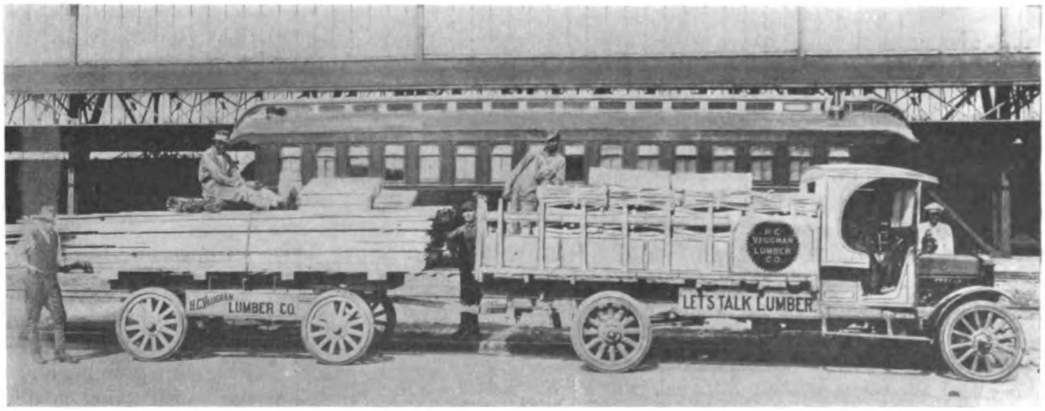

THIS FIVE-TON LOAD WAS HAULED TO A CONTRACTOR NINE MILES AWAY, OVER COUNTRY ROADS, AND WAS BACK FOR FURTHER SERVICE IN AN HOUR

The Trailer as a Reducer of Haulage Costs

By HOWARD GREENE, M.E.

UNDERLYING the rapidly increasing use of the trailer is the fact that the motorless motor truck, as it is sometimes called, is essentially a means of lowering the cost of transportation. The motor truck itself has done much in this direction, and it is the development of the truck to a point where it is capable of handling loads under any and all road conditions that has made the trailer not only possible, but practical in the fullest sense of the word.

The power used in handling a load on a motor truck under normal road conditions is only a fraction of the power required to handle that load under hard conditions, such as heavy grades or deep mud or sand. If, therefore, a truck is made to haul on a trailer an additional load, it will do so very easily under all ordinary road conditions, and there will be so little additional wear and tear on the engine and other parts and such a moderate increase in the consumption of fuel and oil that the expense of handling the additional load will be very much less than if it were handled by another motor truck. To be specific, the total expense involved in hauling a trailer with a load equal to the load carried by the truck will be in the neighborhood of 20 or 25 per cent of the cost of hauling the truck load alone. In other words, if the truck carrying five tons costs $20 a day to operate, an extra five tons on a trailer can be hauled for $4 or $5 a day, a total of not more than $25 a day for ten tons. The economy is of course due chiefly to the fact that the trailer requires no driver and has no engine to consume fuel and oil; the expense of lubrication is exceedingly small.

To haul a trailer, in addition to carrying its own load under abnormal conditions would call for a much greater excess of power than is found in the ordinary type of motor truck—in fact, a truck with an engine capable of doing this would be unreasonably overpowered. Trailer service is therefore confined, as a rule, to roads that are not excessively bad and to grades not much over ten per cent. These limitations do not seriously interfere with trailer work. A truck capable of hauling a trailer over a ten per cent grade is equal to the demands made upon it in a great majority of localities.

Trailer service has been developed, however, to a point where great loads can be handled under far more difficult conditions, which is to say that special tractors are manufactured with such power that they will negotiate the worst of hills and the heaviest of road surfaces. Under easier conditions these machines will handle heavier loads, just as an ordinary truck will easily handle on level roads loads that are far heavier than could be hauled over grades. In short, getting maximum trailer service is a matter of having equipment adapted to local conditions. To be more definite on this point, let us look at figures taken from actual road tests under working conditions. The power required to pull a load varies, of course, with the character of the road and the amount of friction of the vehicle. A mod-

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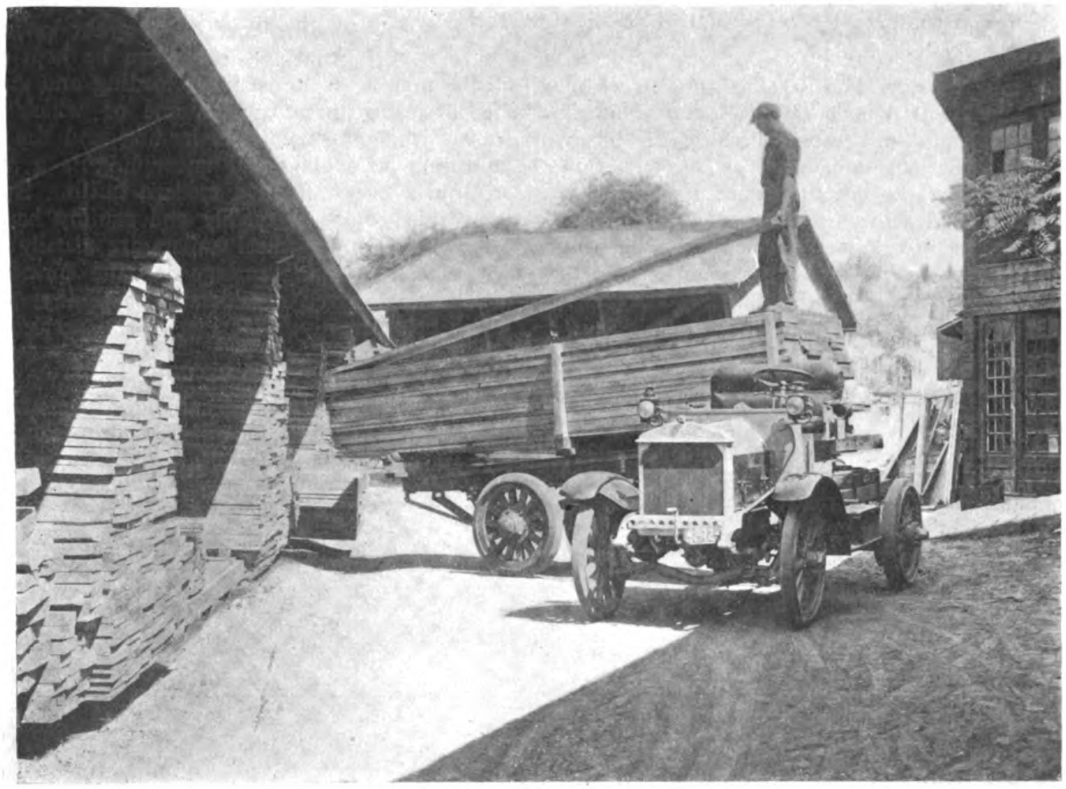
ern trailer with roller or ball bearings pulls very easily. On good asphalt the pull required is 20 pounds per ton; on good brick road about 30 pounds; on poor brick, macadam or cobblestones, from 35 to 60 pounds; on hard clay or gravel, 50 pounds; on soft macadam, 75 pounds; on common country clay road, 100 pounds; ordinary sand road, 150 pounds; and in sand three inches deep, 275 to 300 pounds.

A four-wheel trailer capable of carrying five tons will weigh about 4,000 pounds, making a total load to be pulled of seven tons. Figuring on the best of conditions, a 20-pound per ton pull on asphalt, it will require but 140 pounds pull to keep the seven tons moving. Tests made with a five-ton truck of standard make and model showed a drawbar pull on direct drive of 1,050 pounds. At this rate the truck should theoretically be able to move a total load of more than 50 tons on direct drive and, as a matter of fact, loads as big as this have been moved under favorable conditions. This is an extreme case, of course, and is brought in to show what the possibilities are in short-haul work in emergencies or special cases.

For average work on average roads it is customary to figure on a required pull of 100 pounds per ton, which is the figure given for common country clay road. This is for level roads. For grades of ordinary steepness it is usual to figure that the draft increases 20 pounds per ton for each one per cent of grade. Thus a five-ton load on a 4,000 pound trailer would call for a pull of 140 pounds on a five per cent grade, in addition to the 100 pounds per ton allowed for hauling on the level, or a total of 240 pounds—still well within the high-gear capacity of the truck. But the allowance for grades is rather a rough figure and it is probable that the truck actually would have to go into second gear on a five per cent grade, or, at best, would labor somewhat on direct drive. On second gear, however, the load would be handled without difficulty.

In figuring on ordinary all-round conditions it is customary to make a fairly liberal allowance and to keep the load down to a weight that can be pulled with 250 pounds per ton. In the majority of cases this is ample, when the greatly increased pulling power of the truck on second and third gears is



THE TRAILER AS AN ECONOMICAL FACTOR IN THE RETAIL LUMBER BUSINESS

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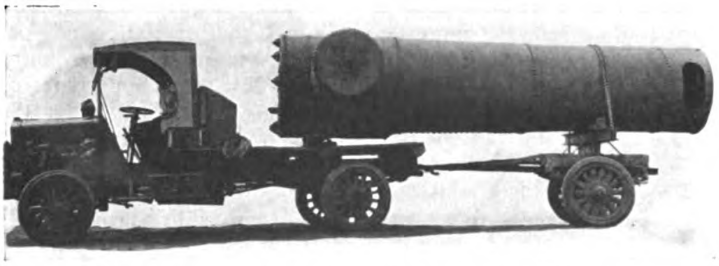


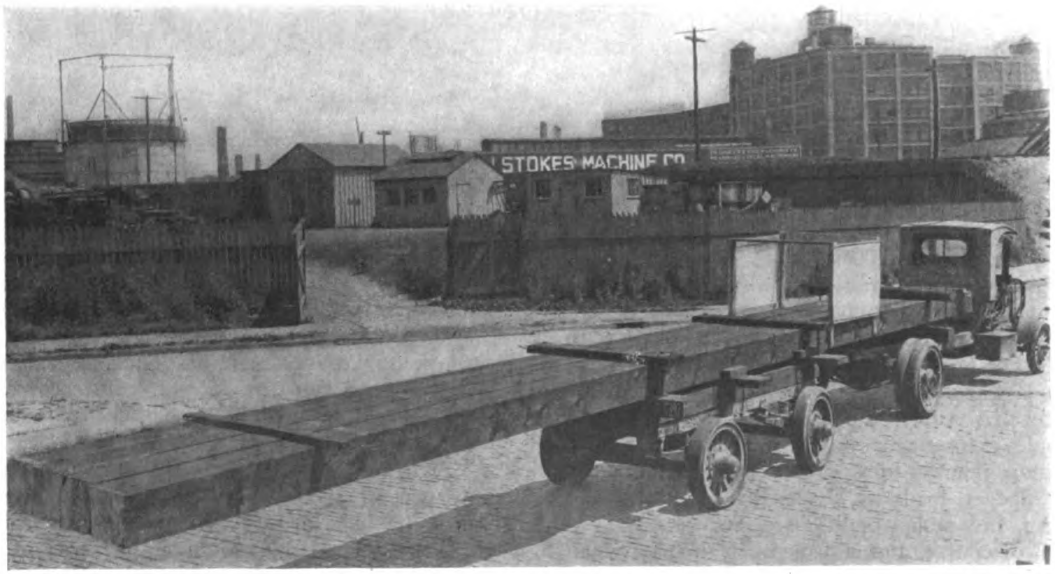
HEAVY LOADS AND POOR ROADS ARE EASY TO HAUL AND TRAVEL WHEN THE TRAILER IS EFFICIENT

taken into consideration. A five ton truck will pull about 3,500 pounds on low gear. Naturally trucks differ in this respect because of different cylinder dimensions, number of revolutions per minute and gear ratio, but the figure given is a fair average. The tractors used for heavy trailer work have tremendous pulling power and will handle their loads under the worst of conditions, so that trailer work is hardly more limited, broadly speaking, than is straight truck work.

The trailer offers advantages other than the increase in hauling capacity without proportionate increase in cost. They are so well known that it will be sufficient merely to touch upon them. The distribution of the load over a large area imposes a minimum load on the road; this is an advantage from the point of view of road maintenance as well as from the haulage point of view, for good roads mean cheap transportation. A truck that is working constantly at or near its normal capacity can handle an occasional extra load very much more cheaply than it could be handled any other way, as a rule. Where part of a load is to be delivered at one point and the rest somewhere else, much time can be saved by leaving a trailer to be unloaded at the first stopping place, while the truck goes on and on the way back picks up the trailer, either empty or with a return load, at a great saving of time. A truck can be kept going all the time, with no delay for loading and unloading, by using three trailers, one of which is in transit while the second is loading and the third unloading. Coupling and uncoupling is a simple and quick operation in a modern outfit. Even a semi-trailer outfit is readily and rapidly handled. Drawbars for four-wheel trailers are usually made with shock-absorbing springs and the spring suspensions are given considerable flexibility, all of which helps greatly in starting and in service over rough roads.

Today, with costs constantly mounting, the keynote for stabilizing prices, and ultimately bringing about their decline, is "increased production." The trailer affords an excellent means for increased production, with corresponding decreased unit prices.

"Cost of Trailer Operation and Types of Bodies" is the title of an article by Mr. Greene, to appear in the March issue.



TRAILERS AS USED IN HAULING EXTREMELY LONG LENGTHS

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Editorial

Publisher's Announcement

WITH this issue, BUILDING AGE appears in a new form, one it is hoped its readers will regard with approval.

It will be the constant purpose of the publishers of BUILDING AGE to produce a magazine that will be the most progressive and helpful in its field. New departments and specially prepared articles will be important features during the coming year. These, it is believed, will serve to furnish valuable information and create wide interest in matters pertaining to building and in those various fields to which building is allied.

The editors particularly desire to come into the closest relationship with their readers. They, therefore, invite correspondence containing inquiry and suggestion.

The Time to Build Is Now

THERE is an old adage: "He who hesitates is lost," which has lost none of its truth through age. The ancient Greeks pictured Opportunity with long forelock but with the back of the head clean shaven, intimating that opportunity must be grasped as it comes, since no hold is offered after it has once passed. This world is full of timid individuals always waiting until times are more propitious, the sun shining more brightly and the birds singing more cheerfully before venturing upon some enterprise that should start at once.

A careful estimate based on the most reliable available data, places the country's needs at 500,000 homes! Who will build them and when?

No doubt the speculative builder will supply some of these, but from present indications no small proportion will result from the efforts of those intending to own their own home.

Here is a vast army of prospective home owners who are entirely unfamiliar with building, who are naturally timid about investing their life savings now, if it would be more opportune to wait another year. Is it any wonder that the housing accommodations are being provided less speedily than the urgency demands?

To all such the message, "Now is the time to build," should be blazoned in large letters.

The mere statement of this truth, even in large type, may not convince every one, since the cautious, conservative counselor, so eager to give free advice to others, can always supply an excellent reason why you should wait. Procrastination is indeed the thief of time.

Despite unrest, labor troubles and other seeming untoward happenings, times *are* prosperous. As a result wages are high, as are also all commodities. Buildings today cost 60 per cent more than in 1914, but in many cases rents have advanced 75 to 100 per cent.

ROUGHLY, the cost of a building is 50 per cent labor and 50 per cent material. Wages are *not* going down. They have been steadily going up and during the next few years are likely to go higher. There is really an actual scarcity of labor at any price. Unrestricted emigration, the only source now available to provide additional labor, it is believed, will not be permitted by Congress for some time. The industries are calling for men—everywhere there is a scarcity. Hence that part of the building cost represented by labor cannot be reduced.

Let us examine the material market. Lumber, brick, stone, concrete, in fact all the products necessary in the construction of a building, require labor and mechanical energy for their production and transportation facilities for their delivery. We have seen that labor costs will not be reduced. Where coal is used in the manufacturing process, as for instance in brick and cement kilns, an increase is likely since the cost of fuel is steadily rising. There are no prospects that transportation rates will become lower. Thus it appears that the cost of materials will remain high and may go higher. Under such conditions the cost of building cannot be lowered.

It is well to consider the advantages attendant with prosperity. They are high wages, continuous occupation, easy money market, the making of it easier to secure loans, assurance of immediate sales should one desire to dispose of improved property, full occupation of the building for rented property, and the easy conversion of tax bearing real estate into profitable investment.

When advantages and disadvantages are set against each other it will be found that a fairly even balance is struck. As the purchasing power of the dollar decreases, the returns from the investment increase, and when the dollar purchases more building the possible revenue shrinks.

The man who is progressive and *acts* is almost invariably right.

It may be that any time is a good time to build, but it seems beyond controversy that no better time can be found than *now*.

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Low Cost Suburban House at Randolph, New York

PERCY C. ADAMS, *Architect*

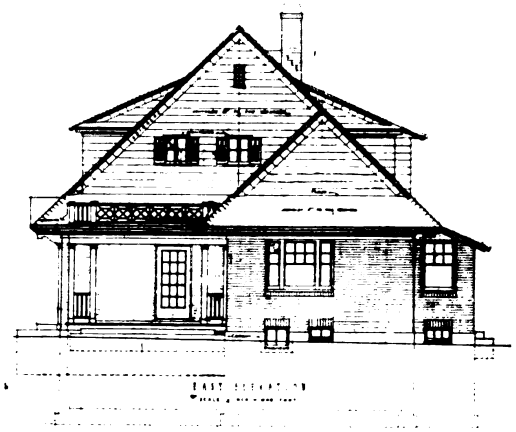
An Attractively Designed Exterior and Well-Planned Interior Combine to Produce a Homelike and Exceedingly Livable House

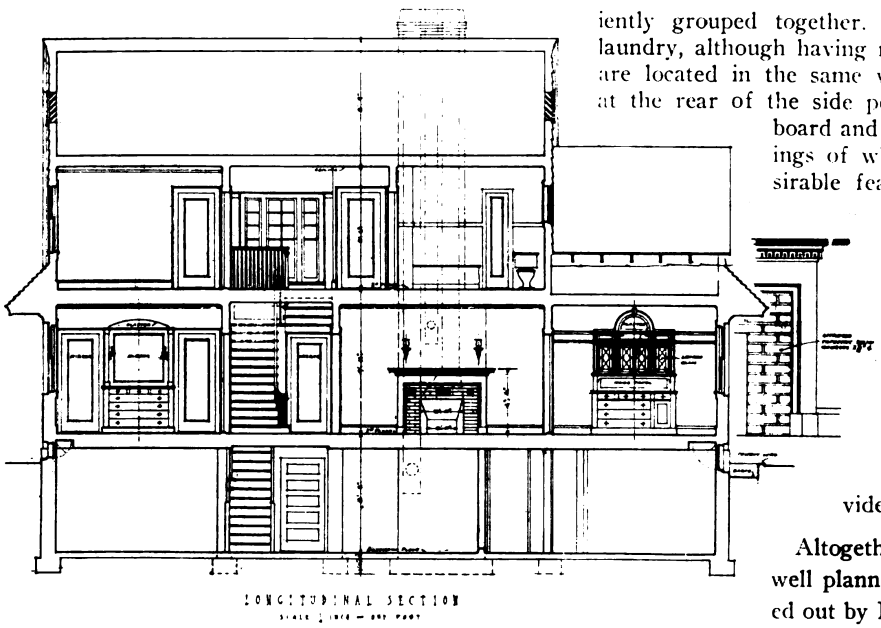
TO HOUSE our populace is a worthy subject, but to house it well is doubly so. Therefore, it is gratifying to note the excellent types of small houses being erected all over the country.

The house at Randolph, N. Y., here illustrated, was designed by Percy C. Adams, architect, and is an excellent example of the modern house at low cost.

True to its Colonial ancestry, the proportions are such as to convey an idea of symmetry, while the building seems to be in entire harmony with its surroundings. The entrance, with its porch, bids you welcome, the flower boxes, well filled, bespeak of a love of nature, while the commodious side porch gives the impression of domesticity and sociability.

The interior is no less attractive than the exterior. Entering the front door, a fair sized hall is encountered with stairs at the left leading to the second story, while turning to the right one enters the living room, which is of ample size and provided with an open fireplace at the far end. To the left of the entrance hall is located a small room, suitable for a den, with bedroom and bath at the rear. The dining room, kitchen and laundry are conveniently grouped together. The dining room and laundry, although having no direct communication, are located in the same wing, which extends out at the rear of the side porch. The built-in sideboard and china closet, detail drawings of which are shown, is a desirable feature in a house of this nature. The design of this utility is in harmony with the rest of the building. In the second story three bedrooms, bath and extra toilet as well as storage room are provided and well arranged. Ample closet space has been provided throughout the house.





LONGITUDINAL SECTION

Altogether a most excellent and well planned house has been worked out by Mr. Adams.

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House at Ran[illegible]lph, New York. Percy C. Adams, Architect

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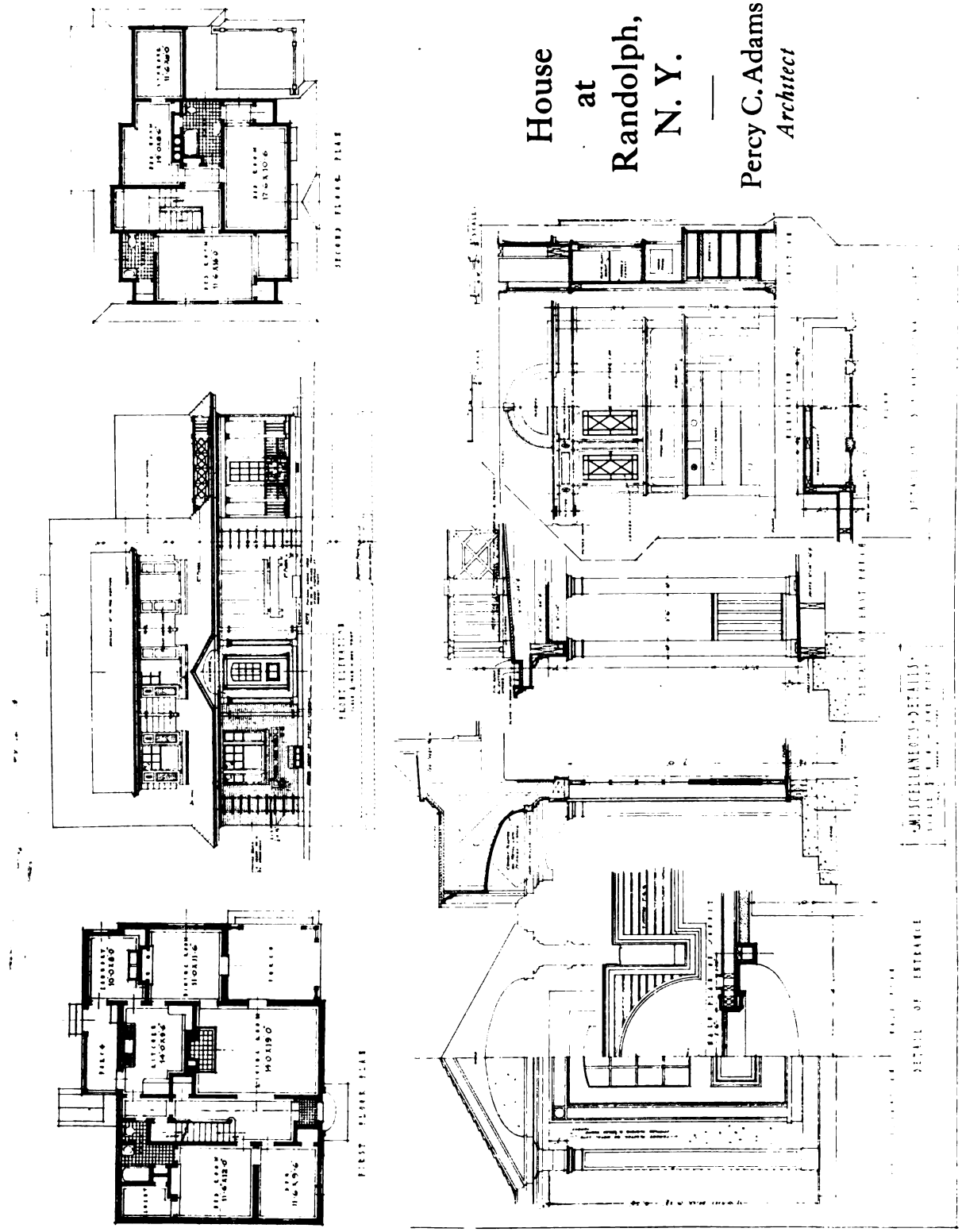

House at Randolph, N. Y.

Percy C. Adams *Architect*

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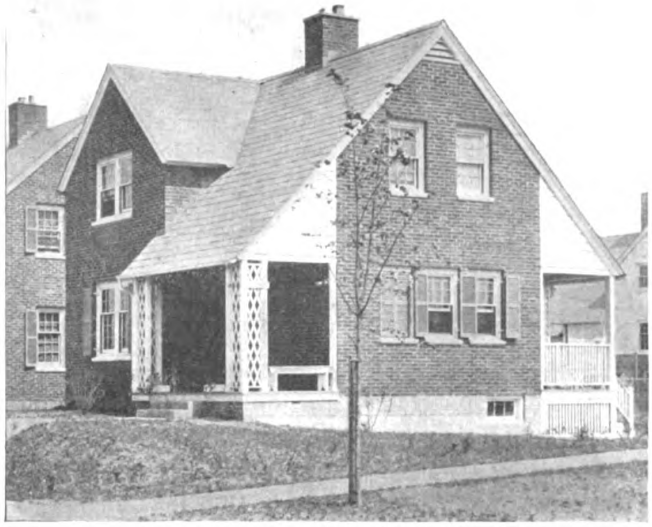
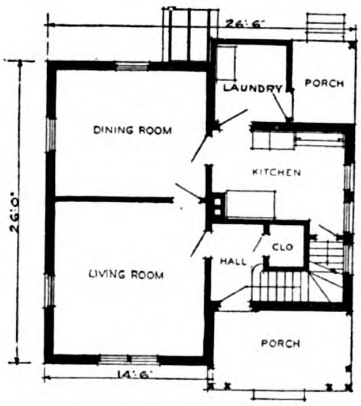




SECOND FLOOR PLAN

An interesting and well-carried out example of the variation of materials. Both houses of same plan.



FIRST FLOOR PLAN



Five-room, detached houses at Erie, Pa., developed by United States Housing Corporation.

See following page for semi-detached arrangement of this house

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SEMI-DETACHED FIVE-ROOM HOUSES AT ERIE, PA., AS DEVELOPED BY THE UNITED STATES HOUSING CORPORATION

(See preceding page for plans)

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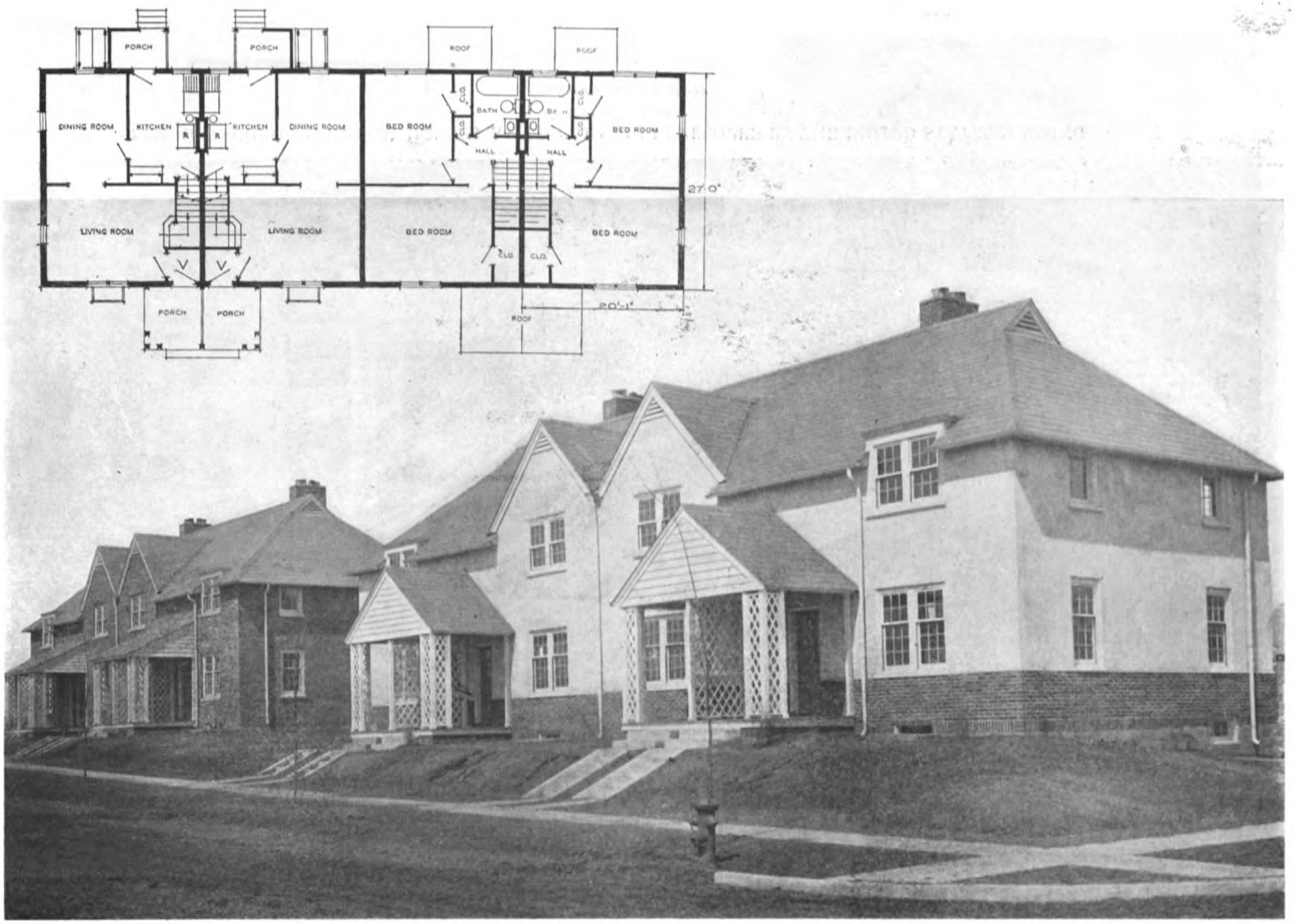
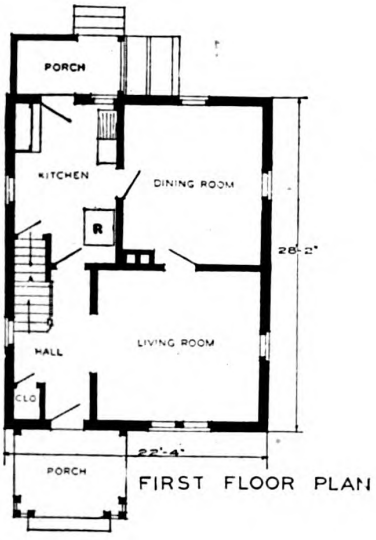


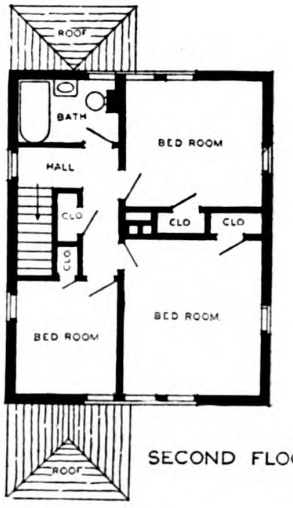
SEMI-DETACHED FIVE-ROOM HOUSES AT ERIE, PA., AS DEVELOPED BY THE UNITED STATES HOUSING CORPORATION





FIRST FLOOR PLAN

Six-room Houses at Erie, Pa.



SECOND FLOOR PLAN

Developed by the United States Housing Corporation

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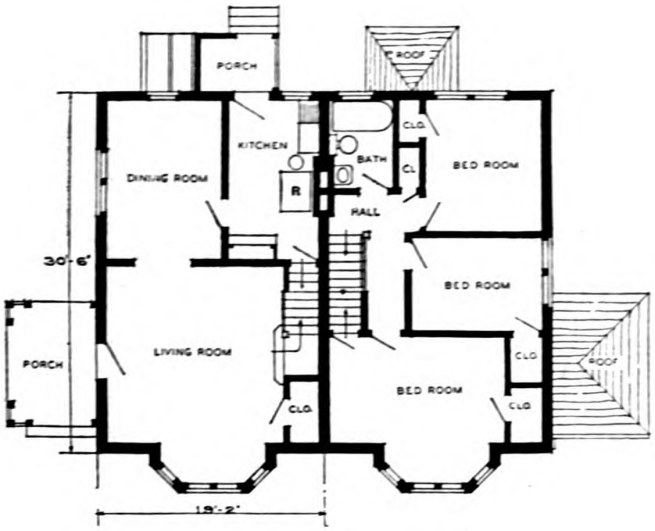

Six Rooms and Bath

Semi-detached houses at Erie, Pa.

Development by U. S. Housing Corporation

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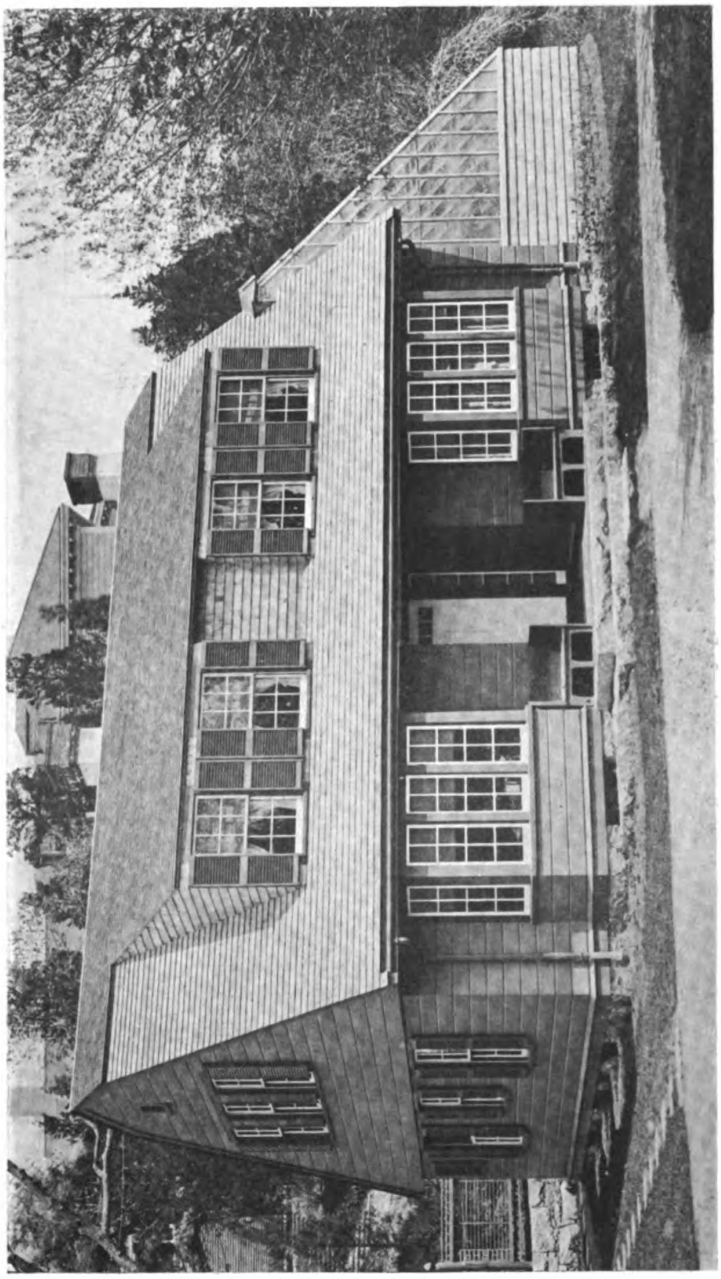
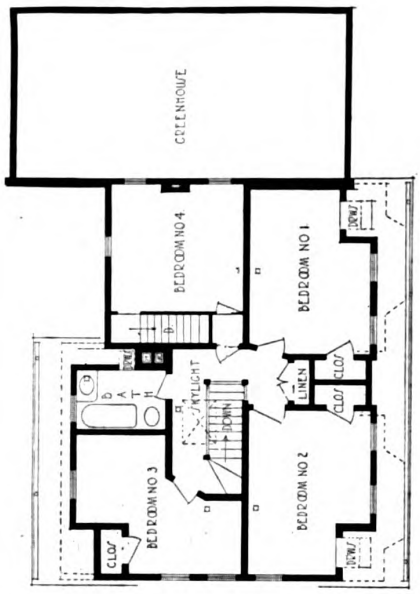
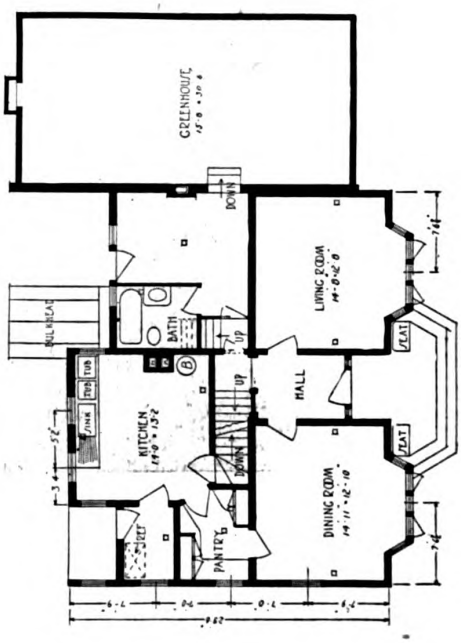




Cottage on Estate
of
Mrs. Henry B.
Stone at
Milton, Mass.

—

Bigelow & Wadsworth
Architects



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House at
Lawrence Park,
New York

—

Bates & How
Architects

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Block of Small Houses
at
Cambridge, Mass.

R. Clipston Sturgis
Architect

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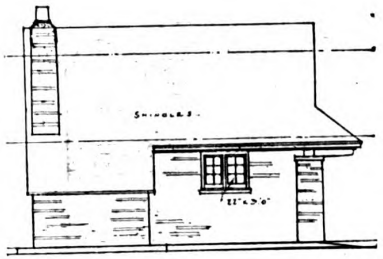
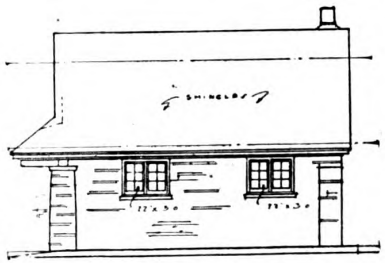
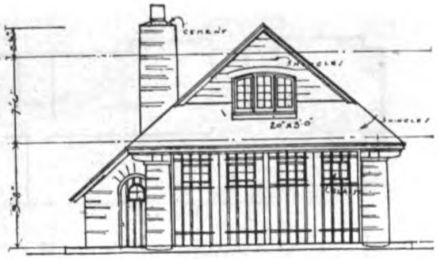
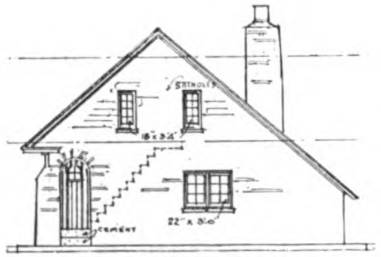
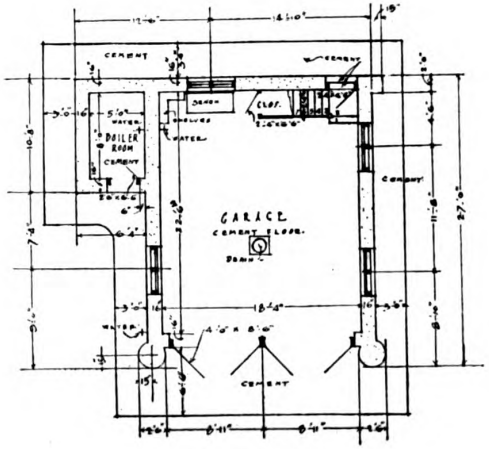






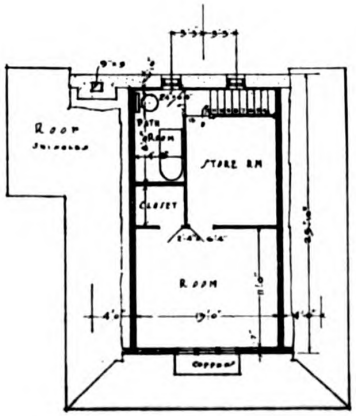






Garage and Chauffeur's Quarters, at Wynnewood, Pa.

McIlvain & Roberts
Architects



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Building Activity in November

AGAIN of 708 per cent is shown in the amount of construction for which permits were granted during November, 1919, compared with November, 1918, according to reports received by BUILDING AGE direct from the building departments of 212 cities. Only 8 cities reported decreases, 204 having enjoyed increased activity. Figures are $153,774,287 for November, 1919, as against $19,020,723 for November, 1918. Government restrictions were still in force during this period last year, not having been lifted until November 21.

The total number of permits granted in the 212 cities during November, 1919, was 32,644, an average value of $4,741. The number of permits granted during November, 1918, was 13,370, the average value being $1,385. The percentage of increase in the number of permits for November is 138.

Eastern cities show a gain of 782 per cent., 78 out of 81 cities reporting gains. Cities in the middle states show 634 per cent. gain, 57 out of 59 reporting gains. Southern cities show 302 per cent. gain, 43 out of 45 cities reporting gains. Western cities show 543 per cent. gain, 26 out of 27 cities reporting gains.

Material prices have risen considerably. The lumber market shows increases almost daily, five to fifteen dollar increases being not uncommon. This condition is due to the fact that there is a big demand for buildings of all kinds, combined with a shortage of materials. Decreases in the near future are not looked for, as every indication points toward higher prices during 1920 with conditions approaching a boom.

A Review of Building Conditions in 1919

IT IS certain that there will be an improved building situation within the coming months. With the arrival of the new year a decided tendency has manifested itself against imposing burdens on private enterprise, and investment in industry and commerce, particularly in construction operations, has become more attractive. Due to more stable labor conditions freer loans on mortgages have resulted.

While it is true that there remains a great shortage of materials, which has retarded construction operations, there was a rapid gain in December. An increase of 20 per cent was scored during the month over November, and it is expected that construction will go forward from now on at a greater rate than at any time within the past four years. The volume of contemplated building operations for December approximated $90,000,000 a week.

Manufacturers of building materials state that the present shortage of commodities will not be overcome for an indefinite period. Until all energies are marshaled for better production it is clear that prices cannot recede, unless by business reaction that would be seriously felt by all. The situation will remain desperate if workers refuse to work their hardest for increased production. Further, it is certain that the high cost of living will not be reduced until production reaches normal.

All signs point to a 1920 building peace and an era of unprecedented building activity. As significant of the improved conditions, in New York, after many unsettled months since the Government lifted the ban on building operations, an agreement has been made between the Building Trades Council and the Building Trades Employers' Association agreeing upon a wage scale for 1920. This encouraging news should give the architect and engineer renewed confidence to proceed with plans for new building and engineering operations which have been held in abeyance for many months past. In many other cities similar agreements have been signed. It is believed the arbitration clauses of such contracts will prevent both strikes and lockouts.

Two things are needed for an improvement in building during the present year, it being assumed that the labor wage peace has been effected. First, a plentiful supply of mortgage loan money; and second, a proper return in the shape of rents on the investment. These facts have been the real reasons for the slowing up in building construction in 1919. The housing situation needs sensible reconstruction ideas.

The cost of labor increased in 1919, the advance being due to the decided shortage of men available in the non-skilled class. The scale of high wages paid by the Government during the war in many of its branches is responsible for the steady increase in the cost of labor since 1914. This scale naturally

(Concluded on page 58)

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CITIES IN EASTERN STATES 1919 1918

	New Work	Value	Repairs	Value	New Work	Value	Repairs	Value
*Albany, N. Y.	53	$247,105	94	$59,010	11	$112,300	106	$15,740
*Allentown, Pa.	35	187,015	9	14,050	4	3,850	....	....
*Altoona, Pa.	18	30,974	31	15,620	1	200	26	5,222
*Atlantic City, N. J.	17	101,285	98	91,106	3	1,575	53	14,630
*Binghamton, N. Y.	84	82,003	124	36,298	33	27,323	59	6,186
*Boston, Mass.	110	1,854,309	372	958,736	23	83,690	271	205,053
*Bridgeport, Conn.	85	441,600	....	....	33	65,489	....	....
*Brockton, Mass.	48	40,285	14	15,505	6	965	7	1,600
*Buffalo, N. Y.	387	1,186,000	90	194,000	....	....	233	669,000
*Cambridge, Mass.	61	803,700	....	....	30	78,100	....	....
*Camden, N. J.	85	139,910	....	....	28	35,235	....	....
Chelsea, Mass.	2	20,800	11	12,000	3	100,500	7	8,500
*Chicopee, Mass.	21	359,800	3	21,200	7	21,200	3	2,300
*Easton, Pa.	9	24,850	12	18,666	1	2,000	3	925
*East Orange, N. J.	51	744,175	27	25,075	4	2,300	11	6,308
*Elizabeth, N. J.	74	2,051,959	8	25,542	13	17,723	2	4,000
*Erie, Pa.	66	175,000	21	29,568	27	34,410	22	29,030
*Fall River, Mass.	17	174,050	22	18,300	11	32,515	7	1,975
*Fitchburg, Mass.	44	346,000	3	1,200	5	14,097	5	1,365
*Harrisburg, Pa.	32	172,200	....	....	7	16,500	....	....
*Hartford, Conn.	80	789,377	69	70,387	30	51,955	26	61,910
*Haverhill, Mass.	30	145,950	....	....	8	5,500	....	....
*Holyoke, Mass.	6	149,450	10	16,700	3	4,100	9	5,935
*Jersey City, N. J.	34	223,200	10	11,235	....	....	2	1,900
*Lancaster, Pa.	58	222,850	56	116,421	9	33,500	17	15,690
*Lawrence, Mass.	8	49,950	12	8,815	....	....	5	4,150
*Lewiston, Maine	33	115,290	13	10,250	1	300	7	4,135
*Lowell, Mass.	1	80,000	....	2,000	1	60,000	....	....
*Lynn, Mass.	35	70,215	33	51,340	12	5,525	16	14,845
*Malden, Mass.	30	427,518	22	72,000	9	2,155	7	3,400
*Manchester, N. H.	12	68,450	13	20,685	8	7,850	8	2,250
*Montclair, N. J.	28	44,897	27	32,225	10	13,085	25	4,334
*Mt. Vernon, N. Y.	26	110,195	8	10,655	....	....	5	4,220
*Newark, N. J.	22	125,325	12	8,600	6	19,250	....	....
*New Bedford, Mass.	258	1,323,373	....	....	78	224,897	....	....
*New Britain, Conn.	72	905,200	....	....	24	104,850	....	....
*New Haven, Conn.	134	99,928	52	10,397	15	31,100	11	3,920
*Newburgh, N. Y.	5	15,000	4	2,000	....	....	3	1,800
*New London, Conn.	86	512,460	60	79,190	23	48,665	31	14,365
*New Rochelle, N. Y.	24	359,100	11	13,000	10	9,400	9	11,300
New York:	52	344,925	11	19,117	6	2,123	11	11,790
*Manhattan	27	3,185,700	253	2,071,475	7	117,950	111	465,325
*Bronx	174	2,448,175	250	200,451	6	32,000	104	50,145
*Brooklyn	578	7,416,426	621	861,424	72	544,137	364	173,845
*Queens	661	3,719,410	....	....	102	107,555	....	....
*Richmond	132	364,127	45	24,820	37	91,129	58	99,460
*Niagara Falls, N. Y.	73	301,761	7	12,000	33	110,798	....	....
*Nutley, N. J.	13	21,409	6	150	4	1,510	6	189
*Orange, N. J.	14	34,760	23	8 675	3	800	15	5,889
*Oswego, N. Y.	21	48,190	....	....	4	33,550	....	....
*Passaic, N. J.	23	574,150	9	9,775	5	4,825	2	1,575
*Paterson, N. J.	107	189,297	....	....	30	6,636	....	....
*Philadelphia, Pa.	496	9,156,040	441	312,580	....	....	343	567,260
*Pittsburgh, Pa.	283	1,712,691	50	96,180	68	241,419	67	88,799
*Portland, Maine	26	56,900	37	40,125	7	11,800	9	13,210
*Reading, Pa.	28	120,575	122	70,200	18	17,925	99	21,500
*Revere, Mass.	12	26,500	9	3,735	4	1,500	6	1,775
*Rochester, N. Y.	166	1,108,150	68	131,712	26	18,335	19	20,740
*Salem, Mass.	53	25,927	....	....	36	9,535	....	....
*Schenectady, N. Y.	42	156,240	9	2,495	28	19,460	9	37,430
*Scranton, Pa.	42	91,838	....	....	7	56,987	....	....
Somerville, Mass.	13	32,700	10	9,100	10	262,130	10	3,380
*Springfield, Mass.	102	569,110	32	20,125	20	17,965	21	64,880
*Syracuse, N. Y.	96	193,616	50	78,975	25	36,885	38	25,675
*Trenton, N. J.	77	272,150	....	....	26	51,445	....	....
*Utica, N. Y.	26	229,300	6	30,500	16	41,960	1	400
*West Hoboken, N. J.	6	32,800	15	9,725	....	....	1	200
*Wilkesbarre, Pa.	43	49,662	....	....	26	9,718	....	....
*Worcester, Mass.	99	399,955	39	92,715	27	23,682	28	29,825
*York, Pa.	16	21,050	24	4,120	3	620	16	1,738
	5782	$48,023,772	3497	$6,182,040	1153	$3,148,773	2334	$2,810,718

CITIES IN WESTERN STATES 1919 1918

	New Work	Value	Repairs	Value	New Work	Value	Repairs	Value
*Alameda, Cal.	6	$19,500	34	$1,586,222	1	$1,800	19	$3,292
*Berkeley, Cal.	34	130,000	68	20,108	12	22,500	33	6,000
Butte, Mont.	32	47,000	17	6,000	71	108,000	45	11,000
*Boise, Idaho	7	21,600	52	15,690	1	2,900	12	6,866
*Colorado Spgs., Colo.	20	5,275	19	12,505	3	555	8	1,745
*Cheyenne, Wyo.	11	10,900	....	....	4	3,500	....	....
*Denver, Colo.	123	423,400	70	82,050	35	55,500	66	41,250
*Everett, Wash.	54	63,305	....	....	59	30,792	....	....
*Eureka, Cal.	6	28,500	3	3,500	1	500	1	400
*Fresno, Cal.	153	352,538	62	23,495	67	275,665	55	18,726
*Long Beach, Cal.	450	871,335	....	....	139	151,250	....	....
*Los Angeles, Cal.	1184	4,902,221	352	330,316	253	368,803	213	150,205
*Oakland, Cal.	261	558,358	70	37,107	133	224,028	75	74,750
*Ogden, Utah	255	1,470,609	49	56,592	108	246,035	....	....
*Pasadena, Cal.	54	99,293	92	74,440	25	10,373	59	13,302
*Phoenix, Ariz.	46	103,970	38	23,690	5	5,950	11	5,105
*Portland, Ore.	319	546,455	392	204,400	284	258,900	194	86,890
*Pueblo, Colo.	27	29,390	....	....	29	11,055	....	....
*Salt Lake City, Utah	66	886,325	15	45,500	17	33,900	12	7,200
*Sacramento, Cal.	22	97,765	97	190,815	4	82,100	32	21,040
*San Diego, Cal.	94	110,081	78	17,106	44	92,070	46	12,240
*San Francisco, Cal.	111	950,390	315	241,520	11	86,065	147	50,922
*San Jose, Cal.	43	76,480	29	42,148	19	9,925	11	3,453
*Seattle, Wash.	470	1,238,770	360	161,945	495	458,595	294	152,320
*Spokane, Wash.	72	38,475	27	21,645	23	1,437	32	18,840
*Stockton, Cal.	43	77,783	20	8,450	51	30,312	....	....
*Tacoma, Wash.	130	96,495	99	84,535	138	111,331	112	33,225
	4047	$13,152,243	2310	$3,266,089	2027	$2,677,891	1466	$713,666

CITIES IN SOUTHERN STATES 1919 1918

	New Work	Value	Repairs	Value	New Work	Value	Repairs	Value
*Atlanta, Ga.	71	468,250	156	$43,475	5	6,360	130	$57,075
*Augusta, Ga.	28	54,527	120	41 744	2	3,700	77	9,452
*Baltimore, Md.	511	1,476,850	642	192,900	54	255,610	328	65,600
*Birmingham, Ala.	145	413,708	239	107,540	40	15,585	242	39,196
*Charleston, S. C.	22	59,970	16	22,500	3	2,115	2	55
*Charleston, W. Va.	62	176,015	....	....	7	10,710	....	....
*Charlotte, N. C.	16	75,816	6	24,250	6	25,250	....	....
*Chattanooga, Tenn.	160	115,977	....	....	123	14,571	....	....
*Columbia, S. C.	23	86,300	73	32 515	1	500	59	7,800
*Covington, Ky.	6	22,800	5	105	1	1,000	1	300
*Cumberland, Md.	72	3,281,834	....	....	8	5,036	....	....
*Dallas, Texas	96	519 150	59	373,950	7	3,000	13	21,610
*El Paso, Texas	101	436 117	....	....	68	19,000	....	....
*Ft. Smith, Ark.	19	58 300	10	3,980	1	5,800	1	250
*Fort Worth, Texas	112	2,245,020	50	27,105	9	7,125	14	8,220
*Galveston, Texas	324	19,270	....	....	365	7,284	....	....
*Houston, Texas	129	576,573	245	32,025	25	24,016	123	13,821
*Huntington, W. Va.	92	271,735	....	....	8	1,112	....	....
*Jacksonville, Fla.	22	170,000	23	39,079	11	138,150	21	14,165
*Knoxville, Tenn.	23	201,125	64	51,081	....	....	55	13,705
*Lexington, Ky.	20	102,000	46	40,000	10	20,000	19	9,435
*Little Rock, Ark.	15	143,500	96	71,273	1	50,000	42	10,435
Louisville, Ky.	52	312,675	94	60,975	4	650	57	148,925
*Memphis, Tenn.	129	495,000	....	....	33	337,120	....	....
*Muscogee, Okla.	17	270,070	6	1,820	8	61,250	....	....
*Nashville, Tenn.	26	56,493	107	75,058	13	25,355	257	21,427
*New Orleans, La.	52	281,650	68	99 198	3	6,400	10	8,580
*Norfolk, Va.	96	583,335	24	81,665	33	257,695	4	17,300
*Oklahoma City, Okla.	91	1,030,000	75	43,380	7	22,850	7	8,045
*Pensacola, Fla.	8	7,000	78	21,915	2	650	88	23,572
*Pine Bluff, Ark.	15	24,800	3	3,000	2	450	....	....
*Portsmouth, Va.	39	227,740	25	30,315	5	11,800	14	21,116
*Richmond, Va.	67	716,063	76	58 685	5	96,550	30	49,446
*Roanoke, Va.	55	170,780	....	....	18	3,210	....	....
*San Antonio, Texas.	220	258,554	....	....	139	98,185	....	....
*Savannah, Ga.	35	76,350	21	111,550	4	16,380	10	3,635
*Shreveport, La.	115	440,050	85	96,630	9	3,550	27	12,350
*Tampa, Fla.	23	302,375	51	16,017	8	500	31	4,045
*Tulsa, Okla.	183	838,505	35	25,950	41	39,085	14	3,750
*Washington, D. C.	500	1,422,495	....	....	119	223,815	....	....
*Wheeling, W. Va.	22	15,260	12	1,880	5	2,035	7	930
*Wilmington, Del.	58	1,400,055	24	33,138	20	23 858	9	12,200
*Wilmington, N. C.	12	89,000	2	16,000	6	40,000	....	....
	3876	$20,052,797	2726	$1,936,701	1314	$1,920,062	1692	$606,440

CITIES IN MIDDLE STATES 1919 1918

	New Work	Value	Repairs	Value	New Work	Value	Repairs	Vaule
*Akron, Ohio	392	$3,042,020	60	$35,425	77	$83,960	33	$21,550
*Aurora, Ill	14	173,000	13	29,000	5	13,500	9	7,000
*Battle Creek, Mich	24	76,000	10	12,000	10	28,000	4	2,000
*Canton, Ohio	138	350,165	26	74,930	38	38,470	....	....
*Cedar Rapids, Iowa	30	122,000	7	8,000	8	29,000	2	10,000
*Chicago, Ill	765	17,577,000	....	....	76	1,223,400	....	....
*Cincinnati, Ohio	962	1,347,285	....	....	506	176,000	....	....
*Cleveland, Ohio	832	3,495,000	....	....	332	544,050	....	....
*Columbus, Ohio	181	400,675	73	128,780	53	87,150	49	230,405
*Davenport, Iowa	115	183,815	....	....	38	3,194	....	....
*Dayton, Ohio	102	354,518	29	9,351	59	120,725	24	16,296
*Decatur, Ill	56	172 575	10	10,300	11	8,586	5	1,900
*Des Moines, Iowa	91	383,750	....	....	18	33,000	....	....
*Detroit, Mich	1643	7,989 530	....	....	272	673,865	....	....
*Duluth, Minn	81	202,585	....	....	68	41 716	....	....
*East St. Louis, Ill	52	194,948	....	....	17	30,050	....	....
*Fargo, N. D.	17	82,400	8	15,600	1	2,000	....	12,000
*Grand Rapids, Mich.	131	676,000	....	....	35	8 511	....	....
*Hamilton, Ohio	23	45,900	7	19,250	1	3,500	3	1.195
*Indianapolis, Ind.	472	600,718	....	....	246	203,702	....	....
*Jackson, Mich	57	295,925	17	124,300	22	24,780	17	38,545
*Jackson, Miss.	10	32,000	....	....	6	8,000	....	....
*Joplin, Mo.	3	11,100	5	2,300	5	2 775	5	735
*Kansas City, Kan.	31	89,110	....	....	11	8,825	....	....
*Kansas City, Mo.	240	1,275,150	....	....	161	330,125	....	....
Kenosha, Wis.	145	181,417	....	....	72	204,209	....	....
*Lansing, Mich	128	203 535	16	6,615	11	11,575	9	4,225
*Leavenworth, Kans.	4	50,000	....	....	4	8,000	....	....
*Lincoln, Nebr.	40	324,825	....	....	7	9,135	....	....
*Madison, Wis.	30	530,650	....	....	2	5,800	....	....
*Milwaukee, Wis.	209	2,875,415	60	88,066	42	144,749	36	70,873
*Minneapolis, Minn.	418	1,681,545	....	....	172	222,710	....	....
*Omaha, Nebr.	114	998,525	....	....	28	89,375	....	....
*Peoria, Ill.	38	885,475	25	25,100	13	23,832	10	7,182
*Richmond, Ind.	17	65,750	....	....	15	7,600	....	....
*Saginaw, Mich.	113	157,827	40	160,640	39	68,032	14	5,785
*St. Joseph, Mo.	10	38,700	19	10,785	1	1,000	16	14,805
*St. Louis, Mo.	250	2,592,175	340	242,495	88	135,285	183	126,310
*St. Paul, Minn.	151	4,280,382	....	....	43	71,744	....	....
*Sioux Falls, S. D.	39	310,500	20	4 525	10	23,500	....	....
*South Bend, Ind.	192	382 439	....	....	44	53,380	....	....
*Springfield, Ohio	15	112 710	10	7 450	3	1,250	2	2,000
*Springfield, Mo.	5	14 050	13	36,025	4	2,475	12	4,950
*Superior, Wis.	14	15 995	16	5,865	7	1,435	32	4,515
*Terre Haute, Ind.	14	78 670	24	4,680	15	11,605	13	4,335
*Toledo, Ohio	139	645,410	84	103,250	55	57,965	42	23,450
*Topeka, Kans.	28	83,125	12	26,230	4	800	2	1,200
*Wichita, Kans.	95	831,900	20	68,090	16	21,925	5	1,870
*Youngstown, Ohio	89	228,765	18	11,650	62	115,610	15	7,275
*Zanesville, Ohio	10	8,000	5	3,000	6	6,000	3	600
	8869	$57,055,754	987	$1,273,802	3591	$5,026,066	545	$621,901

*Indicates increase.

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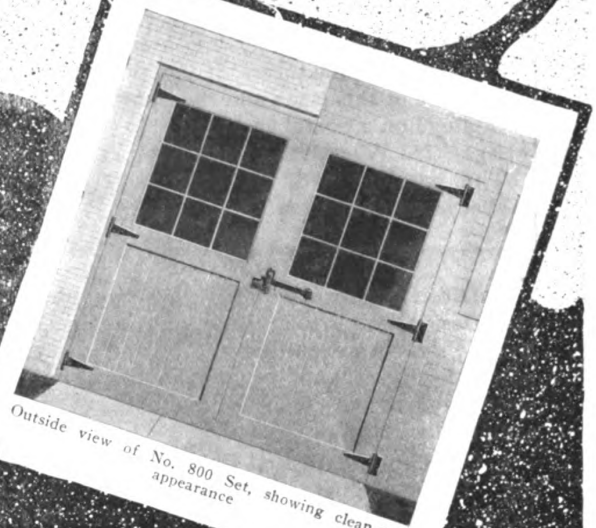
Inside and Out



Inside view of the No. 800 Garage Door Set, which is a very popular style



Outside view of No. 800 Set, showing clean-cut appearance

National Garage Door Hardware reveals the mechanical excellence and quality workmanship that are inbred into the products of this name. Builders everywhere recognize National superiority, and the same standards have been applied to the making of Garage Hardware as have gained for the other types of hardware for builders included in the National line an enviable reputation over a period of eighteen years.

There is a Garage Door Set to meet every requirement; some built primarily for service, while others combine with this quality a decidedly ornamental appearance. It will pay you to use the National line, which includes every kind of Builders' Hardware from the screen door set to the sliding barn door equipment.

Write for our latest catalog of Builders' Hardware, which will give you a much better idea of the scope of the National line.

National Mfg. Company
STERLING, ILLINOIS

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New Catalogs of Interest to the Trade

These catalogs may be secured direct from the manufacturer. If you prefer, write the date of this issue and the number of any catalogs on a postal and mail it to "Building Age," 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.

1. **Directions for Laying Boyle's Bayonne Roof and Desk Cloth.** John Boyle & Co., Inc., New York City.—Booklet illustrating and describing how this material for covering floors of piazzas, sleeping porches, etc., is laid, together with sample book and prices.

2. **Grimm's Corrugated Galvanized Wire Lathing.** Buffalo Wire Works Co., Buffalo, N. Y.—Booklet 61-F describes how to use this wire lathing which requires no furring.

3. **Caldwell Sash Balances.** Caldwell Mfg. Co., Rochester, N. Y.—Circular describing these balances, which render box frames unnecessary.

4. **Creosote Shingle Stains.** Samuel Cabot, Inc., Boston, Mass.—Folder describing various color stains for both roof and wall shingles.

5. **Concerning That Roof.** Cortright Metal Roofing Co., Philadelphia, Pa.—Booklet describing Cortright metal shingles and giving illustrations of attractive houses on which they have been used.

6. **Sample Color on Wood.** Creo-Dipt Co., Inc., No. Tonawanda, N. Y.—A number of small pieces of shingles dipped in Creo-Dipt stains and showing the various colors in which they can be furnished.

7. **Handbook on Saws.** Henry Disston & Sons, Inc., Philadelphia, Pa.—Illustrated booklet telling how to select, care for and use saws and tools.

8. **The Humphrey Radiantfire.** General Gas Light Co., New York City.—Booklet describing this gas heating device which is odorless, and founded on a new principle.

9. **Dado Heads.** Huther Bros. Saw Mfg. Co., Rochester, N. Y.—Circular illustrating and describing this saw which cuts grooves of any widths either with or across the grain.

10. **Roofing Slate.** Knickerbocker Slate Corp., New York City.—Folder describing various colors in which this slate is furnished.

11. **Architect's Level.** Kolesch & Co., New York City.—Folder describing this level used by architects, builders and contractors.

12. **Workmen's Compensation Insurance that Reduces Job Costs.** Liberty Mutual Insurance Co., Boston, Mass.—Booklet describing how this accident prevention service reduces time losses and reduces premiums if recommendations are carried out.

13. **Fiberlic Wall Board.** MacAndrews & Forbes Co., New York City.—Folder describing this wall board and showing attractive interiors.

14. **The Carpenter's Catalog.** Mack & Co., Rochester, N. Y.—Catalog showing various kinds of planes, chisels, etc., used by carpenters.

15. **Champion Sash Chains.** Thomas Morton, New York City.—Booklet illustrating and describing these sash and cable chains, pulleys, sliding door sheaves and fixtures, etc. Detail drawings are given.

16. **The Martin Rocking Fifth Wheel.** Martin Rocking Fifth Wheel Co., Springfield, Mass.—Booklet giving illustrations of various types of trailer bodies and describing construction of the Martin Rocking Fifth Wheel.

17. **Murphy Varnish.** Murphy Varnish Co., Newark, N. J.—Folder describing advantages of this varnish which is furnished either clear or in various popular colors.

18. **Dutch Boy Painter. No. 3.** National Lead Co., New York City.—House organ devoted to paint. This issue gives some interesting data on camouflaging ships, also on care of paint brushes.

19. **Nice Varnishes.** Eugene E. Nice, Philadelphia, Pa.—Folder describing these varnishes, wood fillers, paints, stains, etc. Samples enclosed.

20. **The Oldest Paint in the Newest Form.** National Lead Co., New York City.—Illustrated booklet describing Dutch Boy liquid lead ready for use. Directions for priming, etc., are given.

21. **Samson Spot Sash Cord.** Samson Cordage Works, Boston, Mass.—Folder describing the advantages of this cord.

22. **A Steel Square that Calculates as It Measures.** Sargent & Co., New Haven, Conn.—Folder describing this framing square which calculates the lengths and cuts of hip, valley and jack rafters.

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True Craftsmanship



WHETHER it be a dainty cabinet lid, massive portal or just plain door—there is a McKinney hinge or butt of proper beauty and design to fit.

The name "McKinney" on a hinge or butt stamps it as a standard product—worthy to blend artistically with the most elaborate architectural design and to perform the most sturdy tasks.

For fifty years McKinney hinges and butts have filled every hinge need. Effectively and silently they have served without sagging or repairs. They have stood the test of years and won!

Your facilities for designing or building are hardly complete without the McKinney illustrated catalog. You will find it a valuable reference in meeting standard hinge needs and matching artistic plans.

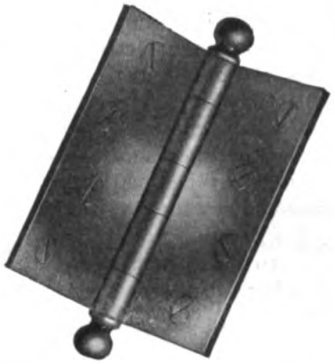
See that this book finds a place within easy arm's reach! A request for your copy will be answered by return mail without the slightest obligation on your part.

Hinge consideration *is* important!

McKINNEY MANUFACTURING CO., Pittsburgh
Western Office, State-Lake Bldg., Chicago Export Representation

McKINNEY
Hinges and Butts

Also manufacturers of McKinney garage and farm building door-hardware, furniture hardware and McKinney One-Man Trucks



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The Own Your Own Home Exposition

By ROBERT H. SEXTON

Second Exposition to Be Held in May, 1920—Its Plan and Scope Outlined.

THE underlying purpose behind the Second "Own Your Home" Exposition, which will be held in the Grand Central Palace, New York City, on May 1st to 8th, 1920, is to aid in bringing about a solution to the present acute shortage of homes. The announced policy of the general committee is to create an ardent desire for home ownership on the part of the public by appealing to that inherent feeling which is either active or dormant in every man and woman, to buy or build and thus eventually own a home all their own and create around it the atmosphere of home life so essential to contentment and prosperity. It has been stated on fairly reliable authority that only 10 per cent of those who really want homes are in financial position to buy them. The possession of a home looks a long way off to the other 90 per cent of homeless Americans. The initial payment looms large on the immediate horizon. It has not yet been made sufficiently clear to the average citizen that the quickest way to start building operations is through the exercise of thrift. It has been well said that purposeful saving and purposeful spending go hand in hand. Thrift does not necessarily mean doing without, but it is the result of proper investment. Create and foster an earnest desire to own a home, encourage thrift in managing household affairs, save for the initial payment, and the longing for a home will be gratified.

It must also be demonstrated to the satisfaction of the financial mind that the home ownership is not a passing fancy or a necessity of the moment to avoid high rents, but that it is an American ideal for men and women to buy or build homes, that they want to live in them permanently and rear their families in an environment which creates healthy bodies and minds, and makes better citizens.

Co-operation is a necessity now more than ever for the stabilization of business and business ideals, in order that the financial as well as the general public mind may be focused on the housing situation. While the resumption of building is gradually getting under way, capital for investment is still timorous as to values with the cost of building materials and labor having not yet reached the high water mark.

No matter what the demand is now or how inadequate the production may be, the law of supply and demand eventually governs. The supply will inevitably meet the demand. The manufacturer and dealer of today who declines to co-operate on the ground that they cannot meet the present demand for their product will do well to remember that "it pays to advertise," else the way is left open for new business enterprises to form, step in and furnish the needed supplies, thus dividing the responsibility of production and distribution with the more conservative producers. This sort of enterprise is an American business characteristic that may be depended upon to act and to act quickly when an opportunity knocks at the door. For this reason, if no other, it is good business judgment to speed up production and to cooperate in laying the foundation for future business when the present pressure has been relieved.

Home ownership should be taught throughout the length and breadth of the land. Let the "Own Your Home" idea be acclaimed. Educating the public to the joys of home ownership is laying a permanent foundation for the future greatness and prosperity of the nation. Why not make it a part of the 100 per cent American ideal for every family to plan to eventually live in their own home? Such a campaign does not mean that every man or woman will forthwith start building a home, but it does mean that many of them will enroll as thrift citizens with the goal of home ownership ever before them, and that they will start planning now for the home that will one day be their own; if not this year, the next, or another that follows soon. The "Own Your Home Exposition" to be held in May is for the purpose of visualizing the "Own Your Home" idea for public absorption. "It is well enough to tell the public to own your own home, but after all the public wants to see something and talk to someone about it."

In line with its determination to give particular attention to the educational features of the Second "Own Your Home" Exposition, the Committee on Exhibits has approved the following classification

(Concluded on page 58)

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"I WANT TO BUILD A HOLLOW TILE HOME"

THAT is what many prospective home builders in your community will say to you in a very short time. Will you be able to build it?

The Hollow Building Tile Association, made up of America's leading manufacturers of this modern building material, trade-marked MASTERTILE, has begun a country-wide advertising campaign to show the Building Public the many decided advantages, economies, and comforts of Hollow Tile construction.

When the Building Public knows that a permanent, fire-resistive Hollow Building Tile house compares favorably in first cost with a well-built frame house, and has the added features of coolness in summer, economical heating in winter, and freedom from repairing and painting, they will build Hollow Tile houses. If you cannot build them, some more progressive contractor in your own town, or one near by, will get the contract.

We want every reader to know how to build Hollow Tile houses, and to be in a position to figure on them when this demand comes.

Hollow Building Tile construction is simple. Any carpenter-contractor can readily take it up. Our new Hollow Tile Manual makes it easy, for it covers all the essential details of Hollow Building Tile construction for the average building. A careful study of its pages will put you in a position to figure intelligently and safely on any building of Hollow Tile.

Send for your copy of this Manual today. Be the "early bird" in your locality and get some of the business which our advertising campaign will create.

THE HOLLOW BUILDING TILE ASSOCIATION

Representing America's Leading Manufacturers

BY THIS TRADE MARK MASTERTILE YOU SHALL KNOW IT

CONWAY BUILDING · CHICAGO

USE COUPON FOR THIS FREE MANUAL

THE HOLLOW BUILDING TILE ASSOCIATION, 111 W. Washington St., Chicago, Ill.

Gentlemen:—Please send me your Manual as advertised in the January issue of the Building Age.

I am planning to build_____

(If you have ever used Hollow Tile please tell us for what buildings and how you like it_____

(Name) (Business) (Street and Town) (State)

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Building Conditions in 1919

(Continued from page 51)

spread to other industries not governmentally controlled. The resulting rise in the cost of production has been followed as a matter of course by a rise in prices. Then came the general demand for higher wages. The increased wage scale has caused higher commodity prices. A noteworthy example of the increase in labor costs is shown in the wage of bricklayers which has advanced to $8.50 per day from $6.25 at the time of the signing of the armistice a year ago last November.

There is apparently no prospect that labor will be available in sufficiently large supply to cause any hope of a reduction in wages. If there were any such hope it has been put out of the question by the greatly advanced standards of living. This developed a serious condition of unrest throughout the country, which must be relieved as quickly as possible.

The course of building in 1919 was influenced by two forces; the first being the war cycle and the second, the business cycle. Construction had reached a high level in 1913, but slightly declined in 1915 owing to general business depression. There soon followed another era of building activity only to be brought to an end by the war.

Building material prices at the close of 1919 showed a decided increase in activity, with practically all commodities in great demand notwithstanding the steadily advancing price trend. Dealers in the basic structural materials were kept busy to capacity with orders for immediate delivery. Inquiries for deliveries in January and February indicate extremely busy building times in the near future.

The upward trend of prices has been steady. All efforts to secure a level of stabilization failed. The demand largely exceeded the possible production and quotations could not be stabilized. In the early months of 1919 brick delivered in New York was selling at $15.00 per thousand retail. December prices were quoted at $22.50 per thousand. The most spectacular jump of the commodity list has been scored by lumber. Last March and April plain oak flooring sold at $72.00 per thousand, f. o. b. New York, wholesale. December's price for the same grade oak touched the $100 level. Quartered oak was advanced in price from $96.00 per thousand, wholesale, in the early spring to a present mark of $210 and upward. The demand for lumber of every grade and description continued to grow throughout the year, and retail dealers are making arrangements to take care of an enormous demand during the 1920 season. Their anxiety to secure adequate stocks is already reflected in the call for production.

The public generally feels that slow progress has been made in the resumption of building on a normal scale. To put the industry back on its feet financially there must be a bigger unit of value, a greater development of individual enterprises. Then there will be created a surplus instead of a shortage, and the depleted value of the unit will be met. The unit must again have a purchase value equal to the wealth per capita of the industry. Of course, prices can never go back to the low pre-war level, but with the very increase of the wealth of the building industry, with the increase in wages, there will come automatic reorganization.

Labor represents a large percentage of the purchasing power of the country. High wages mean increased purchasing power, while low wages mean reduced purchasing power. Labor must meet the existing situation by co-operation, and create an effective partnership in the evolution of industry. The workman must be made to feel the benefits that accrue from the better results which he is called upon to produce. By that means labor can create a co-operative force instead of an antagonistic force. The worker must be convinced that any increased effort he makes is not for capital's gain, but in a great part for his personal advantage and that of the public, of which he is a part.

Increased production cannot result from individual effort, but only in widespread movement for collective effort. There must be no selfishness on either side in securing an increased interest in the problems of production and output on a basis of co-operation. There must be mutual advantage to the man who directs industry and the man who produces in industry. There must be industrial democracy in 1920 as never before, for the labor problem must be met if we are to continue to meet competition with other nations in the markets of the world. We solved many difficult problems during the war. So now we must create the proper regulations in relation to labor and industry.

Own Your Own Home Exposition

(Continued from page 56)

covering exhibits that are essential to give complete information on home building.

In order that each specific industry may be given full opportunity to be represented, special committees composed of representatives in each line of industry have been formed, and the policy formulated for governing the exhibits of the various branches has been approved by them. They are:

Real Estate and Building, Mortgage and Loans, Architecture, Building Equipment, Cement, Lumber, Building Materials, City Planning, Landscape, and Household Economies Committees.

It is conservatively estimated that not less than two hundred thousand home-seekers will visit the Exposition in May and obtain their first lessons in home planning.

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"Here's the Wall Board You Have Wanted!"

No one ever questioned the wisdom of the Wall Board idea. Every builder would prefer to do away with lath and plaster and put up a ready-made wall in convenient-to-handle sections if he could be absolutely certain of a permanent result.

You have questioned somewhat in the past the strength, rigidity and staunchness of Wall Board which you, as a builder, associate with good building material. Today, however, I can offer you Niagara Wall Board which has the inherent strength that matches the strength of the Wall Board idea and is the kind of board you have wanted.

NIAGARA WALL BOARD



Super-hardened by an impregnating process which has a petrifying effect upon the fibres, Niagara Wall Board presents a stiffer, stronger board—a board that stays flat on the wall and outlasts the life of the building.

You will be interested in seeing the new board and having the details of our exclusive plan. The price also is most interesting and the coupon will bring complete information—make use of it now.

Builders, Carpenters, Contractors and *Architects*—you will want to know about Niagara Wall Board—write for a sample today.

NIAGARA WALL BOARD COMPANY
General Offices, BUFFALO, N. Y.
Fibre Mill and Finishing Plant,
PENN YAN, N. Y.

(COUPON FOR DEALER'S USE)

Name .....
Address .....
Town ..... State .....

Niagara Wall Board Company, Buffalo, N. Y.
GENTLEMEN:—Without obligating me in any way, kindly forward complete details about Niagara Board with prices and explain your exclusive plan, forwarding a piece of the actual board.

(2)

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Building Homes for Employes

THE idea of having large business institutions build homes for their employes, and of allowing them to appropriate a certain percentage of their salaries in payment, is a key which can be made to open more than one door, states the Dallas News. The building of every such home is a contribution to the relief of the housing problem, and that problem has become a sore vexation in every community, and not only a vexation, but something of a menace as well, since rents have been advanced to a point that makes them operate as a brake on commercial and industrial progress. It relieves an economic distress which, probably, most salaried men are beginning to feel acutely, for the payments can be made less than the monthly rental that is being exacted in most instances, if not in all. It must be conducive, too, to the cultivation of more cordial relations between employers and employes, and give the employer a better assurance of retaining the services of employes thus aided. In last analysis, it amounts to the employer's lending his credit to his employe at a cost to the employe less than he would have to pay if he used his own with that of money lenders or house builders, while the idea can be applied in a way which gives a guaranty against loss to both employer and employe.

Points Out Freedom From Fire Peril in One-Story School House

THE one-story school house, no matter of what material built, has disposed forever of life peril, with reference to the terrible menace of fire; and cannot be excelled for beauty and low cost, says the Bulletin.

This type of school house has many advantages over other kinds, aside from the greatest one of freedom from fire peril. There are no stairs to climb, no room wasted in halls and stairs, no sweeping of dust from one floor to another, no overhead noise; quicker exits and better light and ventilation are obtainable.

The bulk of American suburban schools are of wood construction; 6,000 small schools in the State of Nebraska alone, in 1917, give some idea of the tremendous volume of rural school building in America. An idea now widely applied in the standard types of industrial buildings deserves consideration for one-story school buildings. This is the slow-burning or mill-construction floor design, in which the interior frame and floors are of timber, arranged in heavy, solid masses and smooth flat surfaces so as to expose the least number of corners, and to avoid concealed spaces which may not be readily reached in case of fire. This type of construction will not only mean freedom from life peril which the one-story structure insures by its very nature, but it will reduce property damage to a minimum while at the same time providing a substantial structure at a low cost, with beauty and adaptability to change or addition. If such a building is partially destroyed, there is much material salvaged.

High Cost of Building Affects Fire Insurance

A TIMELY warning has been given to realty owners by Frank Bailey, vice-president of the Title Guarantee & Trust Company, to carefully examine their fire insurance policies to see whether in view of the high cost of building they would be completely covered in the event of a fire loss. Mr. Bailey's advice is as follows:

"In view of the present value of old buildings and their cost of reproduction, nearly every resident and flat owner is now under-insured. Take, for example, the case of a small dwelling worth $10,000 a few years ago, and insured for $8,000 or 80 per cent of its value. It would now be valued at $15,000 as its reproduction value.

"We will suppose, for example, that there is a fire with a resultant loss of 25 per cent; 25 per cent of $15,000 is $4,250, which would be the reproductive loss because of the fire. If the insurance was $8,000 only, and had not been increased by the owner to $12,000 or 80 per cent of the present value, the insured would be able to collect from the insurance company only three-fourths, or $2,750. He would be considered by the insurance company as a co-insurer with it to the extent of the difference between the amount of insurance he previously carried, to wit: $8,000 (being 80 per cent of the old value) and $12,000 (80 per cent of the new value), to wit, $15,000. Of course, in case of total destruction, he would receive $8,000.

"This rule of contribution applies in case of smaller losses of even 10 per cent of the value, and is in the standard form of every fire insurance company doing business in the State of New York. It, therefore, is of extreme importance for every owner to see to his fire insurance and to have his insurance increased to 80 per cent of the present valuation."

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Flex-a-Tile

House Tops

Quick and Inexpensive

A roof to be covered quickly with a Dependable, Low-cost, Fire-resisting, waterproof roofing! A hurry call to the Flex-a-Tile dealer and Flex-a-Tile Roll Shingle Roofing is on its way. After that, it's simply a question of having a handy man roll it on and nail it down.

Satisfactory Roofing

The man who buys this roofing not only gets an economical roof—he gets all the enduring qualities of higher priced roofings—he gets the Flex-a-Tile unvarying Standard, and the element of beauty. The 5" x 10" Shingle Butts are so raised by our patented process that they can actually **be felt**, and the result is unusually pleasing, simulating very cleverly a shingled roof.

Whatever the Roofing Job there is satisfaction to owner and contractor in this remarkable product.

Not *Common* Roofing—*Uncommon* Flex-a-Tile Think of the Saving!

Roll it on and Nail. There could be no simpler way of roofing than the Flex-a-Tile Roll Shingle Way. It rolls over old shingles or new sheathing boards with perfect ease. And when it is nailed down it is there to stay, whatever the weather conditions. No crack—no unlooked for wearing out!

The saving on Labor is very great, for no skilled workmanship is required—it can be done quickly and successfully with no waste. It saves on Insurance, being in Class "C" as approved by the Fire Underwriters' Laboratories.

Very Low Cost—Positively No Upkeep

Write us your particular roofing problems. There is a Flex-a-Tile solution for all of them.
Send for Bulletins A23 and 1511.

Heppes Roofing Division

The Richardson Company
Dept. J,
4500 Filmore Street, CHICAGO, ILL.

Mills at Chicago—Lockland (Cincinnati), Ohio **Rutherford, N. J.**

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How to Fit Doors and Set Jambs and Window Frames

From J. E. S., New York City.—Would you kindly let me know through your construction answers the following questions? These questions I have heard in many different forms, but I am sure I can get the right one in Building Age. First, the proper way a door should be fitted to the jamb, marking, etc., and how butts should be set. Next, the best way to set jambs, and the proper way to set window frames. These questions look simple, I know, but I have seen so many mistakes in them that I think the only way is to have it written up in your construction column, and then I can show it to my men to convince them.

Answer:

Door Opening:

Preliminary to the setting of the door frame, the rough opening in the wall should be tested to see that the studs are plumb. This door opening should be ½ in. higher and ½ in. wider on each side than the door frame.

Door Frame:

The frame of the door is made of three pieces—head and two sides, with a groove on the under side at both ends of the head to receive corresponding tongues on the sides. A strip of wood of the same width as the door opening should be placed temporarily at the base to keep the side pieces or jambs apart. When the door frame is set in position, extreme care should be exercised to make it perfectly plumb and out of wind. Test the side on which the hinges are to be fastened as to its verticality. Then test the other members and corners with a straight-edge. If the head needs any leveling, rectify it immediately. If the sides are out of level small wedges (shingles make excellent blocking) should be driven in at both sides, front and back. These wedges are fastened to the studs with nails driven in from the outer edge of the jambs, so that when the casing is applied the nail heads will be concealed. When the frame is finally adjusted, place a straight-edge against the face of a jamb and test again for straightness and squareness.

Door Trim:

The plinth or base block is the first member to be nailed in place. Then come the side casings, which are cut to length and nailed; and finally the head casing, which is similarly measured and attached. Door casings are set back about 5/16 in. from the face of the casing to allow the hinges to be easily fastened.

Fitting Door:

Place the door in position, holding it tightly in place by temporary wooden wedges driven in at the bottom. Plane the edge of the door which is to receive the hinges so that it fits snugly into the side of the frame. Then plane the top edge of the door. Allow about 1/16 in. play on top and both sides for subsequent coats of paint or varnish, otherwise the door will bind. The sides of the door should furthermore be beveled off slightly, just a shaving or two, to take care of the spread of the butts.

Place a piece of wood of the same thickness as the finished threshold or saddle against the bottom of the door and draw or scribe a line on the door coinciding with the upper edge of the saddle. This will give the exact height of the door. To obtain the finished height, saw off the door about ⅛ in. above the line just drawn or marked.

Hanging Door:

Remove the wedge at the bottom of the door slightly, allowing the door to drop about 1/16 in., and with a knife or chisel mark, on both door and jamb, a line about 8 in. from the top of the door. This locates the top of the upper hinge. The bottom of the lower hinge, which is usually set about 10 in. from the bottom of the door, is similarly marked on door and jamb. Now remove the door, place the hinges on the lines indicated, and mark along the edges of the hinge with a knife. Do likewise with the frame. Chisel out gains in door and frame, carefully gaging the depths of both ends of the hinge. Drill holes for screws. Put in one or two screws in each section of the hinge and hang door. If the door fits, tighten and insert the rest of the screws.

A. B. G.

What Shape Should Theatre Floors Have?

From W. B., Texas.—I have a public hall to build. No plans have been drawn for this building by an architect. The owners want a raised floor. I am not posted on the rise necessary for a floor of this kind. The hall is 36 x 50 over all. The stage will be 10 ft. by 30 ft. wide with dressing rooms on each side, leaving the hall 36 x 40. The stage will be 30 inches high. If you know of any rules covering the rise of floors to correspond to the height of stage, I will appreciate any favor rendered on this subject.

Answer.—The slope of a hall wherein seats are to be placed is generally governed by law. Most of the building codes which we are familiar with limit the slope to 1 in 12, that is, for each foot of floor, the slope shall not be more than 1 inch. You can safely use a lower pitch than this and still have the stage visible by all persons.

The stage seems to us to be a bit too low and we would suggest that it be made between 3 and 4 feet high. In order to make sure that the hall will be of the proper slope as regards the stage, we would suggest that you prepare a sectional diagram lengthwise of the hall, drawing it to scale. Mark on this diagram the elevation of the stage and where the first line of seats commences. The eye of the spectator should be slightly above the level of the stage, so that he may see everything that is on it. Each row of seats in back of this first one should be sufficiently pitched so that a line drawn from the eye level will pass over the head of the person in front so that an uninterrupted view of the stage may be had.

This is an ideal condition, and should be approached as nearly as local conditions will permit. If the hall is intended to be used largely by children, the eye level of the front row of seats, of course, will be higher than if the audience is to consist of adults.

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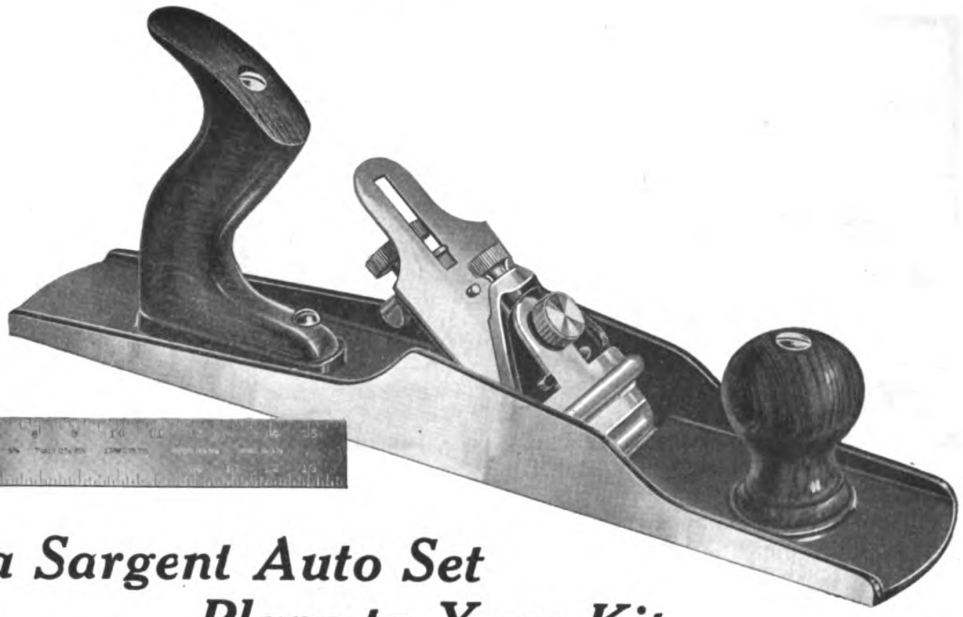

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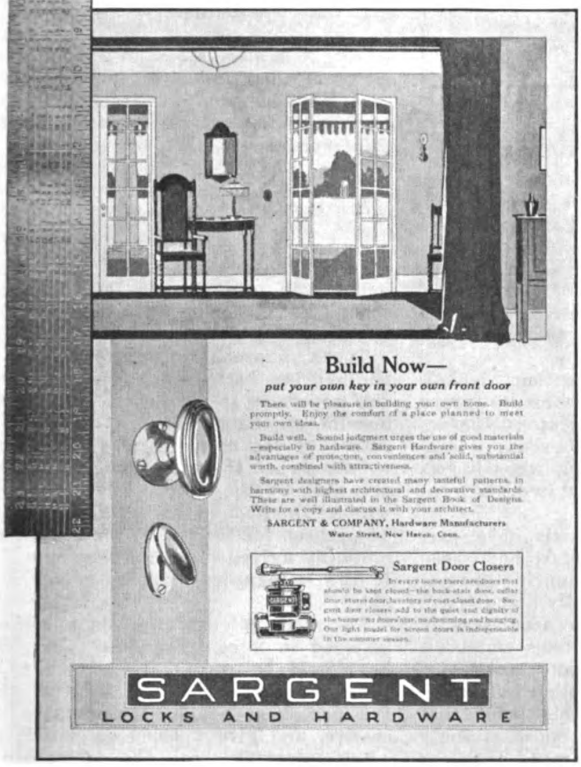

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Legal Department



What is an "Account Stated"?

A suit successfully prosecuted by A. C. Duerr, a San Francisco architect, to recover compensation for preparing a set of plans and for services in superintending construction, etc., draws attention to important rules of law relating to the conclusiveness of accounts. The points involved have equal force as to contractor's claims for services, materials, etc.

Mr. Duerr submitted to one Mrs. Bryan, owner, in care of her agent, a statement of account as follows:

"First set of plans and specications for seven-story steel frame fireproof building to be erected on Geary and Hyde Streets	$2,500
"Architectural services rendered for second set of plans, including details, specifications, and superintending based on cost of $90,000 at 5 per cent	4,500
	$7,000
"By cash	3,000
"Balance due	$4,000"

Although no objection was made to the correctness of this statement, it was not paid and Mr. Duerr brough suit on the account. Relying upon the owner's failure to dispute the correctness of the items as avoiding necessity for proving their accuracy in accordance with the contract of employment and for specifically proving rendition of the service covered by the account, plaintiff merely proved submission of the account and defendant's failure to object to it.

In disposing of the case in plaintiff's favor, the California District Court of Appeal ruled that a good "account stated" was proved. The decision is of importance because it depends upon no special statute in force in California, but on legal principles of general application throughout the country.

In law, an account stated arises when a creditor submits a statement of items due him, and the debtor expressly assents to its correctness. If the account be not paid, it is not necessary for the creditor to prove that each of the various charge items were actually furnished and that the amounts stated cover agreed compensation. He merely sues on the account stated in the same way that he would sue on a note given for the aggregate sum of the items in his favor—without proving that the several items were just and due.

> If you are bothered by any point of building law, write to our Legal Adviser, A. L. H. Street, LL B., who is retained for the benefit of subscribers to Building Age, and is at your service.

But express assent is not necessary. Acknowledgment of the accuracy of the account will be inferred from the debtor's omission to dispute its correctness.

Subject to certain exceptions, including the right of the debtor to prove a mistake in the making up of the account, although, for some excusable reason, he did not object to it when it was rendered, an account stated is conclusive.

But one of the essentials of an account stated is that it must have been submitted to the debtor, or his authorized agent. Quite naturally a court will not infer that the debtor acquiesced in the correctness of the items unless it be proved that the account came under his eye or that of his authorized representative. It was on this point that the California suit was most strongly contested. It was not proved that the account was submitted to the owner, and it was therefore argued on her part that she was not bound by it. It was shown, however, that it was rendered to her agent, who was given broad and general powers in connection with the employment of the architect and the construction of the building. The court holds that these circumstances made the submission of the account just as binding on the owner as if the account had been delivered to her personally. The court further decided that the fact that the agent may have never communicated with his principal, the owner, concerning the account could not alter its binding effect upon her.

It is to be observed, however, in passing, that where there is any doubt as to the scope of an owner's agent's powers it is always best to submit statements of this kind direct to the owner, to avoid just such quibble as furnished the foundation of the defense in the California case.

Are Forfeitures for Building Delay Valid?

Is a provision in a building contract imposing a per diem forfeiture on the contractor for delay in completing his work valid and enforceable?

There is probably no proposition of building law better established than the rule governing this question. Where the amount stipulated for is *manifestly in excess of the actual damage sustained by the owner* the provision will be disregarded by the courts and the owner will be limited to his actual damage. The reason for the rule is that, although mutually agreed upon, an excessive forfeiture is regarded as being unconscionable.

But when a contractor finds himself involved in a controversy of this kind he should be careful to see that his proof presents evidence of the fact that the per diem penalty is actually excessive, and give a basis on which the actual damages can be ascertained. Otherwise he may find himself mulcted for the stipulated amount.

An illustration of the point we make is to be found in the recent decision of the Texas Supreme Court in the case

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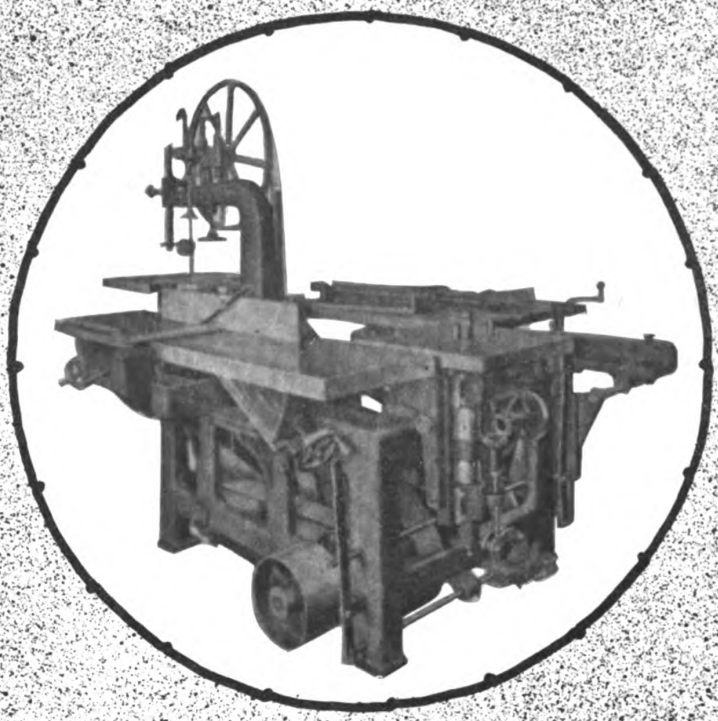

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of Methodist Episcopal Church, South, of Paducah, Tex., vs. Walsh, 212 Southwestern Reporter, 950.

Defendant undertook to construct a church building for plaintiff for $5,200. The agreement provided that he should pay $10 for each day that the structure should remain uncompleted after a specified date. There was a delay of 84 days, and the court upholds an award of $840 against the contractor on this account.

It was plausibly argued that these damages are excessively disproportionate to the value of the building. But the trouble was that defendant did not prove a basis for assessment of actual damages. The court was unable to say what the actual damages were, and therefore felt constrained to respect the amount the parties had agreed upon.

"Where, as in this case," says the Supreme Court, "it cannot be ascertained from the face of the contract that the damages stipulated to be paid in case of a breach are excessive, and there is no evidence of the amount of damages actually suffered, so that it cannot be determined from the evidence whether the stipulated amount reasonably approximates the actual damages, the provision cannot be construed as a [non-recoverable] penalty."

In other words, defendant (or his attorney) "fell down" when no proof was made showing that the fair rental value of the building for church purposes was some amount substantially less than $10 a day.

When are Builders Liable for Injuries to Workmen?

From A. H. A., Kansas—I wish to ask you a question in regard to hired carpenters. I understand that if I have a contract, and a man gets hurt on the job, he can collect damages. Can he do this if it is not my fault? And how about it, if it is day work and I pay him and collect from the owner or give him an order on him? How can I work men and not be responsible for them when they get hurt?

Answer—If you are not covered by the Kansas Workmen's Compensation Act you are liable for such injuries to your employees as may occur through your fault. Such fault may consist in violation of some state labor law designed to secure the safety of workmen, or in the failure to use that degree of care to provide a reasonably safe place of work which an ordinarily careful employer would use under the same circumstances. But you are not subject to an ordinary suit for personal injuries not directly due to your fault.

Men employed and paid by you are your employees, so far as concerns your responsibility for injury to them, although you may be reimbursed by the owner for the wages paid to them, or although you may pay them by giving orders on the owner. You can avoid the legal relationship of employer and employee between yourself and workmen serving under you by having a distinct understanding with them and the owner that they are the employees of the owner and that you are merely acting as his foreman or superintendent so far as they are concerned. But the mere fact that an injured workman may be an employee of the owner, and not yours, will not necessarily keep you clear of responsibility for the injury. If it can be shown that the accident was due to your carelessness or fault, you would be jointly liable with the owner. Where an employee is injured through negligence of the employer's representative, both the employer and the representative are liable.

But suits by building employees to recover damages for injuries sustained are subject to this general principle of personal injury law: If it can be shown that the particular injury would not have occurred except for some act of carelessness on the injured man's own part, he may be debarred from recovering damages on the ground of contributory negligence.

What has been said above relates to lawsuits to recover damages for personal injuries, under the old rules of law applicable to accidents resulting from negligence. It does not apply to an accident falling within the provisions of the Workmen's Compensation Act.

Workmen's Compensation is a system under which provision is made for awards in favor of injured employees in certain industries, without special regard to the cause of the accident. Under this system, which is in force in Kansas as well as most other states, it is provided that where a workman is hurt in the course of his occupation he shall be entitled to a limited award, varying according to the nature of the award. The award is not regarded in the light of a penalty against the employer, but as an expense incident to the conduct of his business, which he is supposed to absorb by insuring himself against liability.

The Kansas law, like that in force in other states, covers the building industry. Employers of five or more workmen are presumed to choose to be governed by the act, unless they give official notice to the contrary. If they do elect not to be governed by the law, then they become subject to a provision that in case one of their men is injured through negligence attributable to the employer, the latter will not be permitted to defend an ordinary suit for damages on the ground that the accident was due to contributory negligence of the injured man. Nor can suit against the employer be defended on the ground that the accident was caused by carelessness of a fellow employee of the injured man. In other words, if an employer of five or more men says that he does not intend to act under the Compensation Law, his hands are tied to a considerable extent in defending a suit brought on common law principles of liability for personal injury. On the other hand, if he does choose to take the benefits and disadvantages of the Compensation Law, the injured employee is restricted in the amount that he can recover. So the employer's liability for injuries as to which he is not at fault is offset by the fact that if an employee is injured through his negligence there is a smaller money liability than would exist except for the fact that the employer has elected to conform to the Compensation Law.

Employers of less than five men may choose to come under the Compensation Act in Kansas. But unless they do choose to do so, they are in no way affected by the provisions of that law. As to them the old rules of law remain in force—no liability for accidents not caused by their fault or negligence, but liability for all damages sustained where negligence is established.

It not being possible, within the space of a single article, to give a detailed explanation of the workings of Workmen's Compensation, you should write to the State Labor Commissioner, Topeka, Kan., for a copy of the law in force in that state, together with circulars explaining its application.

No employing builder can afford to remain uninformed concerning the provisions of the laws of his state concerning liability for accidents that may occur to his employees in the course of their employment.

Of course, the Compensation Act does not apply against a builder where the owner is the employer of the labor used on a building. In such case any compensation award must be made against the owner as the employer. But should the builder be the negligent cause of an accident he might, even in such case, find himself confronted by suit for damages. This suit might take the form of a claim by the injured man for damages on the ground of negligent performance of the builder's duties as foreman or superintendent for the owner, or of a claim by the owner for reimbursement on account of being compelled to pay the injured man an award under the Compensation Act.

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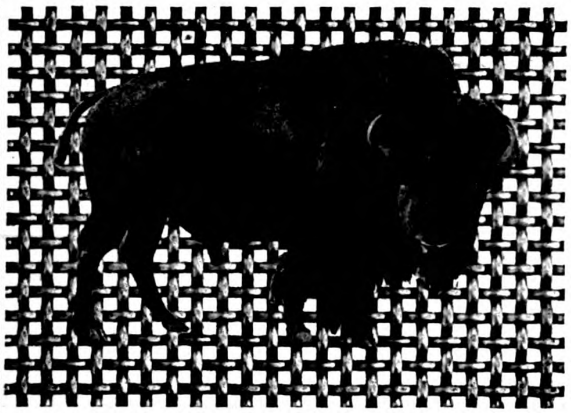

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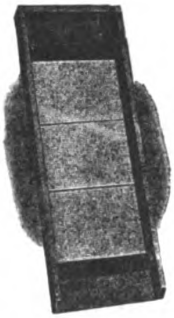

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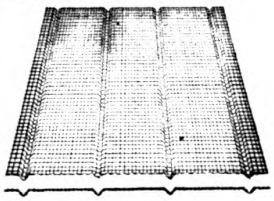

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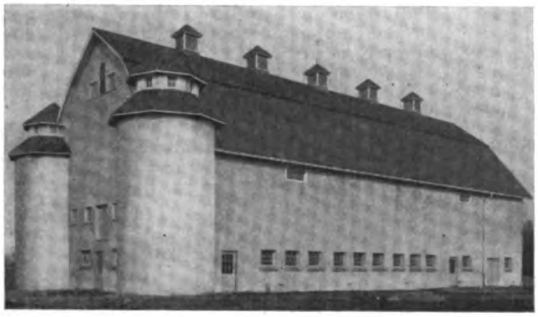

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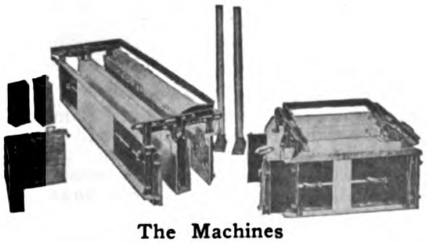

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Hess Pipeless Furnaces have surprised us. We are rather conservative in our claims and do not wish customers to expect too much; but they are writing in with most extravagant reports of success—greater than they anticipated. We knew our PIPELESS would do as well as any and better than some, but pipeless furnaces have been over-rated by some makers, and there has been much disappointment.

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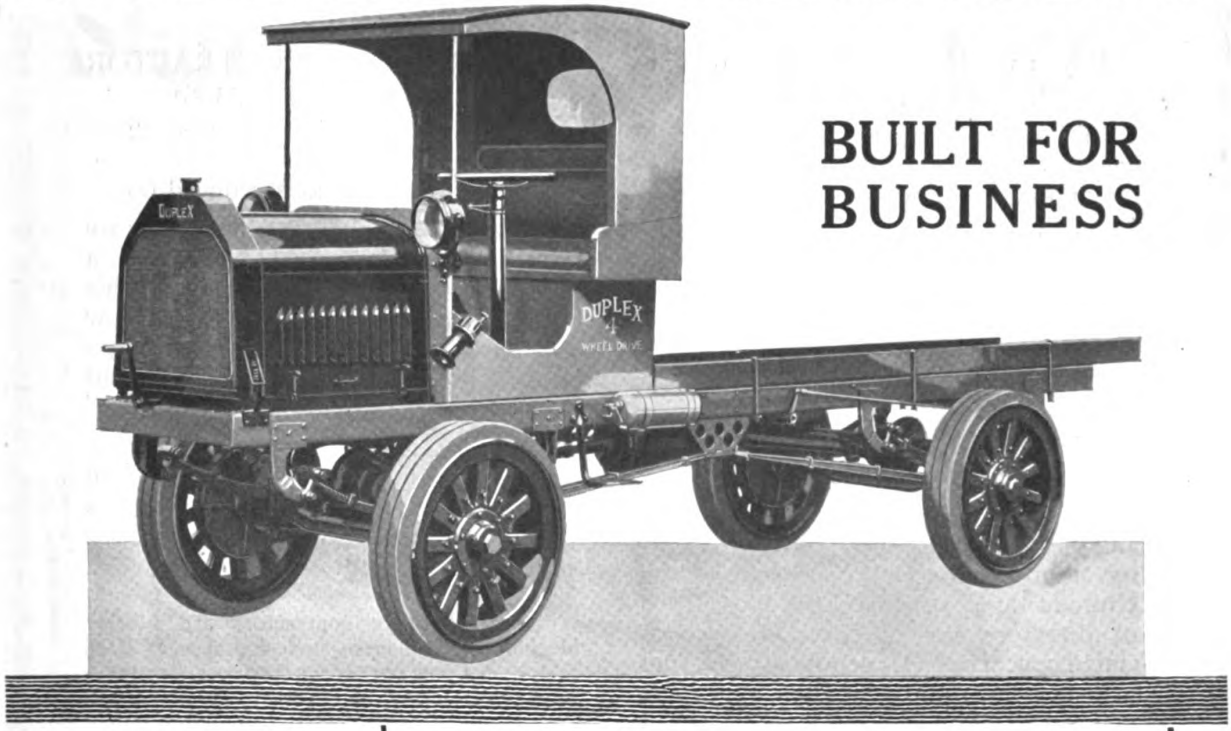
DUPLEX TRUCKS



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The Duplex Limited

HERE is a general purpose truck of medium capacity, pneumatic tired, which develops a road speed of 25 miles per hour *loaded*, with the motor running only 1300 R. P. M.

This means that the *power is in the motor itself*—and that the Duplex Limited does not depend for its power on low gear ratio.

The Duplex Limited is a Duplex through and through—fully as fit for its class of work as the famous Duplex 4-Wheel Drive which has such a wonderful prestige in the heavy duty field.

4-Cylinder, enclosed type motor—water cooled—cast en bloc. Bore 4", Stroke 5¼". 3 Point Suspension. Pneumatic Cord tires. 145" wheel base. Equipped with Windshield, Electric lighting and starting; Ammeter; Boyce Motometer; Speedometer; Electric Horn; Tools; Jack; Rim Wrench; Front fenders; Alemite Grease gun. Driver's seat without extra charge. (Power Tire Pump at extra charge.)

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$2575

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The famous Duplex 4-Wheel Drive Heavy Duty Truck has back of it years of remarkable achievement—and a standing so high that it is generally accepted as the leading truck of its kind.

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The Duplex Truck Company is one of the oldest and most successful truck companies in America—made so by the *owner service* of the Duplex Truck itself.

Today Duplex 4-Wheel Drive Trucks are finding increasing favor in all lines of business because everywhere business men want to get away from experimenting with trucks.

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If you would be interested in obtaining compensation protection *at cost*—

In carrying a form of policy which has regularly returned 30 per cent of the annual premiums—

Which includes an Accident Prevention Service that has reduced the insurance *rates* of its policyholders 20 to 50 per cent—

Then you will be interested in investigating the advantages of the Liberty Mutual Insurance Company.

The Liberty Mutual is a cooperative organization of over 4000 of the biggest and best-rated contracting, public-utility, and commercial concerns in the United States. It is managed by a board of directors elected from these associated concerns. All details of its actual insurance work are handled by expert insurance men, of long experience in compensation protection.

The Liberty Mutual furnishes compensation protection to its members *at cost,* paying back its profits each year. It has already paid back in cash dividends *over* $3,000,000, averaging 30 per cent of its yearly premiums.

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RATE REDUCED 33.2%

1916, accidents on jobs reduced 22%
1917, accidents on jobs reduced 54%
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In *addition* to this 33.2 per cent rate reduction, this contractor received a *cash dividend* of 30 per cent of his premium. His insurance cost is now less than half what many other contractors are paying to stock companies that have stockholders' profits and agents' commissions to pay.

This accident-prevention service often effects, through reduced time-loss, a dollars-and-cents saving that exceeds the cost of the insurance.

* * *

Many prominent contractors are Liberty Mutual policyholders—such concerns as Fred T. Ley & Company, Inc.; Norcross Brothers; Roydhouse Arey Company; Hugh Nawn Contracting Company; McClintock-Marshall Company.

It will pay you to investigate *why* they buy their compensation protection in this strong New England Company.



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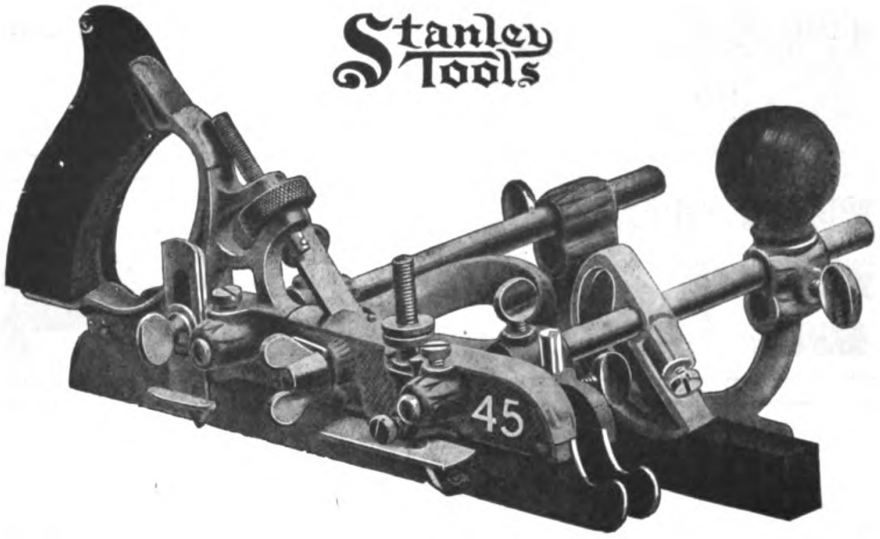
Stanley "Forty-Five" Plane



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Another FEDERAL

This Federal 3½ ton truck was on the job 365 days in the year for the George A. Fuller Company during the building crisis. It is believed by this company to be one of the reasons for its success in the meeting of the unusual demands made upon it.

FEDERAL

A Construction Truck That Gives Real Service

These are strenuous days in the building construction field. For the last year contractors have been rushed as never before. "Speed" was the watchword—and the contractor who could make the most speed was the one that would pile up the most good will, and the most profits.

Among Detroit Contractors, the success of George A. Fuller Company, 504 Penobscot Building, stands out conspicuously.

The George A. Fuller Company readily acknowledges that one of the reasons for its success during the building crisis of the last year, was the Federal Truck.

The three-and-one-half ton Federal shown in the illustration was on the job every day 365-days-in-the-year, and was one of the reasons for the ability of the George A. Fuller Company to meet the unusual demands laid upon it. If the building contractor will talk with others in his field he will soon find that the opinion of Federal service, and Federal reliability, and Federal stamina, is shared generally by the trade.

Traffic News, the Magazine of Haulage, Sent Free On Request

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"Shorten the Miles to Market"—"Use Motor Trucks"

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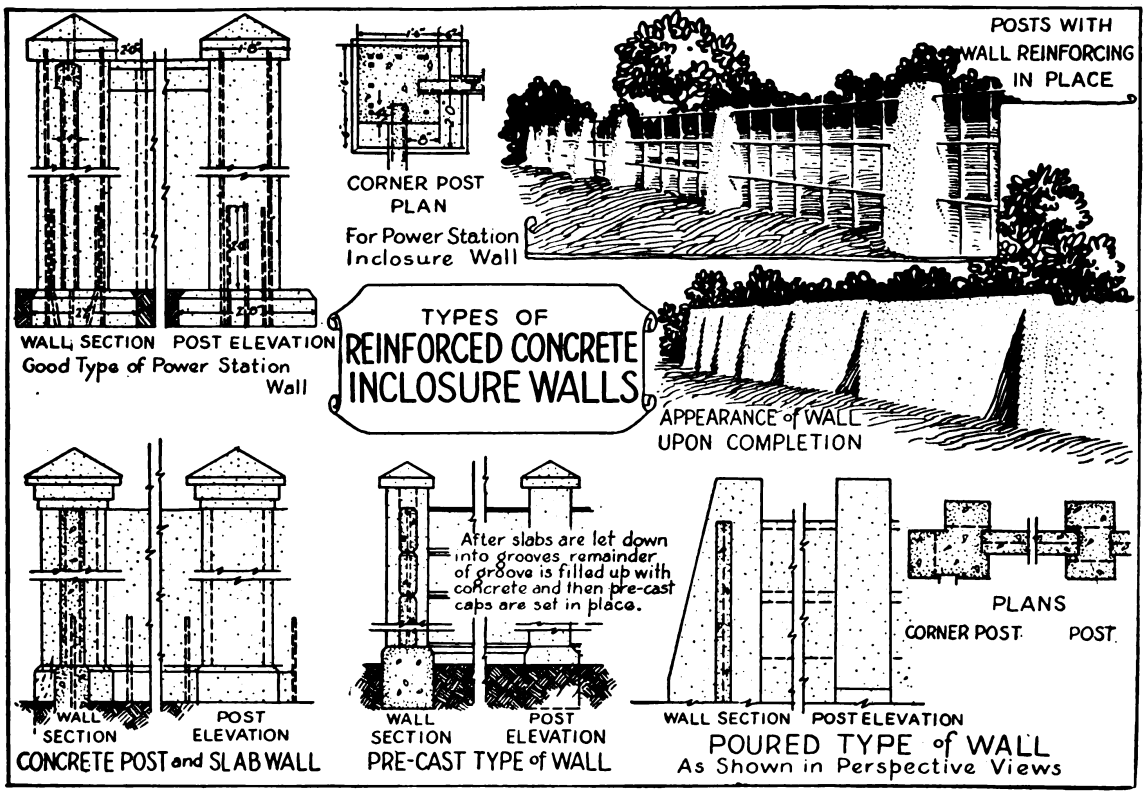

The above illustration gives an idea of the practical suggestions offered by the **ALPHA** Blueprint Service Sheets and Special Bulletins, which cover the following concrete improvements:

Workingmen's Homes	Spring House	Inclosure Walls	Tanks and Troughs
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Bridges and Culverts	Ice House	Storage House	Coal Pocket Post and Walls
Foundation and Hatchway	Manure Pit	Smoke House	Walls, Sills and Lintels
Gutter and Curb	Septic Tank	Hog House	Garages and Runways
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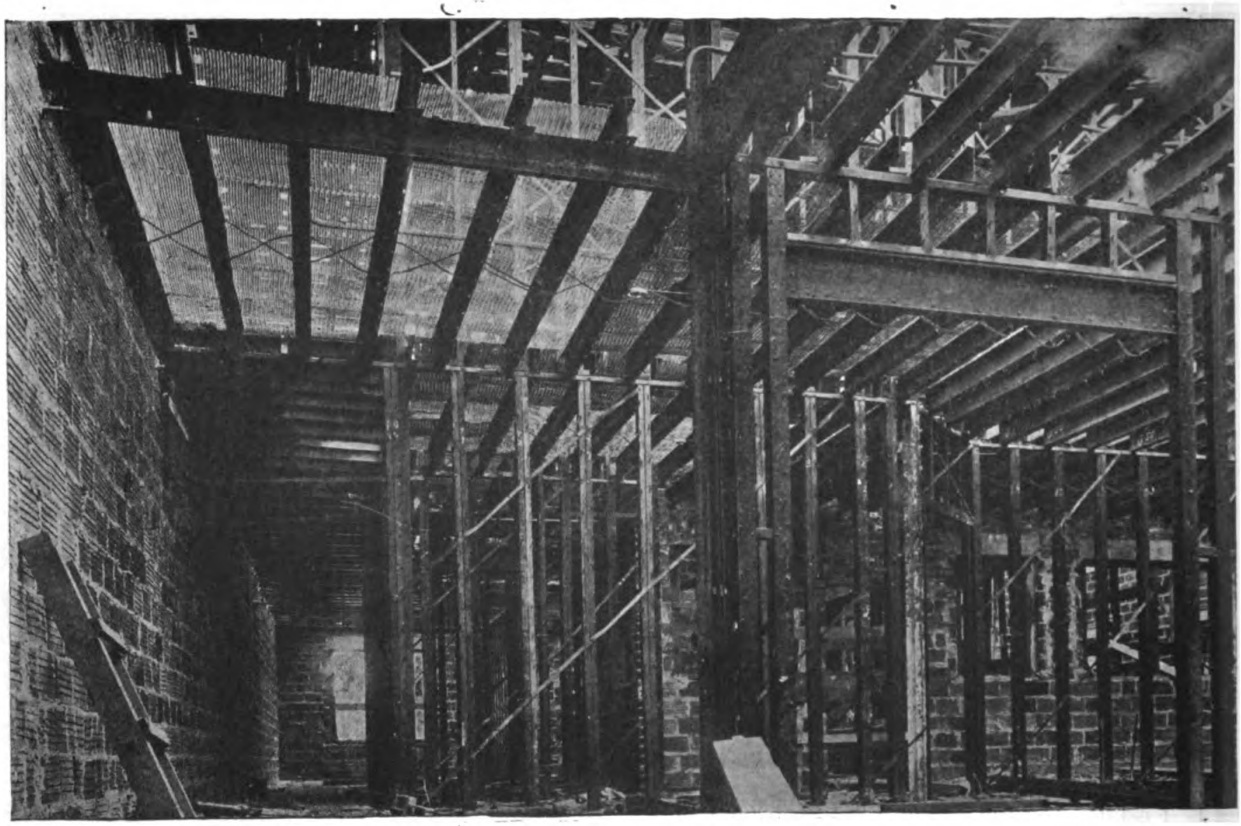

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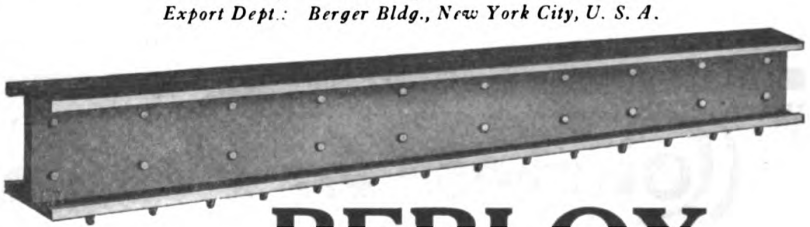

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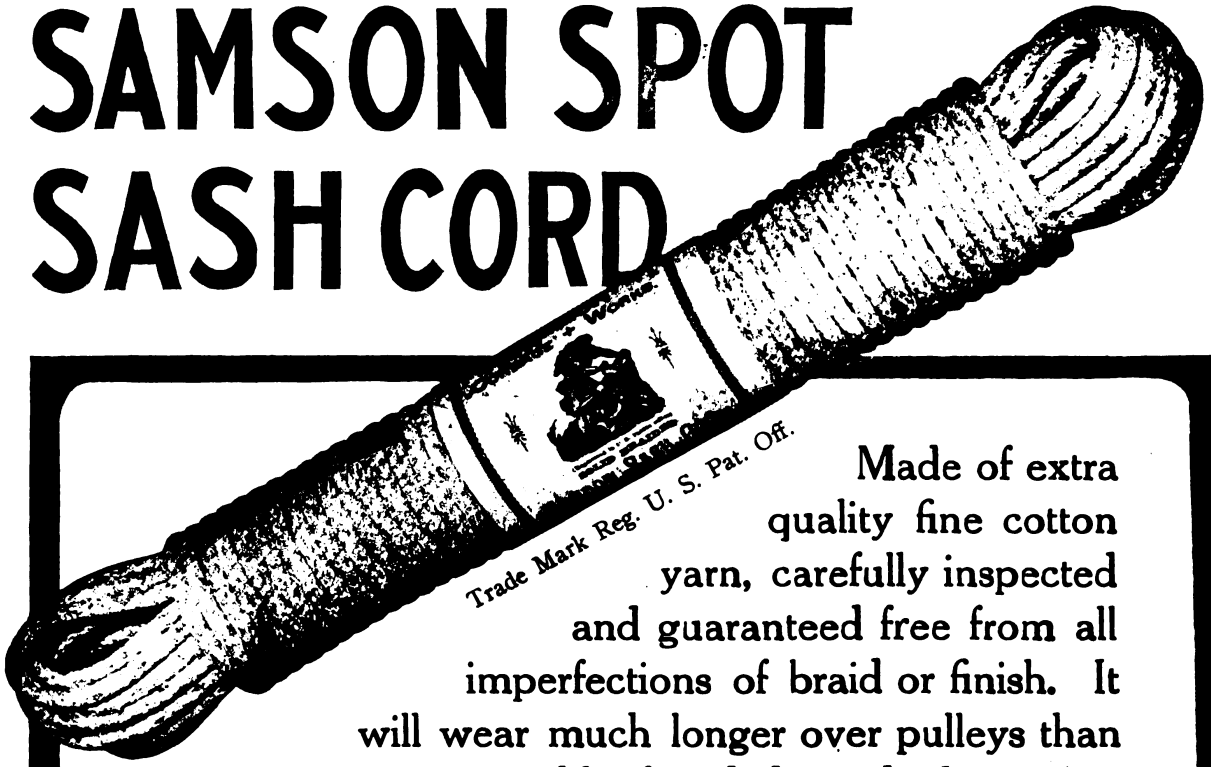

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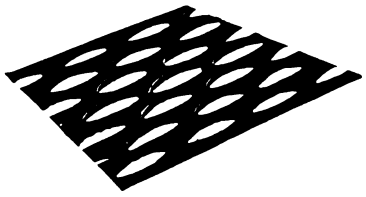

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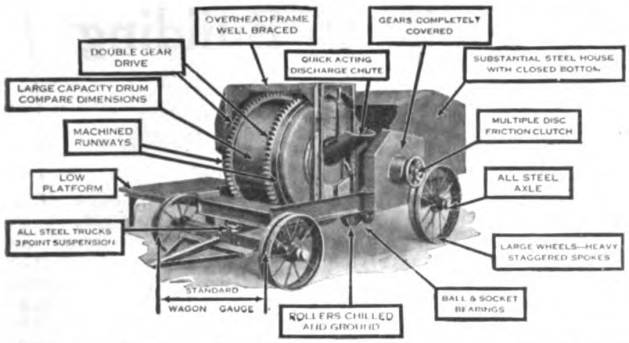



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4 cu. ft. and 7 cu. ft. capacities Wet Batch Rating. No. 104-S, gasoline, No. 107 - S, steam or gasoline. *May be equipped with low charging platform, power charging skip, automatic water-measuring tank and light duty hoist,*

The Big Yardage Mixer for Footings, Sidewalks, Silos, Culverts, Etc.

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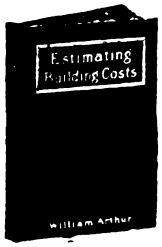
A List of "Guaranteed" Books on Building

Money Back If They Are Not Satisfactory

Arthur's Estimating Building Costs

This book contains the most authoritative and comprehensive data on figuring labor and material on building work ever published in a book of its size or price. The builder who starts contracting does not treat himself squarely if he fails to purchase the experience of many contractors in all lines of building work. It is all well enough and necessary to get experience of our own; but to fail to get that of others when it may be had at a low price is unwise.



In modern engineering, architectural and contracting offices there is not time to teach estimating to young workers. They are supposed to know something about the fundamentals, just as they know that there are 27 cubic feet in a cubic yard. If they do not know they must, at least, be able easily to find the information. The index of this book is arranged to serve them. Why get "stuck" when an investment of $1.50 will save you both time and worry? You may not know how much material you actually need to send per cubic yard of concrete at various proportions, but if you can turn to the table that gives the quantities you are not apt to be hindered. With your time worth a dollar or more an hour just think how soon you would save the price of the book.

Quite frequently people come into a lumber office and ask what amount of material is required for certain parts of a building. The lumberman often knows, but sometimes forgets. This book, Estimating Building Costs, gives quantities for all purposes. If a customer has received the wrong kind of information and has taken home too much material he is displeased, because he has spent more than he needed to, while if he did not get enough material and has to return for more, he feels just as sore about it. Is it worth while to run the risk when a dollar and a half will give certainty?

It should be remembered that this book is based on work actually done and time taken. Different conditions change the necessary labor time, as excavating in frost compared with the work in summer; but a fair average can always be made out if we know what others have actually done.

This book is arranged to be of great service to builders, contractors, students and instructors. Each chapter has a series of questions for a test of progress. The Key is printed at the end of the book. In technical classes of colleges and Y. M. C. A.s this feature will be appreciated. For certain requirements Estimating Building Costs is a superior book to even The New Building Estimator. It is written on simpler lines, and is new from title page to the end.

The book begins with the excavation and ends when the house is finished. The chapters are: Excavations and Piling, 7; Concrete, 18 pages; Brickwork, 24; Stonework, 7; Plastering, 5; Metal, 9; Roofing; Painting, 9; Plumbing and Heating, 7; Miscellaneous includes Hardware, Electric Wiring, Tiling, Bonds, Tables, Rafters, Cisterns, Weights, Comparisons of Cost between Brick and Frame Buildings, 18; and a final chapter entitled, Hints on Drawing, taking up 41 pages.

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The work is of a size to be readily carried in the pocket, and the 14 pages of cross reference index will be found a most convenient feature for the man in a hurry to find a specific matter.

The chapter on Carpentry gives the number of board feet and cost of framing lumber per square of 100 sq. ft., and many valuable tables, including timber measure, common and hip rafters for roofs of various pitches and with from one to eighteen feet run, the safe bearing loads of timber and yellow pine costs. Reliable data on figuring the strength and weight of materials are also given.

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It tells how to estimate, step by step, the cost of labor and materials, from the work of excavation for the foundation to the finishing of the building. It gives a careful analysis of each item of cost in construction, all being demonstrated in progressive order and by means of figures and rules.

These methods of figuring costs are brought out in the clearest and simplest manner, and may be applied in estimating the cost of constructing any dwelling, stable, barn or outbuilding.

The author has endeavored to make this book so general in its scope that the builder living in any part of the United States will find it of great service in getting the actual cost of the different items in builders' work.

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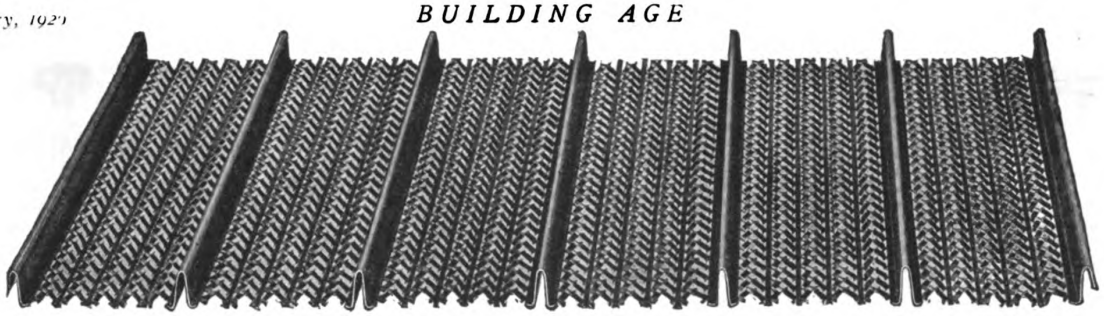

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are much less expensive than other types of permanent construction, and much more economical than old-style constructions which rust, decay and require constant maintenance.

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Our new Hy-Rib Book is free to all who plan or build. Write for it.

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·YOUNGSTOWN·OHIO· WAREHOUSES AND SALES OFFICES IN PRINCIPAL CITIES
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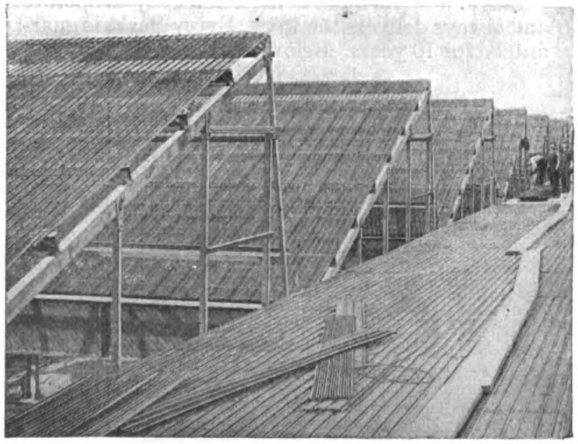

Hy-Rib Saw-tooth Roof, Oliver Chilled Plow Co., Hamilton, Ont. David Dick & Sons, Contractors. Prack & Perrin, Architects.

Concrete Roofs and Sidings, Industrial Works, Bay City, Mich. Albert Kahn Architect.



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No Time Out for Winter This Year

AMERICA'S need for homes is too great to halt construction this winter to the same extent as in other years. Building must go on and Carpenters and Contractors will profit accordingly.

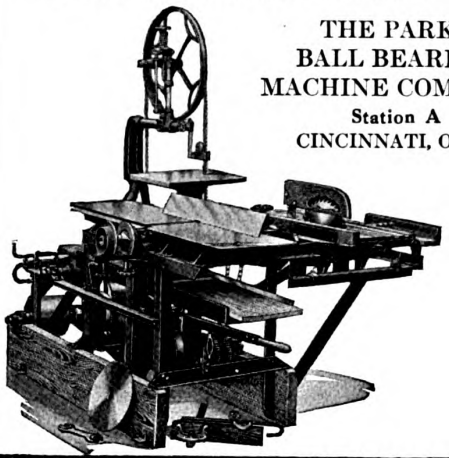
What proportion did you get of the billion dollars spent for new buildings in 1919? How much *more* would you have made had you one or two or more Parks Woodworkers to *multiply your man power* and make you independent of rushed-to-death Planing Mills? Two-thirds of that billion dollars went to labor. If you had a Parks Woodworking Machine which *doubles* and *trebles* your labor production how much more than you did could you have gotten for your labor?

Building production must be maintained at a high rate the winter through. It is not too late to put a Parks on the job. Let it help you execute contracts you are now afraid to tackle. Let it make your time count twice as big.

A Parks is light—take it from job to job. Made of strong angle steel, stoutly reinforced, it saws, planes and joints miles of material. Easy to operate and always delivers the work. Every Parks is guaranteed for 10 years. Below is shown the

Pride of the Shop

A sound, rigid, portable Woodworker that stands up year in and year out in daily service. Almost vibrationless. Operating cost next to nothing. Repairs negligible. Combines self-feed 12-inch Pony Planer and Jointer, Circular, Rip and Cross Cut Saw, Band Saw, Rounder and Boring Machine.



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CINCINNATI, OHIO

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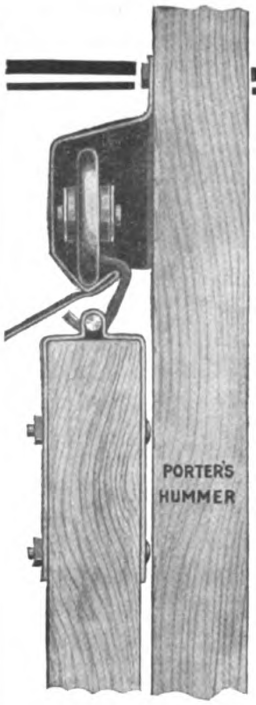

The Trade-Mark That Means Full Satisfaction

The contractor knows that in a Porter Product he is assured of the quality that makes for satisfaction.

Fifty years of co-operation and knowledge of his requirements have built around the Porter Trade-Mark a complete confidence.

And the confidence is warranted. For back of the Trade-Mark is the Porter pledge of satisfaction.

PORTER Barn Door Hangers

Porter Barn Door Hangers have all the superiorities, all the betterments that have built up the Porter prestige.

Important points are exclusively Porter's—the whole represents all the Porter distinction of thorough workmanship, superior materials, time-tested design.

They are of a quality of steel that will not sag with the weight of the door for which they are made.

They are of a design that makes them waterproof and bird-proof.

They operate easily because of their doubled running surface and the roller bearings of their wheels.

Write for our free catalog on door-hangers. Let us tell you more fully of the advantages of the "Hummer" and other styles. Or ask for our "Barn-Planning Service Book."

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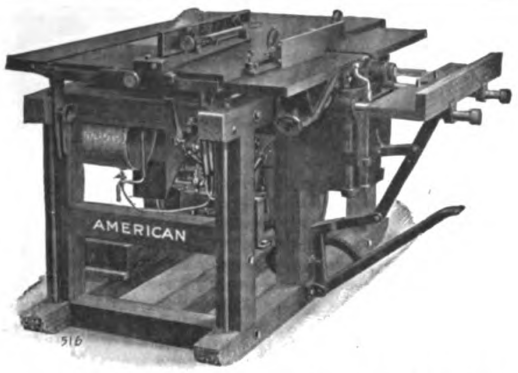

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Two Sturdy, Vigorous

"AMERICANS"

To Cut Your Costs

THEY will bring you a steadiness, a reliability, a capacity for extra work, that will mean dollars in your pocket. They will demand little of your attention but give you a tremendous return in high-class, high-speed work. Look into their merits—compare them with others offered you.

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American Saw Mill Machinery Co.

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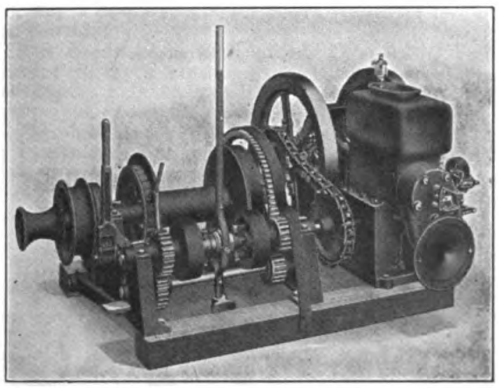

"American" No. 4 Hoist with Self-Contained Gasoline Engine; Also Furnished with Electric Motor or for Belt Drive



In the year to come as never before, Industry will be the controlling factor in the affairs of this Nation And to Industry now as always The L·S·Starrett Co. acknowledges its indebtedness and reaffirms its policy of cooperation through service.

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Starrett Tools

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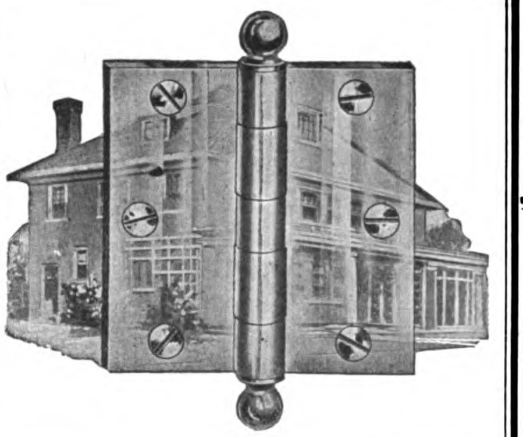

Your

ATTENTION!!

is called to the hinges on the door. To some people door hinges may seem rather small and unimportant—nevertheless, their mission in helping to make or mar the appearance of the rooms in a modern home is worthy of serious thought. The

GRIFFIN

"The Door Butt of America"

is designed along lines that insure both beauty to the home and *service* whenever the doors are opened and closed.

The Griffin operates freely and easily, it is amply strong for heavy doors and it is such a pleasing fixture that architects and home builders are glad to specify and use it.

Being finished in the various Griffin hardware finishes, it is in wide demand for the better class of houses and office buildings.

Send for illustrated catalog and circulars.

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45 Warren Street, New York
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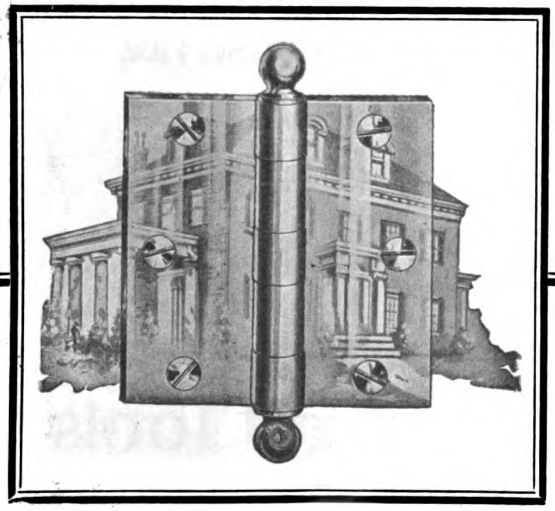
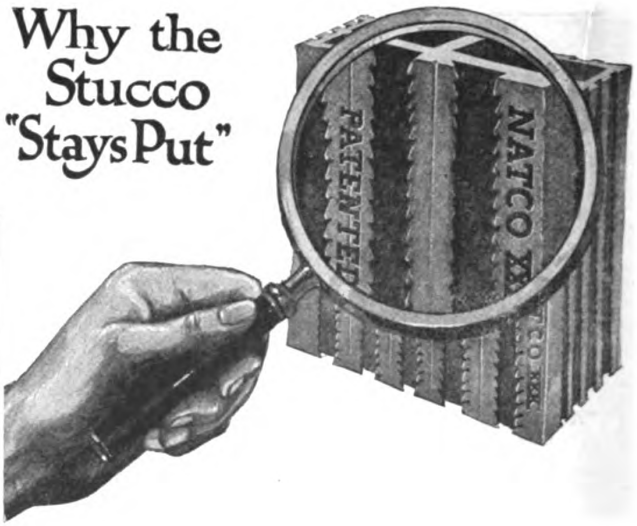


Why the Stucco "Stays Put"



THE deep dovetail scoring in every unit of Natco XXX gives both stucco and plaster the needed chance to get a real grip.

And it's an everlasting grip.

For Natco is not metal.

Nor is it wood.

It's a burned clay product that never corrodes, will not warp or absorb moisture, and cannot burn.

Other advantages of Natco are its minimum weight with maximum strength—hollow air spaces that provide a wall with perfect insulation against moisture, heat and cold,—indestructibility—economy.

We maintain an engineering department to assist you on any building problem at any time.

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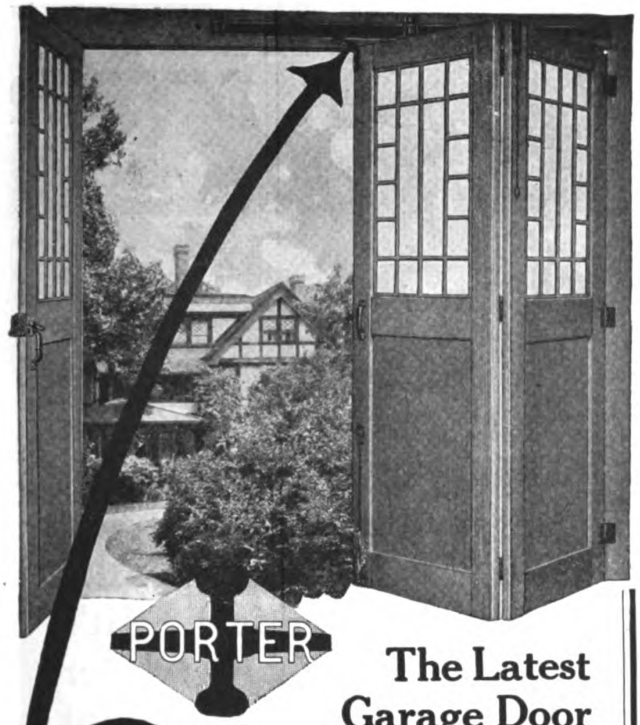
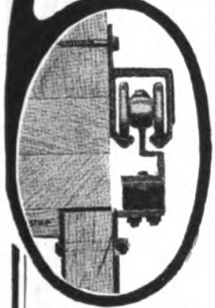


The Latest Garage Door Track Refinement



Shows Offset Swivel and Sectional View of Track and Hanger

Specify Porter's "Straight-Away" Garage Door Track and Hanger, and you have provided for space-saving, inward folding-sliding doors that have every desirable advantage.

The extra cost and extra labor required for installing the curved track hanger are eliminated, because of the Porter *Offset Swivel.* This permits the roller bearing truck to roll on a straight track. Doors easily open and close. Friction is reduced to minimum. Ice can't jam the sills. Perfect fit of doors against jamb and weather strip is insured. Storms can't blow in doors hung with "Straight-Away." Slotted holes in door strap provide for quick and easy adjustments when desired or necessary.

The "Straight-Away" is made primarily for standard doors 2 ft. 8 in. x 8 ft., but it will do just as well for any 3 doors specified. Extra length of track can be provided.

The complete outfit is packed in a strong carton, except the track which is packed separately. Requires no expert help to install it. Screws are placed in envelopes and plainly marked where they are to go.

"Straight-Away" is backed by a guarantee that protects both you and your client. Write for further information.

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798 Guion St., Ottawa, Ill.

THE
STRAIGHT-AWAY
No Sag
Garage Door Track & Hanger

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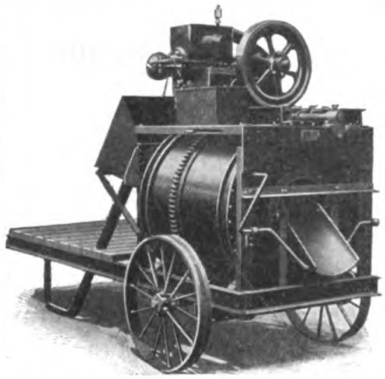
You need fewer men with *ARCHER MIXERS*

FEWER MEN—The Archer will do away with three or four men to every gang. It is the original end-discharge mixer. No wheelers needed.

SPEED—Works faster, mixes better. One man can move it and it does not need a team to take it from place to place. Made in one-bag and half-bag sizes.



Why worry about men? Get an Archer Mixer and get along with a smaller crew.

Send Coupon Below for Free Booklet

Let us tell you how much more profitable it is for you to have one or two small Archers do your work than one big expensive machine. Send the coupon.

ARCHER IRON WORKS

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We make the Archer Dump Body and Hand Hoist. They are ideal for contractors' bulk hauling—sand, gravel, excavations, paving, coal, etc. The body is built with great strength, and a pull of only 20 pounds on the hoist will dump a 5-ton load in 2½ minutes. One ton in 30 seconds. Ask us for particulars and prices.

➡ Tear Out and Mail This Coupon ⬅

Without any obligation on my part, please send me your free booklet as offered above.

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Address .....

2442



MIKE and Ike, "boys in uniform," are going to strike. Mike—the tough looking citizen on the left—is reading the riot act to his playmate Ike. Gentleman Ike is skeptical. "It's going to be a hard winter Mike," says Ike. "We might as well be making little ones out of big ones until next spring, then make a *clean getaway.*"

All of which reminds us that contractor-builders should be preparing for a clean getaway, too, next spring.

Consider the minor details of construction—such as sash chains—*now* and write MORTON for further information.

Morton Sash Chains, pulleys, etc., are made right. Strength and Durability are the important features.

Address Desk B-A for quotations.

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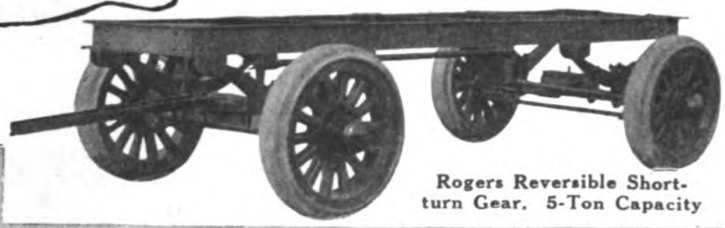
Figure your Hauling Costs

No matter how efficient your workmen are and how fast they work, they would earn more for you if there were no loss of time in transporting your lumber and material.



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A Ford car or any inexpensive automobile and a Rogers Light Trailer will do the trick just as well.

For heavier hauling there is a trailer that will exactly suit your needs.

Rogers Trailers are All-Steel. They are made to stand hard usage.



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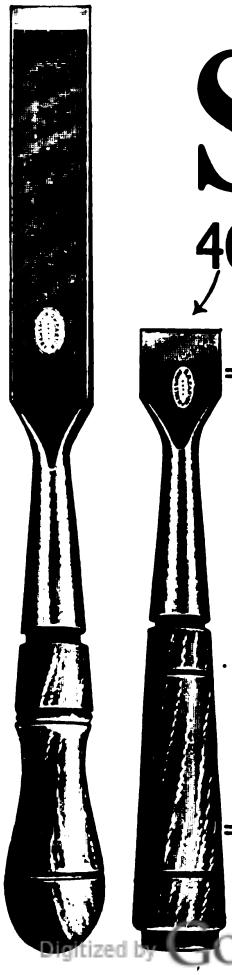

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WORN? Of course it's worn. Note the two cuts made from photographs of a new BARTON Chisel and one that has been in almost daily use for forty years.

The owner has had the pleasure of using a fine tool with a keen hard edge for forty years. That's economy—it's also comfort. This is typical of the service given by BARTON Planes and Keen Edged Tools.

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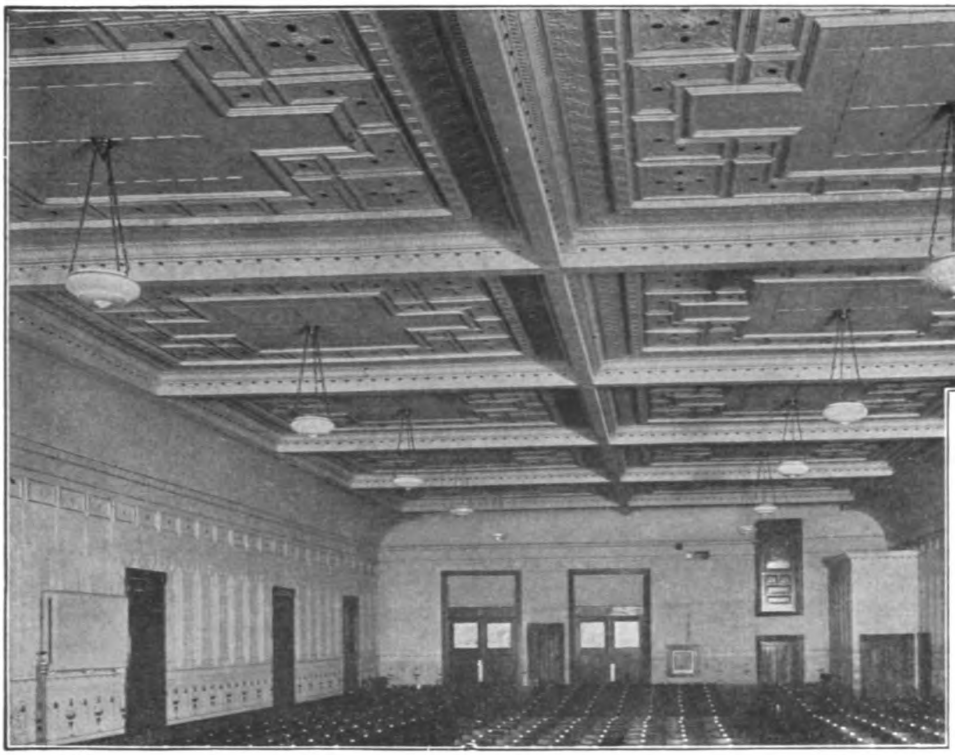

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Fiberlic Wall Board

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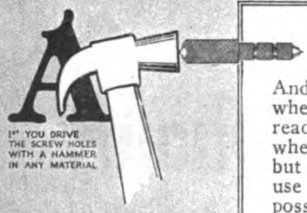

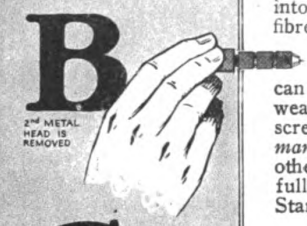



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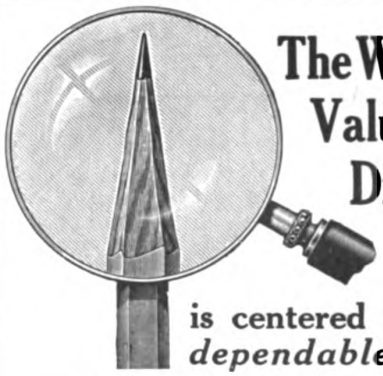

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is centered upon a *dependable point*

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Why not? Construction of new buildings should not be permitted to lag on account of lower temperatures. The shortage of homes and other buildings is scarcely less than last spring. An all-year-'round material is available.

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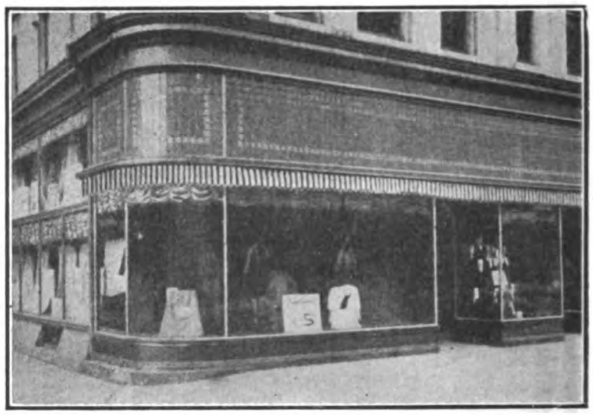
IMPERISHABLE STUCCO

Can be successfully applied regardless of cold weather. It is a non-freezing, all-mineral composition; the original magnesite stucco, peer among plastic building materials. Produces beautiful finished structures at moderate cost which are proof against fire and water, frost and decay. Let us tell you about this timely solution of present building needs.

NATIONAL KELLASTONE CO.
Room 517, 155 E. Superior St., CHICAGO, ILL.



You can make big money remodeling store fronts

With the COULSON Plan it is a very simple job to modernize an out-of-date store front. We furnish everything complete, ready to install. Many new and exclusive features—patented, too.
Write for catalogs and blue prints. You incur no obligation.

J. W. COULSON & CO.
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Plenty of Hot Water



The first essential in a well planned home

ECONOMY

Combination Boiler and Gas Water Heater with Positive Thermo Valve Control

A reasonably priced piece of equipment which renders instant and continuous hot water service on the storage principle, with a marked saving in consumption of gas. Specify for the bungalow, residence, two-flat building, three-story detached apartment, club and play-ground showers, factory lavatories, restaurants, etc.

Refer to Sweet's Architectural Catalogue for specifications, size, suggestions, etc., or write us for full information.

Economy Heater Co.
108 So. LA SALLE ST.
CHICAGO, ILL.



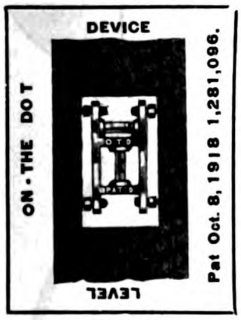
Winter!

And a coal shortage. And prices going up. What's the answer? Conserve the coal supply. Reduce fuel expense 25% by using weatherstrip. Almost every home in your locality is a prospect. Our weatherstrip is scientifically designed, of good material and easy to install. We help you to make sales. Ask for detailed information.



Allmetal Weatherstrip Co.
122 Kinzie Street
CHICAGO

ON THE DOT
LEVEL DEVICES



This remarkable little leveling device is just the instrument carpenters, builders and mechanics have long been waiting for.

Where the job requires a level bar of considerable length and absolute accuracy, O-T-D level devices are of particular advantage.

O-T-D is a small instrument about three inches in length that can be mortised into any board (picked up on the job) making a perfect level or plumb bob. The cut shows how the O-T-D level device is mortised into a board of any length desired and is adjusted by four set screws—one at each corner—which hold it firmly in place.



O-T-D does away with the old-fashioned inaccurate plumb bob—saves time and trouble and makes for speed and accuracy.

Price $3.00 at your dealer or direct

Write us today

CHAS. M. NEIMES SALES COMPANY
30 North Dearborn Street
CHICAGO, ILLINOIS

RAIN, snow, sun and sleet! They are Time's workers of ruin to houses. If you are working with brick, concrete or stucco make the job waterproof and attractively brilliant with Bay State Brick and Cement Coating. Either a clear, crisp white or one of the many alluring Bay State tints on the walls, will swell you with pride.

Our Book No. 19 and samples will surely convince you.



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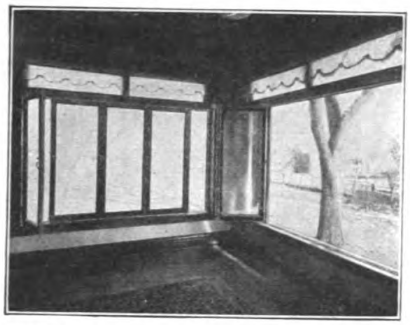
The Casement Window You Really Want



for the sun-parlor, sleeping porch, bungalow, sanitarium and other similar installations, operates on

AIR-WAY

Multifold Casement Window Hardware

Slides and folds sash horizontally. Windows operate smoothly, positively and under perfect control. Close storm tight. Entire window may be thrown open, or one or more sash, as desired.

Sash open inside. Screens or storm windows applied outside. Windows easily cleaned.

Send for handsomely illustrated pamphlet, NC-2, containing description and details. Sent to anyone interested without obligation.

Richards-Wilcox Mfg. Co.

A Hanger for any Door that Slides

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LONG-BELL

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White Oak Piling,
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Southern Pine Timbers and Lumber, Bridge Timbers, Piling and Poles, Wood Blocks, and Fence Posts.

These special materials for heavy construction all bear the Long-Bell trade mark, the user's assurance that he is receiving the product of modern mills and skilled workmen.

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Lumber

Edwards' Metal Shingles

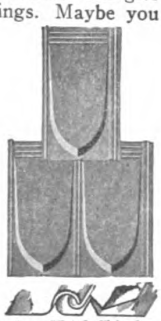


Will Outlast Your Building

ROT-PROOF—FIRE-PROOF—LIGHTNING-PROOF

We want a good, live man to represent us in each locality—to push our surpassing line of Metal Shingles and other up-to-the-minute metal roofings. Maybe you are the very man to take hold of

Edwards' Metal Shingles
in Ten Popular Patterns



Edwards' Metal Shingles are attractive, durable, water, wind and fireproof. There's a design to suit every taste. They are easily laid, the only tools needed being hammer and nails. And the patent Interlocking Device provides automatically for expansion and contraction.

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RATCHET DRIVER
No. 10
SAVES TIME AT EVERY TURN

Here you have— an easy working ratchet, right hand, left hand (and rigid), a comfortable handle and with a l a strong and serviceable driver.



Made in 8 lengths of blade, from 2 inch for small screws, up to 12 inch suitable for all kinds of high power house carpentering.

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A Growing Number of People Prefer Sheldon's Slates to any other roofing

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SHELDON'S SLATES
RED GREEN, PURPLE, BLACK

cost no more than an ordinary shingle roof—or a roof of Asbestos or asphalt shingles—and their life is immeasurably longer; they never wear out.

The booklet illustrated contains interesting facts for the man about to have a new roof put on or an old roof repaired. It is also a splendid thing for the roofer to give to his roofing prospects. Copy on request.

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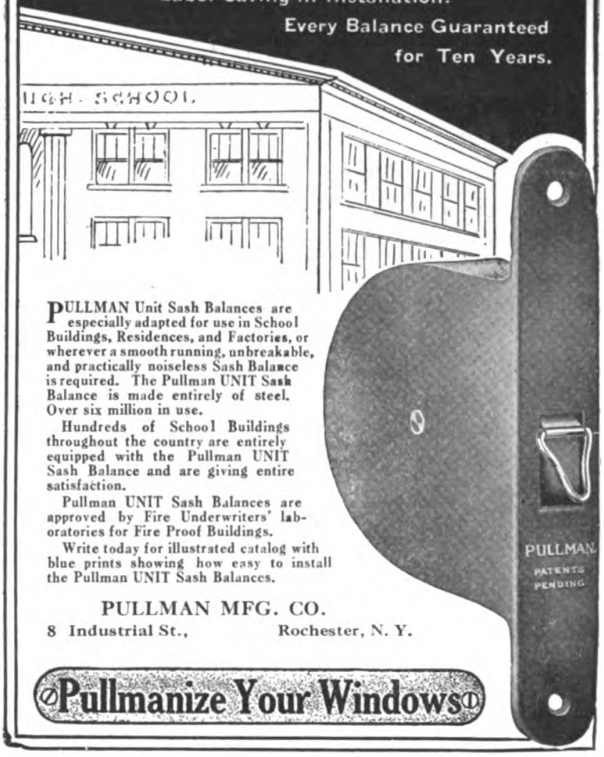
Cost Less than Cords, Pulleys and Weights.
Labor Saving in Installation.
Every Balance Guaranteed for Ten Years.



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Pullmanize Your Windows

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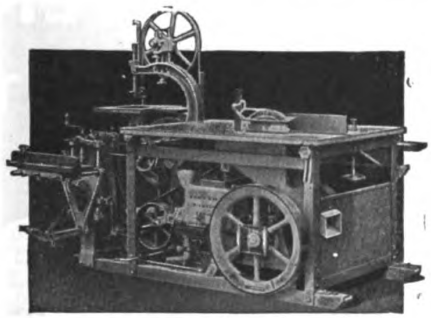
C. H. & E. Portable Saw Rigs



No. 6 Portable Saw Rig

A complete combination woodworker with engine or electric motor "built in" and under the table. Write for price and large new catalog just off the press.

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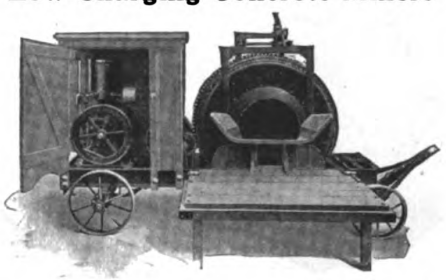
ALLIED — ALLIED CONSTRUCTION MACHINERY CORPORATION — ALLIED

"THE STANDARD"

Low Charging Concrete Mixers



Increase Production—Cut Costs

Speed and thorough mixing are the most important points to be considered when you are in the market for a concrete mixer. The faster you can place thoroughly mixed concrete, the more money you will make on the job.
"The Standard" Concrete Mixer is adapted to every sort of a building project.
In addition to Concrete Mixers, "The Standard" line includes Hoists, Pumps, Air Compressors, Wheelbarrows, Engines, Block Machines—everything needed by the contractor.

Ask for Catalog No. 48 and specify the particular items in which you are interested.

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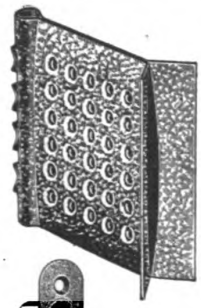
SPECIALTIES FOR BUILDERS





Niagara and Niagara Junior Wall Plugs, galvanized Niagara Veneer Ties 4½", Wall Ties 7½", also 12" Single and 12" Double Width, galvanized. Niagara Major Veneer Ties 13/16" Wide. Sash Pulleys, Sash Chain, Sash Fixtures. Brass Chain Window Shade Pulls with Rings. Steel Chandelier Chain, Old Brass and Antique Copper finishes.

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"Star" Ventilators
PATENTED

Exhaust foul air continuously without operating expense. This facilitates a current of fresh air that is indispensable for persons confined within buildings.

The U. S. Government adopted the "Star" Ventilator as its War Standard on account of its efficiency.

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A Truly Remarkable Tool

for smooth, round, oval or square boring, scroll and twist work. Takes but little practice to put this tool to many varied uses such as core boxes, fine and delicate patterns, veneers, screen work, scalloping fancy twist columns, newels, ribbon molding and mortising. Just the thing for cabinet makers, carpenters and woodworkers. Write for dealers' proposition.

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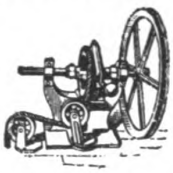
Operated by

hand belt  or electric

ANY CAPACITY

Catalogue and prices on application

J. G. SPEIDEL
READING PENNSYLVANIA

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Lightning Rods



Prevent Lightning Losses

The Shinn-Flat Conductor is the modern, scientific form of Lightning Rod. It consists of a ribbon-like mesh of woven copper wires, one inch in width—distinctive in design—with 36% greater carrying capacity.

The Shinn System has been in use throughout North America for many years, and is endorsed by the leading electrical authorities of the world.

A Chance for Contractors to Earn Extra Money



If ever there was a year when property owners cannot afford to permit their buildings to remain unprotected—it is the year 1920.

The high cost of replacement, and the almost impossibility of securing labor and material, make it folly for any property owner to go through another Lightning season without protection.

There is a big opportunity in every community for contractors or builders to make extra money by installing Shinn-Flat on new buildings, as well as on buildings already constructed.

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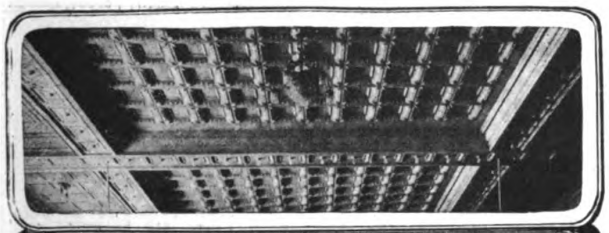

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"boost" your reputation

They make such a fine looking job that people can't help but admire them. The designs are so deep and clean cut—every detail is brought out.

And they are easily and quickly put up—the Pressed Bead and Button construction makes this possible.

We will be glad to give you estimates on a job. Write us today for Catalog D-13.

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Branches
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EXPANDED METAL LATH-FLOOR CORES-REINFORCING PLATES-METAL LUMBER
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A Low-Priced Timkin Bearing Light-Running Holland Trailer

May be attached to either an automobile or truck.

Will handle a half ton of building material, tools or supplies at a minimum expense. Durable and inexpensive.

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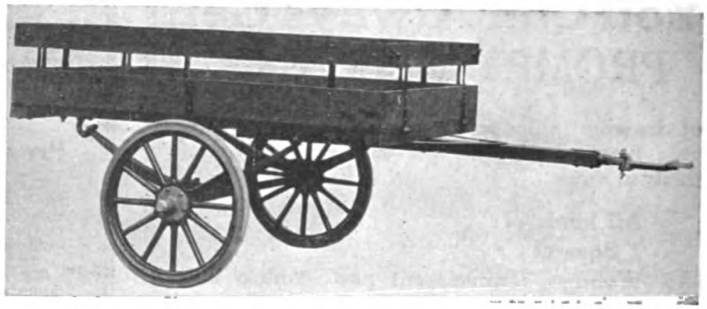

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COPPER STEEL
Galvanized
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We manufacture Sheet and Tin Mill Products of every description—Black and Galvanized Sheets, Corrugated and Formed Products, Roofing Tin Plates, Etc.

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Patent Pending

They have stood the test of time

For use in all classes of new work

Box frames unnecessary

Mortises cut at mill reduce cost of installing. Counterbalance sashes at any given point. They outwear ordinary weights and cords. Unaffected by atmospheric conditions.

Cheapest method for modernizing old windows, as alterations in sashes and frames are not necessary. Sashes should be weighed before ordering.

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"Over 10,500 Plants

including woodworking plants, pattern shops as well as cabinet and carpenter shops, housing projects, etc., have adopted the 'Wallace Idea'; they take the machines to the work instead of the work to the machines. They have thereby eliminated foot work, saved hand work and have made a tremendous cut in their costs, and have greatly speeded production. It would pay you to investigate this idea thoroughly."

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Something For You

in our Pamphlet 29; viz.:

Valuable Tables for finding size of joist, safe load of joist, actual load on hanger, etc., etc.

Some of these Tables are not in print elsewhere.

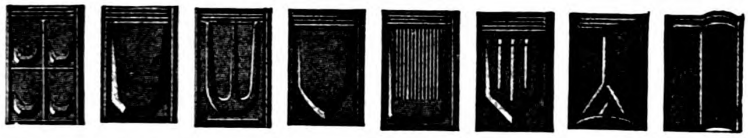
The Pamphlet and the Mounted Model Hanger will be mailed on request.

SOMETHING FOR US. We ask your special attention to items 5, 6, 7 on page 5 of the Pamphlet and to the matter on pages 23 and 24 relating thereto.

The W. J. Clark Co.
Salem, Ohio, U. S. A.

Walter's and Cooper's Metal Shingles

The Shingles That Last



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The Most Complete Line of Designs **The Best Material, Workmanship and Finish**
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In your section there are hundreds, perhaps thousands, of buildings which need a coat of stucco, as also new ones. With this machine, applying stucco, plaster, etc., by centrifugal force, you can do this work cheaply, quickly and well at a good profit to you.

Full information on request

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10,000 builders are using from one to eight of our different machines.

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IMPROVED CIRCULAR SAWING MACHINE

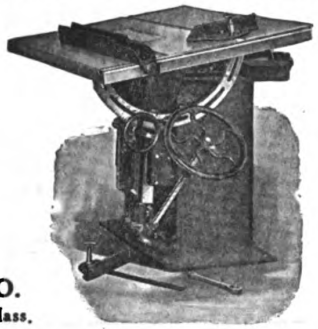
With solid frame and tipping table

APPLICATION ALMOST UNLIMITED

Table can be adjusted to an angle up to 45 degrees.

Send for circular giving full information.

We also make wood boring machines in two sizes.



R. E. KIDDER CO.
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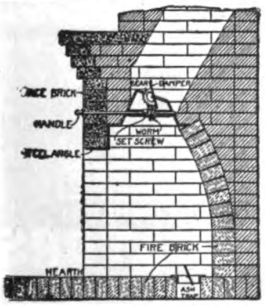
Recommend

MORGAN Doors

no matter what the size of the house and you'll always have satisfied customers.

MORGAN SASH & DOOR COMPANY
Dept. 85, Chicago

Factory: Morgan Co., Oshkosh, Wis.; Eastern Warehouse & Display, Morgan Millwork Co., Baltimore. Displays: 6 East 39th St., New York; 309 Palmer Bldg., Detroit; Building Exhibit, Ins. Exch., Chicago.



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Don't try to reduce the cost by leaving out a good damper. It results in an expensive fireplace to operate and allows rain, wind, birds and other objectionable things to enter the room when the fireplace is not in use.

Stover Dampers support the brick work, form a smooth throat, regulate the draft perfectly, and reduce the labor cost of erecting fireplaces.

The price is low enough so a Stover Damper can be used in every fireplace. Made in several styles for all size openings. The improved style shown above is one of the most popular.



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Improved Style
Made in 7 sizes

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We also make windmills, feed mills, gasoline engines, hinges, pulleys, saw vises, latches, sink brackets and other hardware.

STOVER Mfg. & Engine Co.
Freeport, Illinois

Stover Mfg. & Engine Co., 747 East St., Freeport, Ill.
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Look them over, anyway, and see the difference.
You can *see* the quality.

The old-fashioned Quality

The L. & I. J. WHITE CO.
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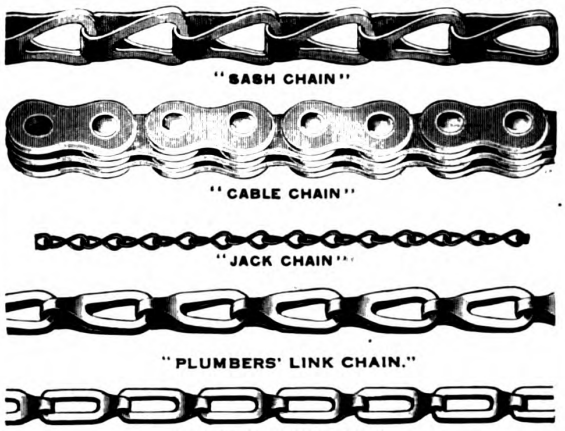
ORIGINATORS OF SASH CHAIN **CHAINS** CONTRACTORS WITH THE UNITED STATES GOVERNMENT FOR 40 YEARS



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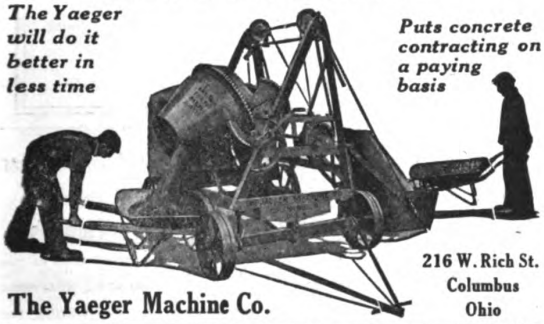

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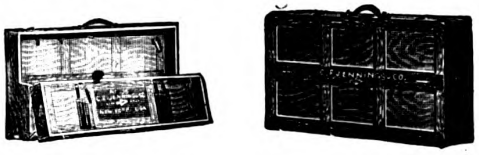

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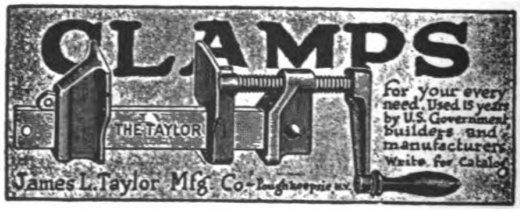

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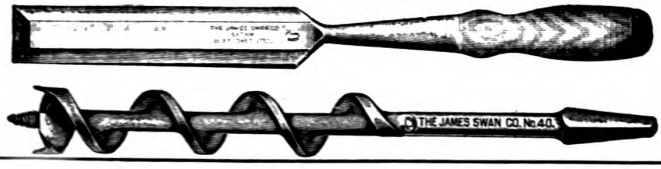

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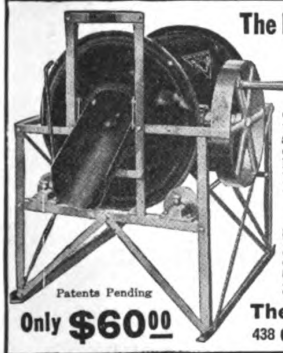

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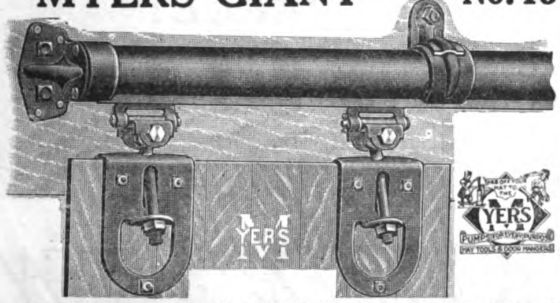

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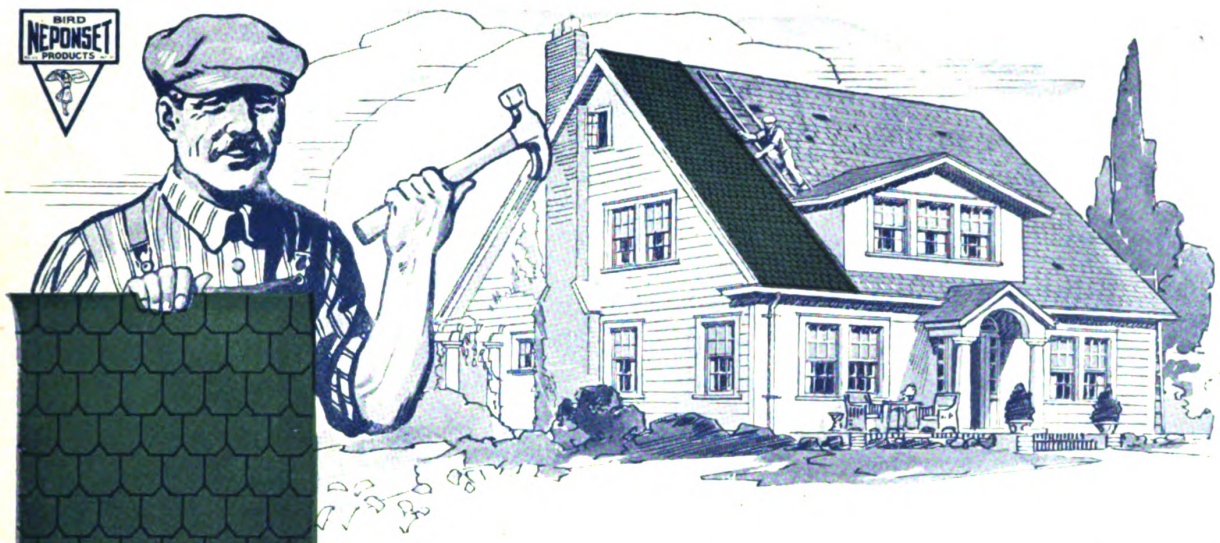

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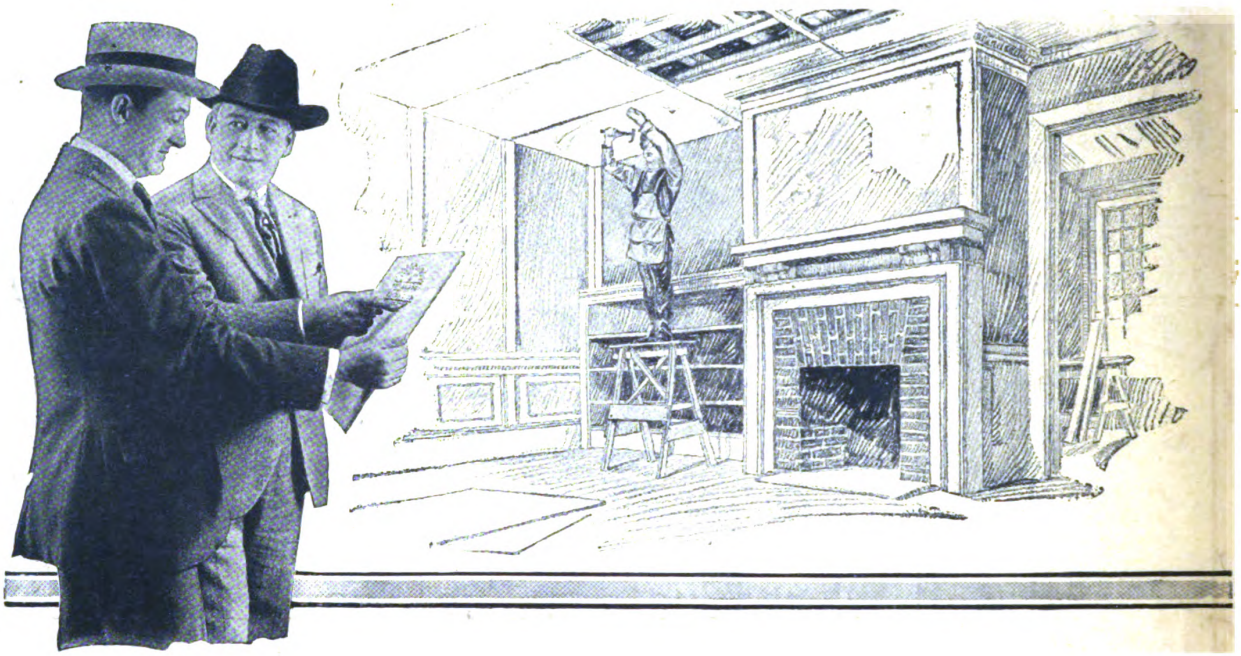

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1. Whittle or saw it! It looks, feels and works like lumber.



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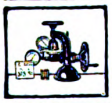
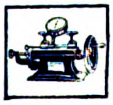


4. Official Government testing machine proves Upson Board withstands breaking test of nearly 400 pounds to the square inch.



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"WHENEVER I pick up a piece of wall board, I look at the center first of all, because if the board hasn't a blue center, it isn't genuine Upson Board.

"I have learned—as every builder has—that genuine blue-center Upson Board is the most dependable wall board made in America."

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Like other products, which have won out through superior quality — Upson Board has many imitators.

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Upson Board is really "artificial" lumber—for it is made entirely of spruce and other pure wood fibre, fabricated under enormous pressure into laminated boards of uniform thickness.

Then each panel is subjected to the original Upson method of scientific processing whereby each panel is kiln-cured, water-proofed and surface-filled.

This process insures supreme strength and maximum satisfaction.

Upson ads boost the carpenter

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One year—five years—or ten years from the time you put Upson Board on your walls and ceilings you will be satisfied with the job.

The Upson Company has had less than one complaint to every 3,000,000 feet of Upson Board sold and used.

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Upson Board usually cuts the cost of painting in two because its surface is properly primed and is free from wax or grease.

Upson Board resists moisture and ordinary leaks because it is properly water-proofed with high grade oils and gums.

It comes in many different lengths and thicknesses for a hundred different uses.

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No matter where or how you want to use fibre-board, for your own protection, insist on blue-center Upson Board — the board that is different. The Upson Company, 63 Upson Point, Lockport, N. Y.

Better than plaster for walls and ceilings — especially for re-covering unsafe or unsightly plastered ceilings.

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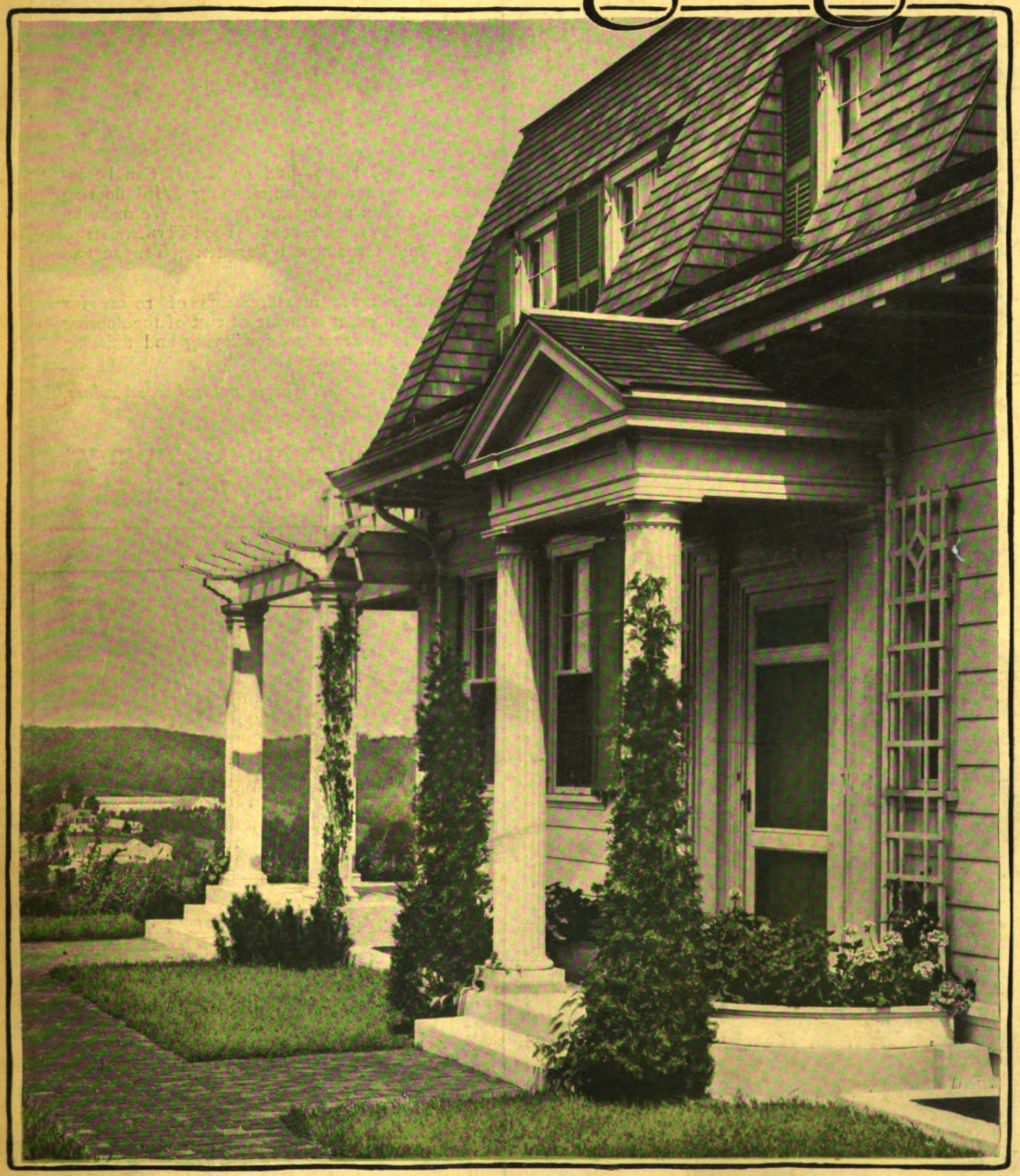

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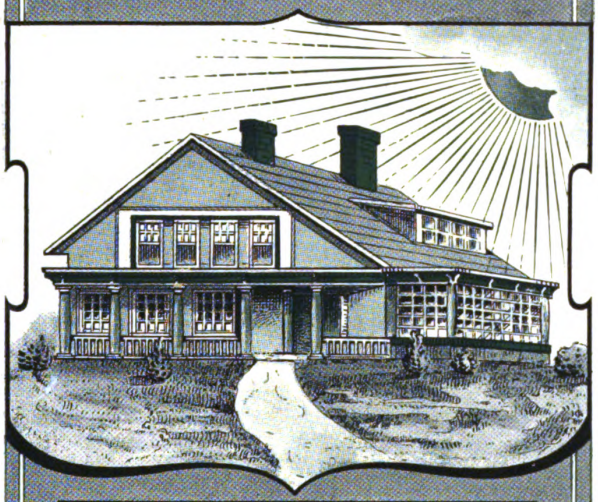

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Wherever an economical, durable, attractive covering is needed—
Consertex Canvas Roofing will give satisfaction. It's a chemically treated heavy cotton fabric which will not crack, stretch, shrink, curl or peel. It's easy to lay and profitable.

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Send accurate measurements of rooms for sketch with exact estimate of cost of the flooring required. Instructions for laying and finishing accompany all orders shipped.

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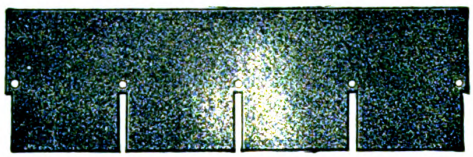

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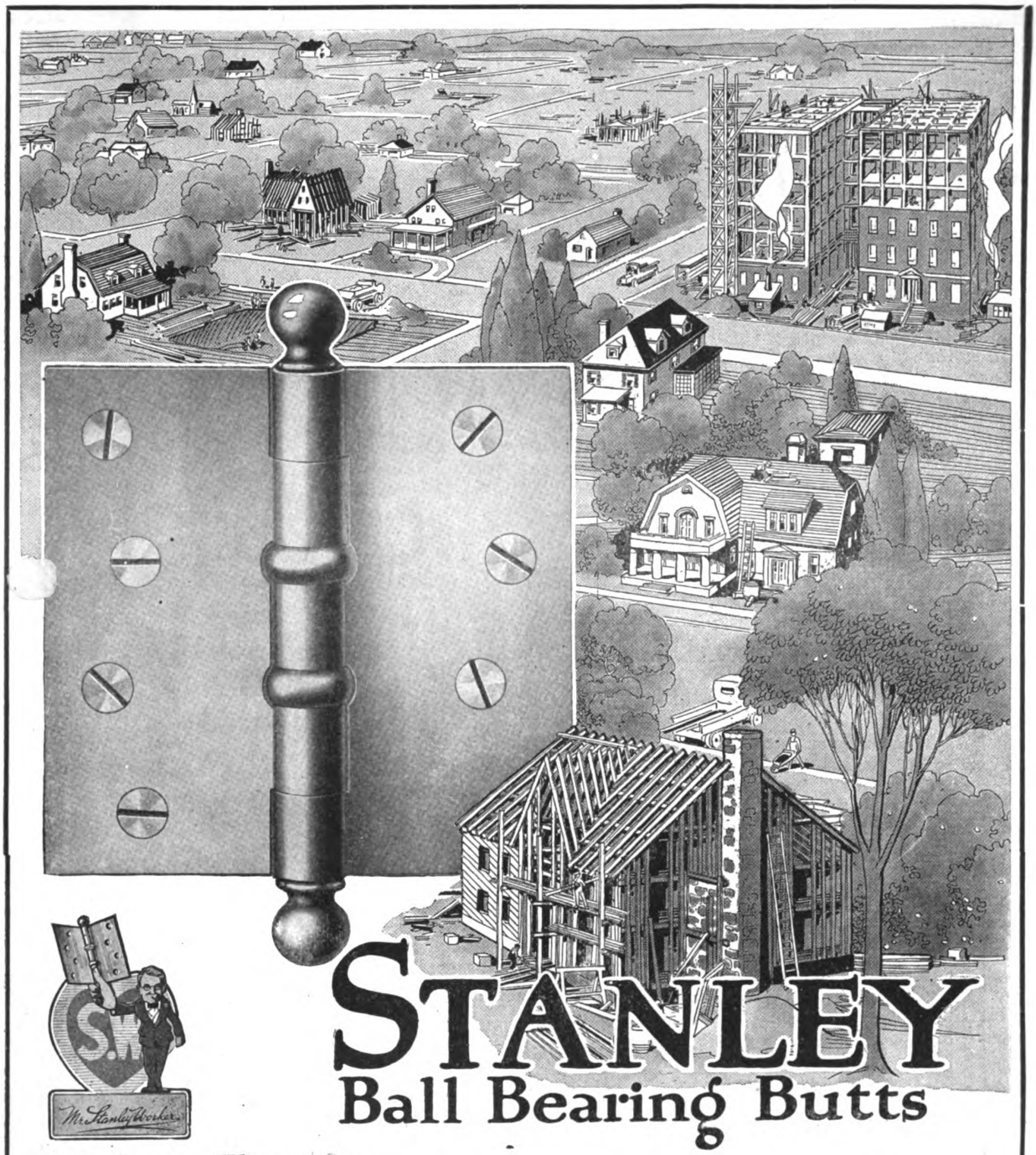

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BUILDING AGE

Formerly Carpentry and Building, Founded 1879

February, 1920 Vol. XLII. No. 2

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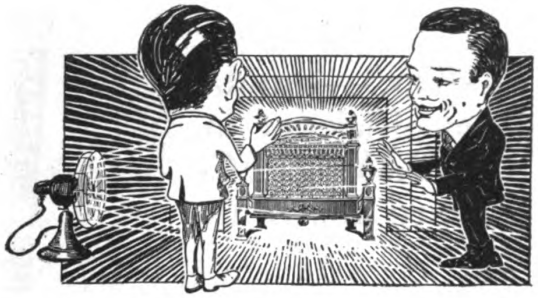

Now then, get an electric fan and blow a draft of cold air across in front of the heater and tell them to stand in front of the heater and feel the radiant heat going right through the cold draft without in the least affecting the heating power of the rays. This proves that Radiant-heat is not affected by drafts or air currents.



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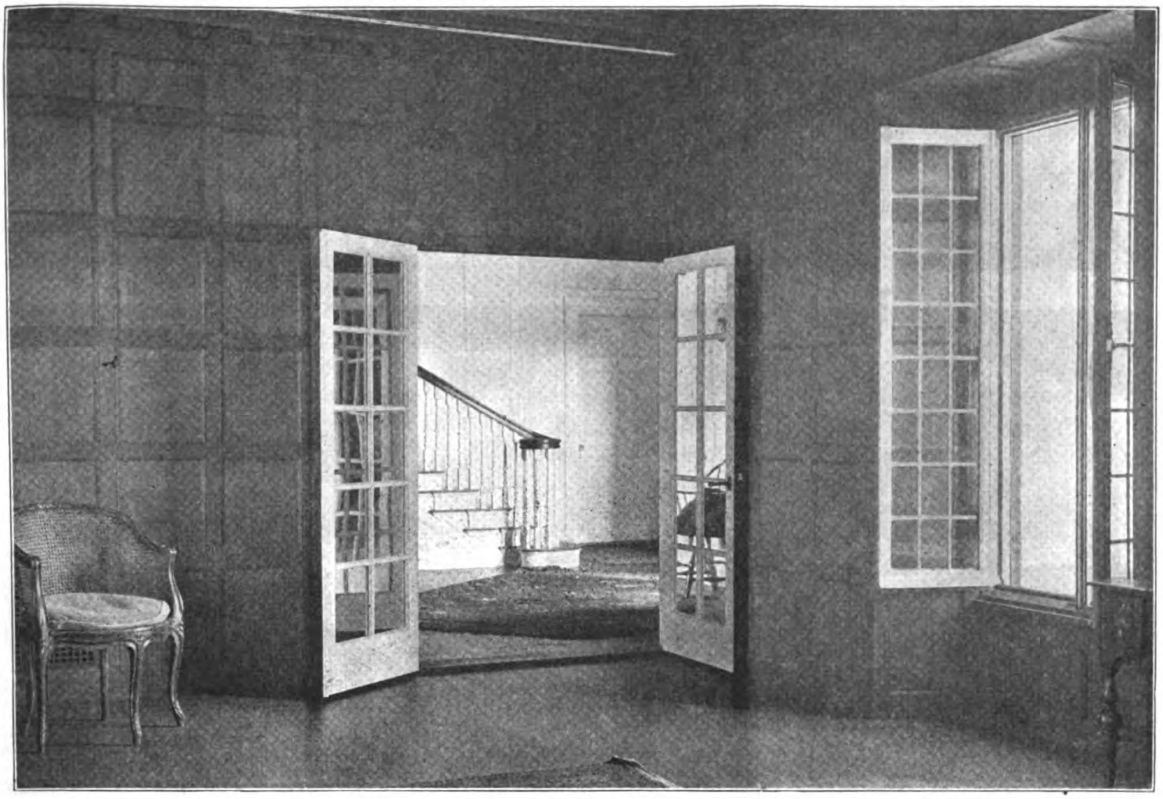

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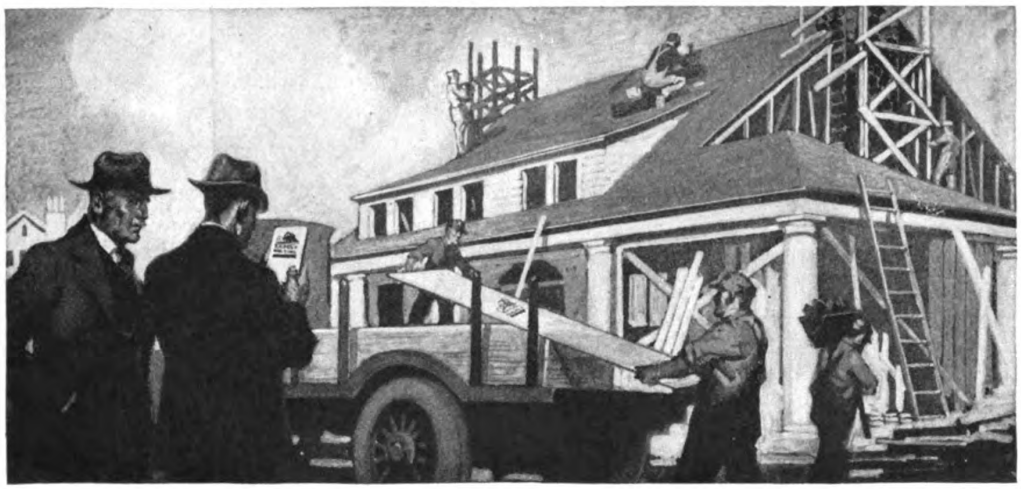

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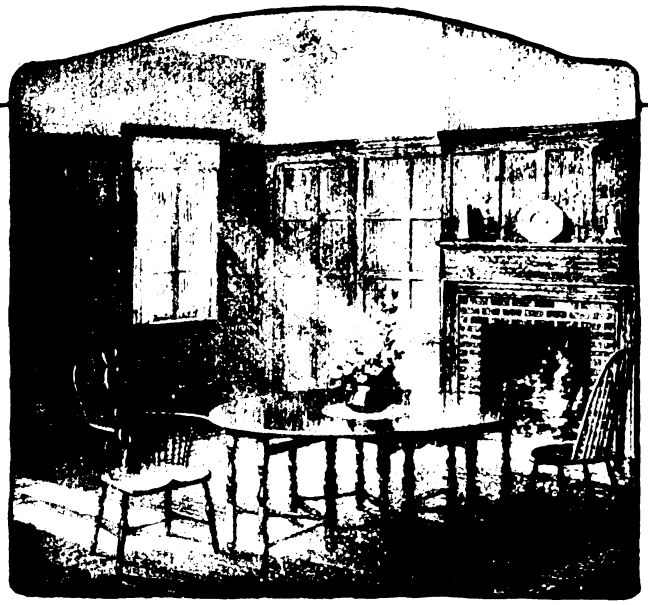

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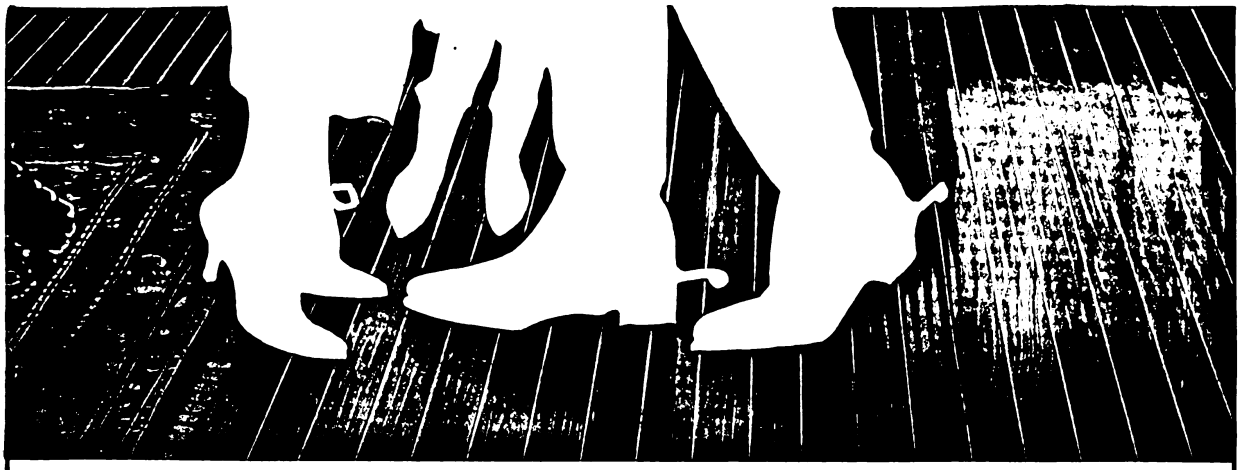

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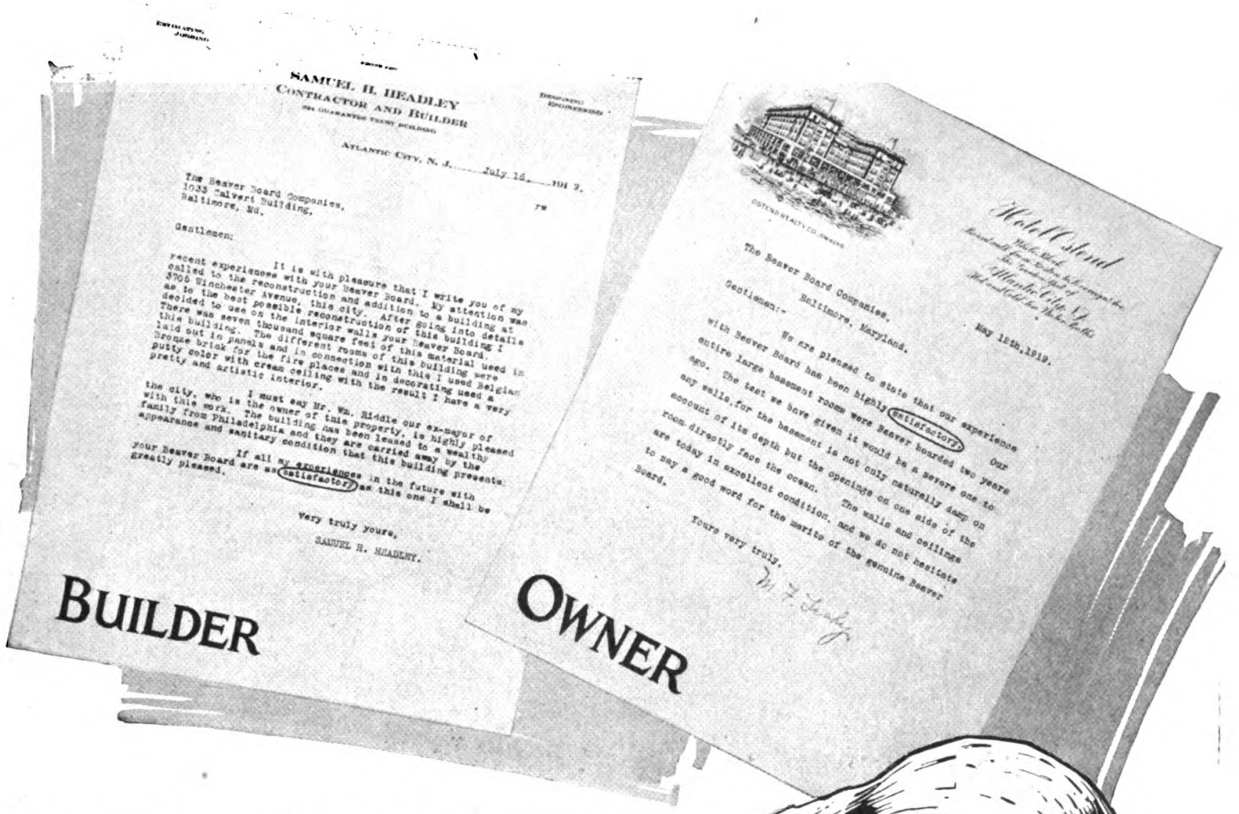

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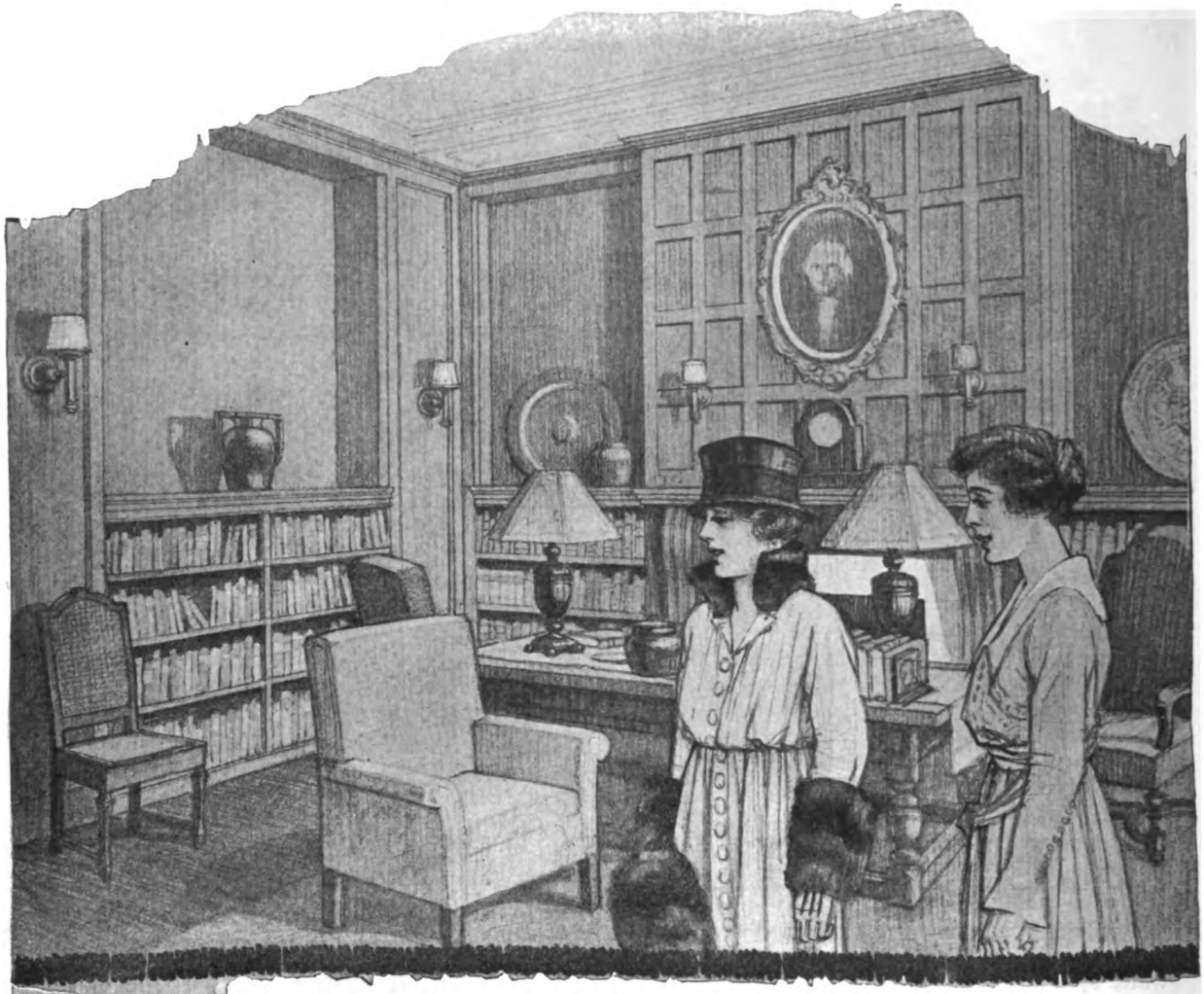

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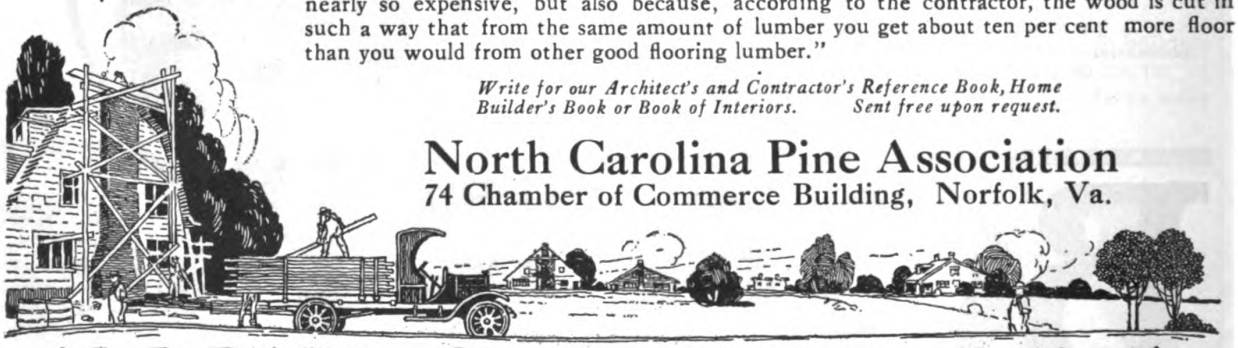

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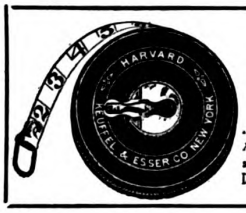

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Section of Outside Wall of House, Showing Wool Between Studding.

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Mineral Wool has superseded all other materials used for similar building purposes because it does "a great work at little expense." A house lined with Mineral Wool has an indestructible, fireproof and vermin-proof guard; it protects the entire household. In the winter time it keeps the cold air out, facilitating proper heating and economy in fuel. In the summer it keeps the heat out.

This material, being of fibrous, inelastic composition, acts as a deadener and muffles all sound. It is considered the best insulator material on the market, making it a perfect refrigerating machine.

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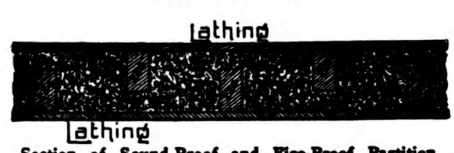

Section of Sound-Proof and Fire-Proof Partition. Can be used for outside walls also.

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BUILDING AGE

NEW YORK, February, 1920

Home Building for Permanence

Beginning a Series of Articles Treating of Correct Methods of Building to Insure Minimum Cost of Maintenance and Satisfaction to the Owner

A FOREWORD

PROBABLY never in the history of the country have we entered upon a year with as great a housing shortage, or one that gives so much promise of a tremendous revival of home building.

We have departed greatly from the paths of the Pilgrim Fathers and other early settlers who lived in a day when each man owned his own house, no matter how humble, when his home was his "castle" as well as his fort. Unconsciously we have drifted into a life so different from theirs that, had not s o m e t h ing phenomenal happened, we should have soon found the home, that strongest bulwark of our modern civilization, entirely disappearing in many of the congested sections of the country.

The "World War"—for so it has now been officially designated—with all its attendant horrors, was not an entirely unmixed evil. Out of its smoke and ruins has sprung the "Own Your Home" campaign, daily gaining impetus. If we could but fathom the hopes and longings of the tenement house dweller in the crowded city or even the more prosperous apartment house occupant, living in "three rooms and bath," and forbidden by the terms of his lease to raise a family of more than one, we would undoubtedly find there a very emphatically expressed desire to have a home all his own with its flower garden and vegetable patch.

> **"Therefore when we build, let us think that we build forever. Let it not be for present delight, nor for present use alone. Let it be such work as our descendants will thank us for, and let us think as we lay stone on stone that a time is to come when those stones will be held sacred because our hands have touched them and that men will say as they look upon the labor and wrought substance of them, 'See, this our fathers did for us.' "**—Ruskin.

To-day what has been regarded as the impossible is constantly becoming the possible, for men formerly earning but a few dollars a day are advanced to higher paying positions, or are receiving all over the country greatly increased wages for the same character of work they formerly performed.

Mortgage money has become easier to obtain, and these easier financial conditions during 1919 have prepared the way for the building of homes on an unprecedented scale. This is as it should be. These home builders will feel like the man long overseas, who exclaimed on returning, "Well, this is God's own country again." An unnatural or artificial mode of living will not breed a sturdy race. It was but recently reported by a legislative investigating committee that in a certain block of New York City, taken as typical of hundreds of blocks, but one bath was found among 80 families! The wonder is that with such conditions Bolshevism did not break out long ago. The prospective home owner is daily being told by manufacturers of different materials how to build for satisfaction. What materials are the best and most economical? The architect, the builder and the prospective home owner should know the merits of different forms of construction independent of any information furnished by the manufacturer.

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Beginning in this issue, BUILDING AGE will describe and illustrate from time to time the correct methods of building with the various materials that are suitable for the small house. In this article, the stucco house with hollow tile walls and timber beams is featured.

Stucco on Hollow Tile

CONSIDERABLE space will be devoted to the stucco house, since this type of home building seems to be one of the most popular.

Within the past decade the use of hollow tile for wall construction has greatly increased. So far as dwellings and other buildings of moderate size are concerned, this, no doubt, has been to a large extent due to the demand for buildings possessing greater fire resisting qualities. In addition hollow tile not only possesses fire resisting qualities, which recommend it as a desirable substitute for the all-wood building, but, due to its cellular construction, incorporating within itself an air space, it also possesses an advantage over the solid brick wall of the same thickness because of its ability to keep out dampness and insulate against heat and cold equally well.

Hollow tile for wall construction, as at present largely manufactured with an exposed face six by twelve inches or twelve inches square and varying in color from a light to dark buff, does not present a finished or pleasing appearance, when left exposed.

The application of stucco to the exterior face of the tile wall solves the problem of appearance in an entirely satisfactory way.

Tile for exterior walls should be hard burned with all faces scored with deep dovetail ragged scoring. Badly cracked tile should be rejected. The tile should be laid up in cement mortar, but the addition of a small proportion of hydrated lime is not an objectionable practice. A mixture composed of one part cement, not more than one-fifth part hydrated lime and three parts of sand by volume will give good results. Mortar should be well mixed and only sufficient water added to give a stiff con-



HOUSE OF M. W. ELLIOTT, MELWOOD STATION, PA.
F. H. SMART, ARCHITECT

STUCCO ON STANDARD WALL TILE. NOTE THE OVERHANGING ROOF GIVING PROTECTION TO THE STUCCO; ALSO THE RUBBLESTONE WALLS UP TO FIRST FLOOR BEAMS, PERMITTING STUCCO TO BE KEPT WELL ABOVE GRADE. THE ROOF IS OF SLATE.

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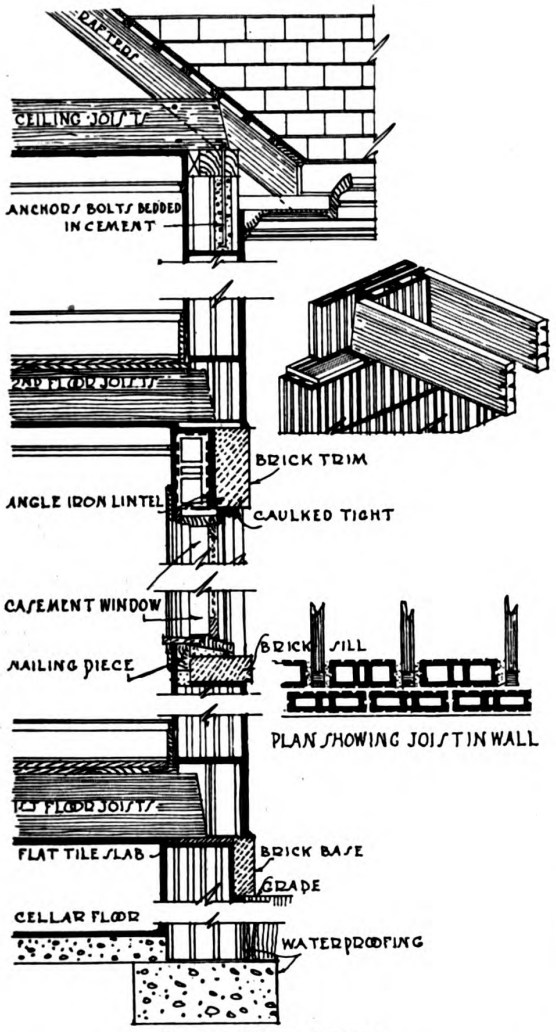
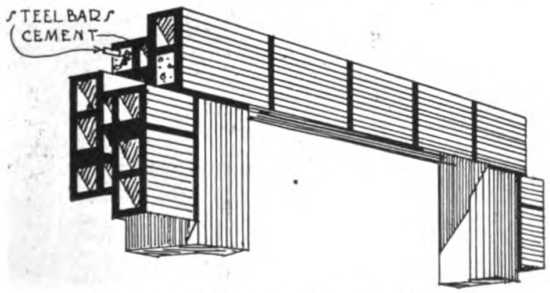


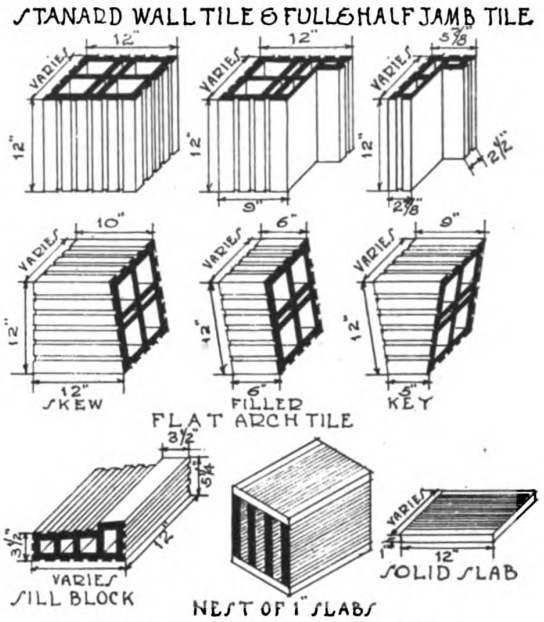
Typical Wall Section

Other materials may be substituted for the brick trim, here shown.



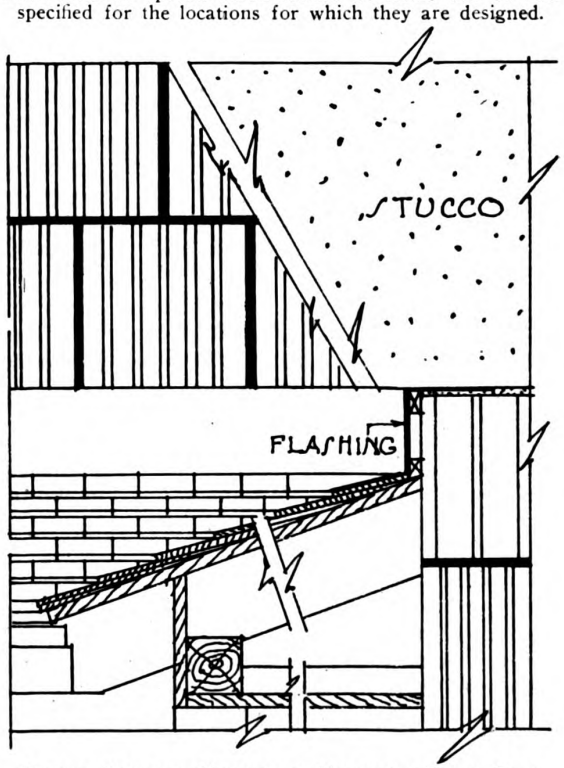
Composite Tile and Concrete Lintel

Lintels may be formed of regular wall tile of either type by reinforcing with steel rods and filling with concrete. It is important that the concrete completely fill the spaces in the tile.



Standard and Special Tile Blocks

Each kind of special block should be made use of and specified for the locations for which they are designed.



Detail Showing Method of Flashing Porch Roof

If it is desired to conceal the flashing, metal lath can be run down over flashing and the stucco continued to roof surface.

CONSTRUCTION DETAILS

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sistency. The blocks should be of uniform size, and any variations in thickness (face to face) should be adjusted on the inside. The outside faces should be set flush. Standard tile should be laid with the webs vertical, each vertical joint breaking with that



HOUSE OF C. F. MELLISH, DETROIT, MICHIGAN
MacFARLANE, MAUL AND LENTZ, *ARCHITECTS*
STUCCO ON INTERLOCKING TILE.

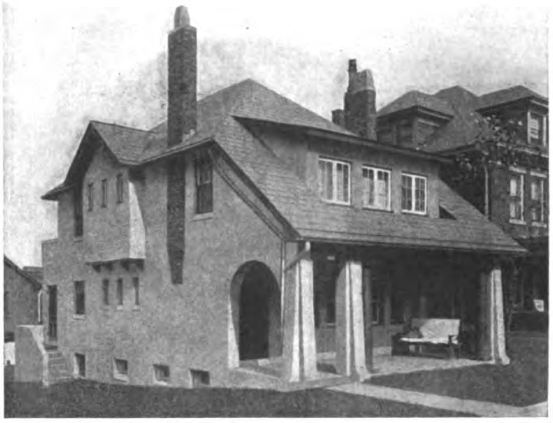
below. By many it is believed that a coat of some type of waterproofing material should be applied to the tile walls prior to the application of the stucco. Experience has shown that this is not necessary provided the blocks are of the proper quality and the mortar joints are well pointed. The blocks should be laid with a liberal air space in the joints.

The tile used for wall construction is somewhat porous and therefore, if dry, will absorb water from the plaster. For this reason tile walls should be slightly wetted before the stucco is applied. This wetting is often overdone, in which case it will harm rather than help the construction. Only sufficient water should be applied to prevent the tile robbing the plaster of moisture. Water left standing on the face of the tile after wetting indicates that an excess amount has been used.

Provided the foundations and wall construction are correctly designed and built, cracks and crazing in stucco on hollow tile may yet develop from several causes. Chief among these is the use of an excess amount of water in stucco coatings. This subject will be fully treated in a later article dealing with stucco finishes.

Accompanying this article are a number of construction details which should be carefully studied and followed. Where windows occur, it is important that a special jamb tile be used, rabbetted so as to provide for the window frame. The joint between the window frame box and tile should be well filled with mortar to within one inch of the stop head. The rest of the joint should be caulked, preferably with oakum, after the cement has well set, although a good type of elastic or roofers' cement will also serve the purpose. Unless this is carefully done the wall will leak air around the periphery of the window. In fact, all joints between frames of either doors or windows and tile should be tightly caulked (with either oakum or roofers' cement) at the head, sides and sill.

This is an important item, as all woodwork entering into the wall construction, such as window and door frames, etc., will shrink. The woodwork should be back painted before being set. This will help preserve the wood. Openings are an important consideration, and besides the joints already mentioned care must be taken to provide proper lintels and sills. Special arch blocks of terra cotta are manufactured by some companies for this purpose, and if this material is to be used for the lintels, it should be distinctly mentioned in the specifications. Such construction as a piece of timber laid over the window head to reinforce the frame, with standard tile blocks built above, should never be permitted. Either arch tile, reinforced concrete, brick arches, angle iron or similarly suitable material should be used for the lintels. A satisfactory lintel can be constructed by using the regular wall blocks, filling the hollow space with concrete and reinforcing with steel bars. Such lintels can be made up on



HOUSE OF DR. J. G. B. FITZ-HUGH,
McKEESPORT, PA.
THOMAS A. RUSSELL, *ARCHITECT*
STUCCO ON STANDARD WALL TILE. WALLS BELOW GRADE ARE OF CONCRETE. THE ROOF IS OF SLATE.

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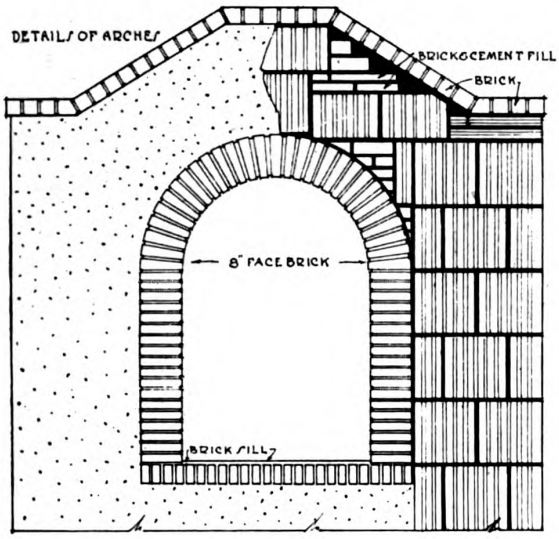
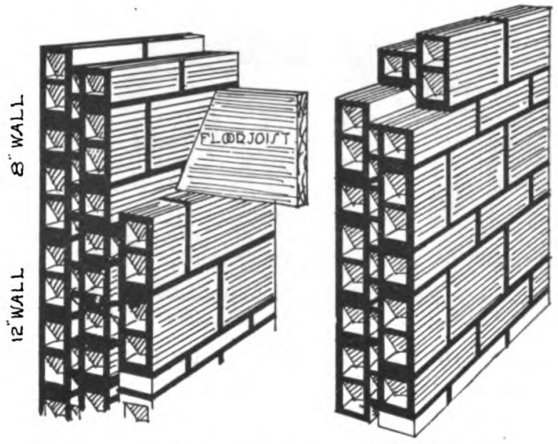


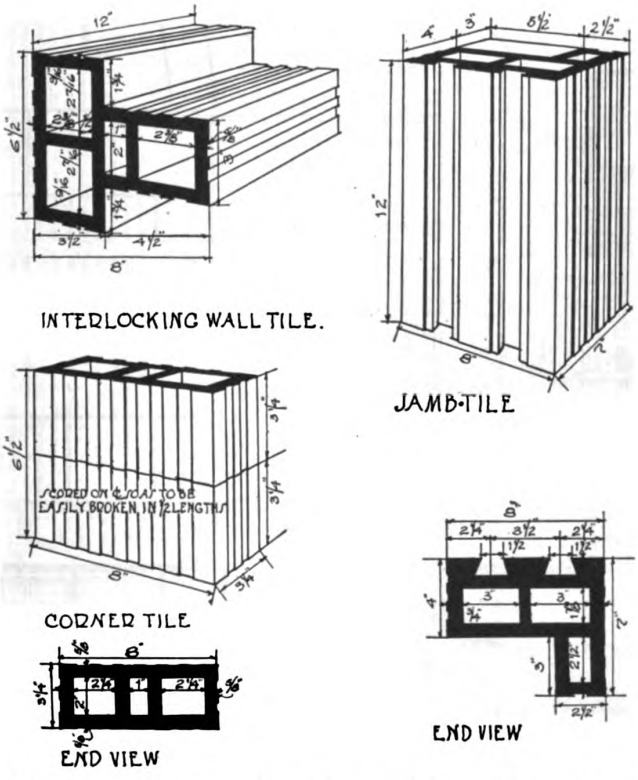
CONSTRUCTION OF OPENING IN A PORCH WALL

This illustrates the use of brick trim, which can often be used to advantage, thus adding a warmth of tone and touch of color to the sometimes otherwise hard and cold appearance.

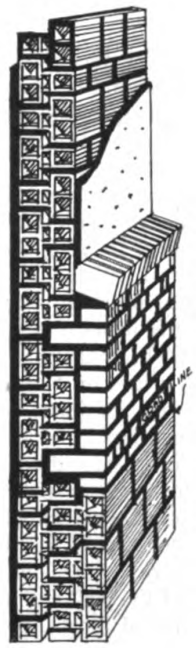


TYPICAL WALL CONSTRUCTION FOR INTERLOCKING TILE

Note the method of offsetting the wall at the beam level to provide a solid bearing for the floor joists.



REGULAR INTERLOCKING WALL TILE AND SPECIAL BLOCKS USED IN CONNECTION THEREWITH



BRICK VENEER

The manner of bonding brick to interlocking tile, when used from grade to water table is here shown.

CONSTRUCTION DETAILS

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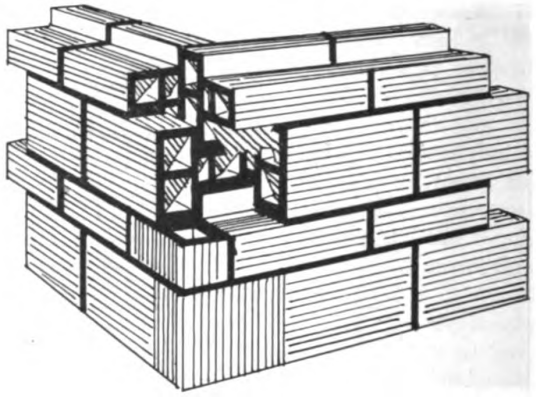
HOUSE OF JOHN L. POWELL, WICHITA, KANSAS
HERMAN J. STROEH, *ARCHITECT*
STUCCO ON INTERLOCKING TILE.



CORNER CONSTRUCTION

WHEN INTERLOCKING TILE ARE USED THE CORNERS SHOULD BE FORMED BY THE USE OF SPECIAL CORNER TILE BUILT IN AS QUOINS.

the ground and set in place—about four days to one week later.

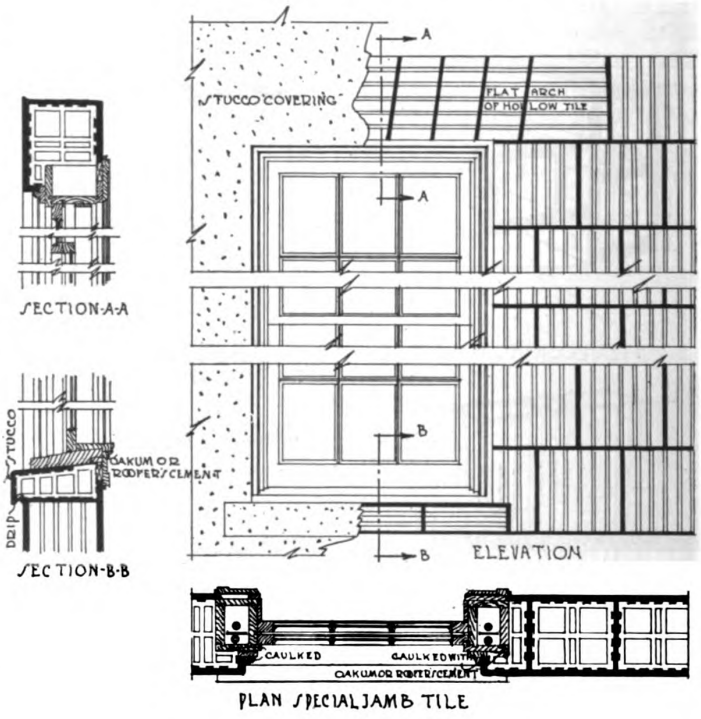
The window sills may also be formed by special sill blocks of tile, as shown. Irrespective of the nature of material used for the sill (tile stuccoed, concrete, brick, stones, etc.), proper drips should be provided on the underside. This is an important item.

Where the floor joists rest on the tile walls, they should be given as liberal a bearing as possible; usually 4 inches is adequate. For other than the interlocking type a course of flat tile about 1 inch thick should be laid over the standard wall blocks, well bedded in cement, forming a flat horizontal surface on which the joists can rest. Instead of breaking stock blocks to fit around the joists, the outside of the wall should be built up with thinner blocks (3 inches or 4 inches) and the space between the joists on the inside filled in with blocks of a thickness sufficient to make up the full wall thickness. This is illustrated in one of the drawings on Construction Details.

Where a pitched roof is used, a 2-inch by 4-inch cap plate laid flat can be set on top of the wall and anchored to the top course of blocks, the anchor bolts extending down into the cellular spaces which should be then filled with cement. This serves as a bearing for both the rafters and attic or ceiling beams.

The stucco overcoating should not be extended down to the ground surface if it is possible to avoid it. While this is more important when the backing is of frame than when it is of tile, yet the provision of a base course of brick or stone is always a preferable feature.

The use of brick arches, sills, base and other trimmings in connection with stucco exteriors, if well worked out and not overdone, enhances the beauty of the structure, and breaks up the otherwise flat



TYPICAL WINDOW CONSTRUCTION

TILE LINTEL AND SILL ARE HERE SHOWN. OTHER MATERIALS MAY OFTEN BE USED TO ADVANTAGE. GOOD JAMB CONSTRUCTION MAY BE OBTAINED BY THE USE OF BRICK TRIM AROUND THE EXTERIOR OF THE OPENING, FORMING A REBATE WITH THE TILE BACKING.

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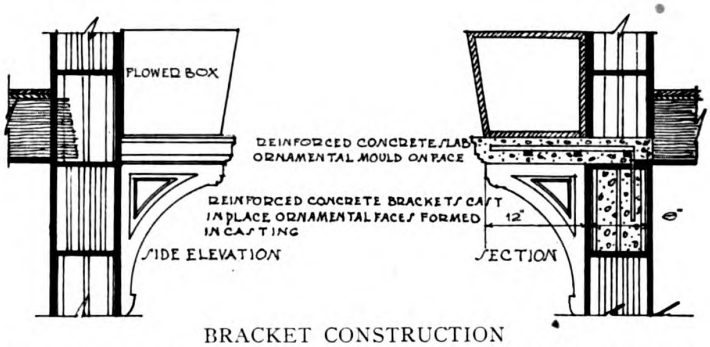
and often monotonous surface. When this is not desirable the use of a green or red tile insert in suitable locations gives a pleasing variation and should be used.

The use of flower boxes also is helpful in this respect, and the brackets for these can be made an integral part of the construction, as illustrated. One set of forms is sufficient, the brackets being made of reinforced concrete and cast on the premises.



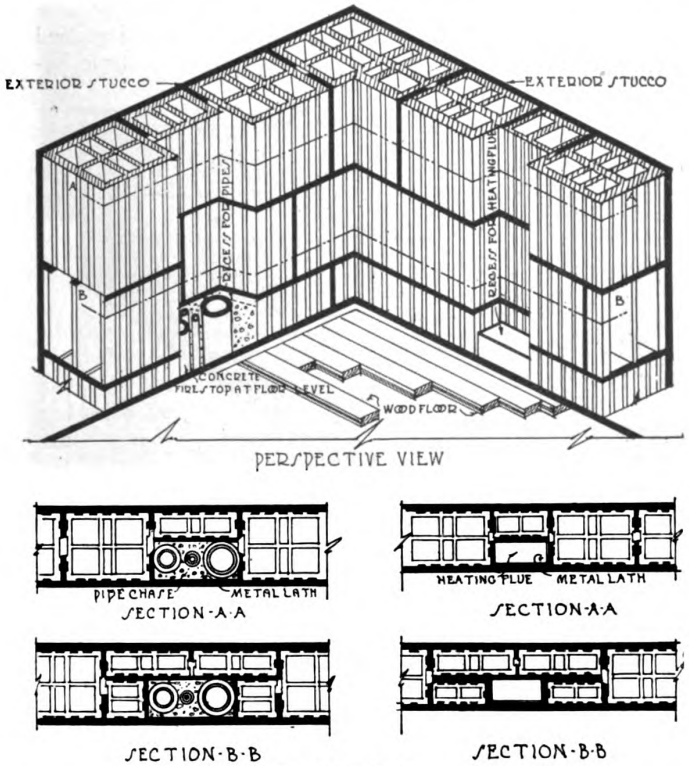
BRACKET CONSTRUCTION

BRACKETS OF CONCRETE FOR SUPPORTING FLOWER BOXES ARE HERE SHOWN. THE CONCRETE SLAB MAY BE OMITTED, IF DESIRED, AND TOP OF BRACKET EXTENDED INTO WALL. WITH SLIGHT MODIFICATION THIS CONSTRUCTION IS SUITABLE FOR THE SUPPORT OF BAY WINDOWS OR OTHER PROJECTIONS.

The use of special blocks to form pipe chases should be insisted on. The importance of not permitting standard wall blocks to be broken for such purposes cannot be emphasized too often. There should always be at least three cell walls and two enclosed air spaces between, for every part of the wall. This cannot be accomplished when standard blocks have the inside cell broken to recess plumbing and other pipes. Insistence on this point will prevent damp spots appearing here and there on the inside of the finished building. Where such chases are plastered over on the inside, metal inserts should be built in the joists between the blocks, to which wire lath can be fastened.

Properly built, the stucco house with hollow tile walls makes an entirely satisfactory and livable home. Usually the cost will exceed that of the frame or all wood dwelling, and also of the stucco covered frame building.

However, with the greatly increased price of lumber, the difference is not so considerable as formerly. The tile wall will usually be found to be slightly cheaper than the brick wall with face brick used on the outside.



PIPE CHASES

CORRECT METHOD OF CONSTRUCTING PIPE AND SIMILAR RECESSES IN HOLLOW TILE WALLS

Builders' Second Show Is Planned at Detroit, Mich.

Detroit's second annual builders' show will be held by the Detroit Builders' Exhibition, Inc., February 28 to March 7, inclusive. It will be a builders' products exposition.

The Detroit Builders' Exposition, Inc., is the successor to the Detroit Builders' Show Association, organized hastily a year ago to conduct the initial show. Its officers are men well known in the business life of the city. J. H. Culver, of the White Star Refining Company, is president, and Frank B. Griffin, who was connected with the old organization as treasurer, is exposition manager and assistant treasurer. Headquarters has been established in Room 924, Chamber of Commerce Building.

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Lattice—Part I

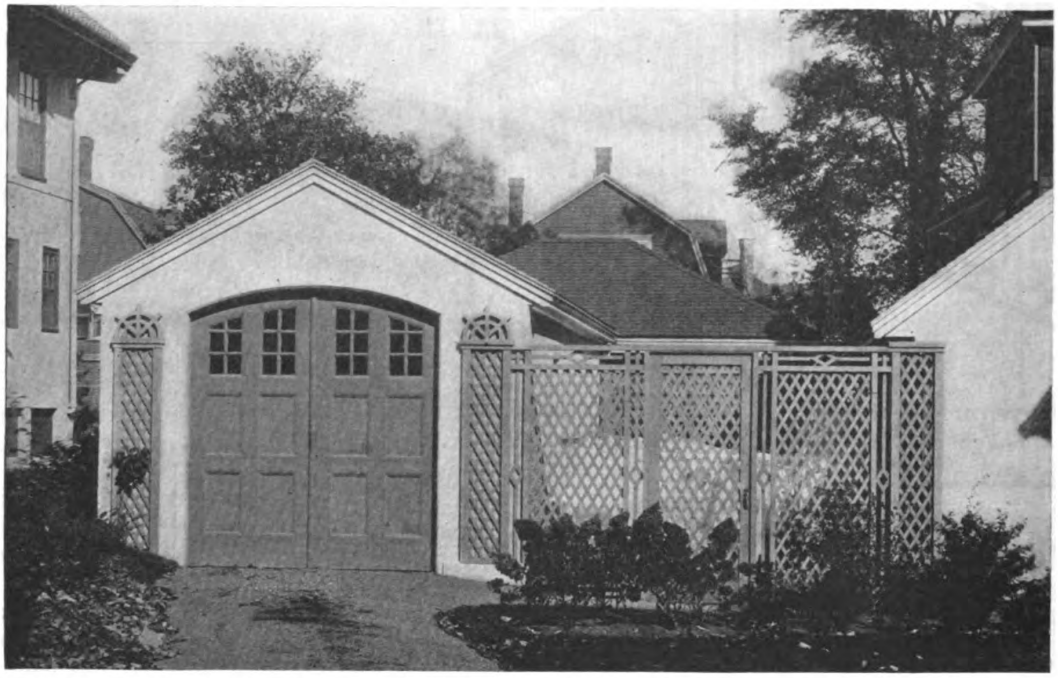
Some Notes on the Origin and General Adaptation of Lattice as a Decorative Form as Part of the Structural Detail of the House, Both Exterior and Interior, and as to Its Adaptability for the Ornamental Treatment of the Garden and the Grounds About the House.

EVERY man and woman fortunate enough to have spent their early days in some suburban town or on the larger and more prosperous farms throughout the country will recall the elm-shaded streets with the low white houses standing back from the road and the gardens, both flower and vegetable, tended with the most solicitous care and brought to the highest state of cultivation.

It was among such lowly surroundings that the lattice in this country first had its origin, for it was in these gardens and along the grassy plots between the fence and the house that ingenuity devised the trellis support and the long arbors as a clinging place for growing vines and one where they would best thrive in the sunlight and pure air of their surroundings.

At first but a simple make-shift support, these lattices have become each year more and more ornamental in character and intricate in design. They have not only been made to serve in a very much improved form their original purpose but they have also later become affixed to the house, and following what was undoubtedly the origin of their interior adaptation, the placing of small lattice in small flower pots, they have also become a very much used element in interior decoration.

Where affixed to the house, either outside or in, they have taken on a purpose of permanence and have therefore become structural. Where used detached and out of doors they have become equally permanent because they have supplied support for vines that in the course of time be-



LATTICE USED TO MAKE AN ATTRACTIVE CONNECTION BETWEEN TWO BUILDINGS. NOTE THE EFFECTIVE TREATMENT SECURED BY THE PLACING OF LATTICE PANELS ON EITHER SIDE OF GARAGE DOORS.

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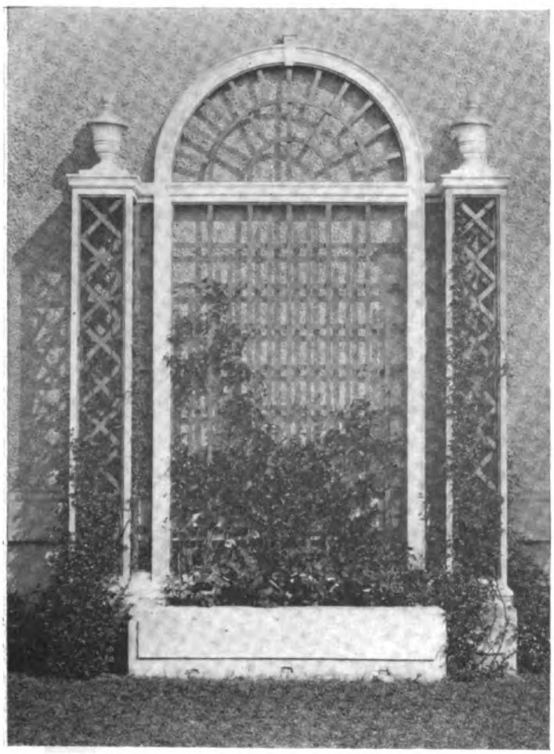
come very large and heavy. It has therefore become necessary to treat lattice as something more than a make-shift, a temporary method, to serve a special purpose and it is interesting to note that the architect, the builder and the carpenter have considered lattice of sufficient importance



LATTICE USED TO PRODUCE AN ARTISTIC TREATMENT OF A BLANK WALL SPACE.

to give it much thought and consideration and to perfect methods of construction that would best secure stability and permanence.

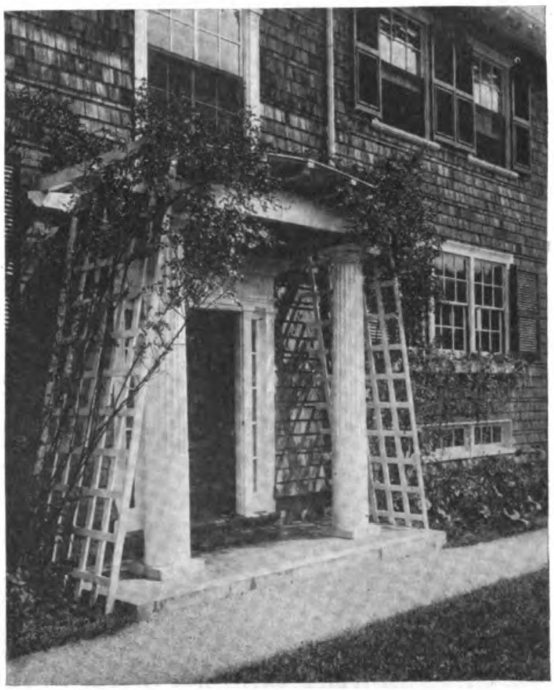
It will be the purpose of these articles to illustrate and describe the best methods in the construction of lattice, the best materials to be used and the most approved means of making lattice a structural part of the building.

THE origin of lattice will date much further back than the settlement of this country because there are to be found in many of the very pretentious Italian and French gardens, whose history dates back many hundred years, evidence that lattice was used for a decorative purpose and to a considerable degree. But there are further evidences that in constructing this lattice no thought was given to its permanence and there is therefore very little to be found sufficiently well preserved to afford an exact idea as to just what purpose it was intended to serve.

If we are to build even so small a detail as lattice, naturally we should build it as well as possible and if it is to be made to withstand the deteriorating influences of the elements and carry the heavy weights of the rapidly growing vine it must be staunch and strong as well as ornamental in its construction.

For the purpose of these articles lattice will be divided into two general classes, interior and exterior. The treatment of these two classes is essentially different, for few of the precautions necessary in the construction of exterior work will be required for that used in the interior, which will be largely ornamental in its purpose.

Exterior lattice may be used to considerable advantage in a variety of places and may be made to conform to all the various conditions to which the builder or designer will seek to apply it, but it will be found that its subdivisions will fall into one of the following classes: (1) Lattice on barren walls used as a clinging surface for vines or as a depending screen. (2) As a filler for window openings and especially along the walls or fences out of doors. (3) For gateways, as arbors for vines, as shelter spots such as summer houses or any place where it is desired to make an



LATTICE USED TO BREAK UP THE FORMAL LINES OF AN ENTRANCE PORCH. SIMPLE, INEXPENSIVE, BUT EXTREMELY EFFECTIVE.

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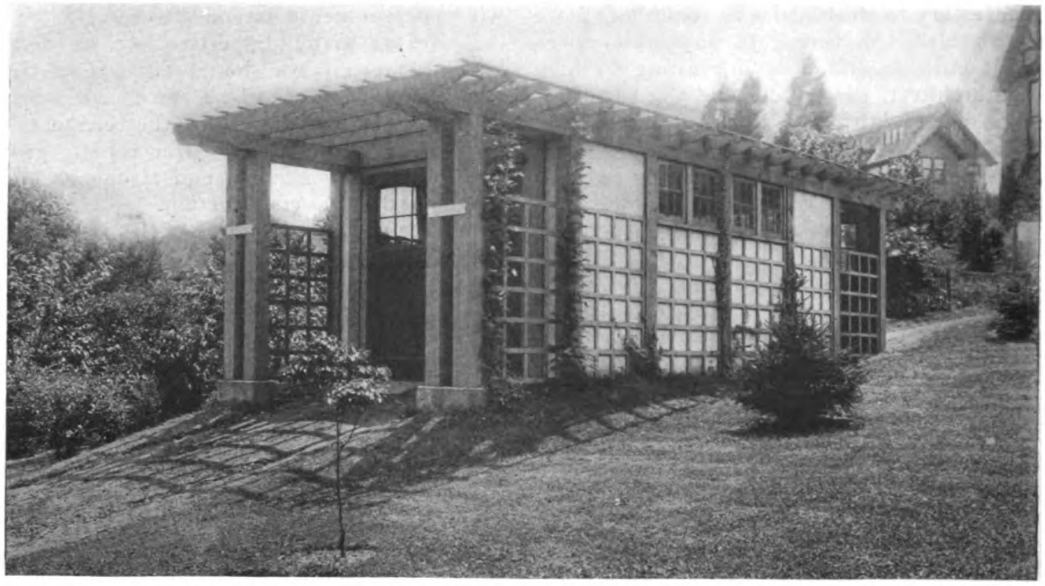
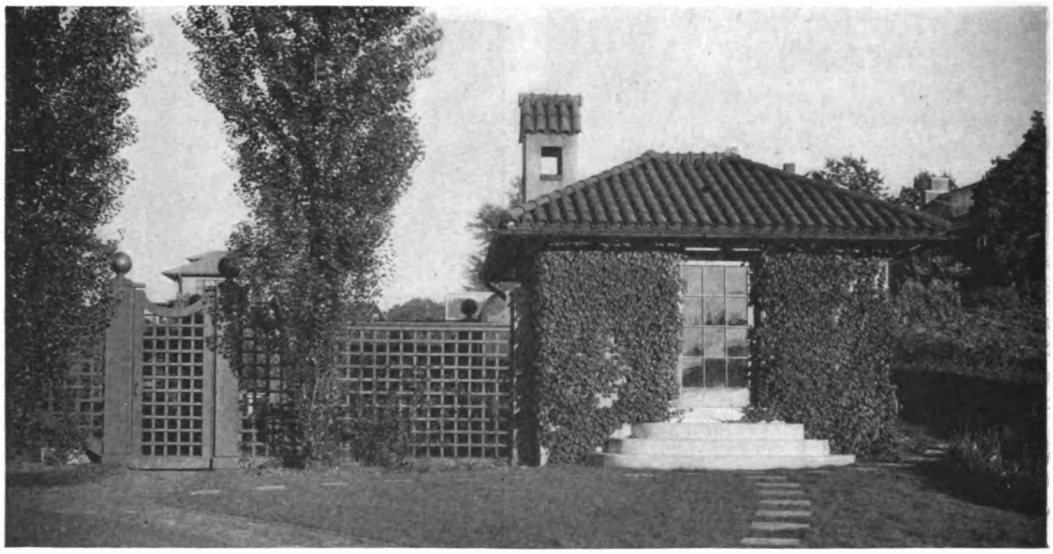


A TWO-WAY GARAGE SHOWING LATTICE EFFECTIVELY USED TO SECURE A GOOD ARCHITECTURAL EFFECT AND TO PROVIDE SUPPORT FOR CLIMBING PLANTS WHICH WILL EVENTUALLY MAKE THIS STRUCTURE A MOST ATTRACTIVE FEATURE.



A LATTICE FENCE SERVING AS SCREEN FOR BLEACHING LAWN, AND WITH THE WELL CONSIDERED PLANTING CONNECTING THE BUILDING AT RIGHT WITH ITS SURROUNDINGS.

Two Examples of Lattice Used Structurally to Produce Good Decorative Form

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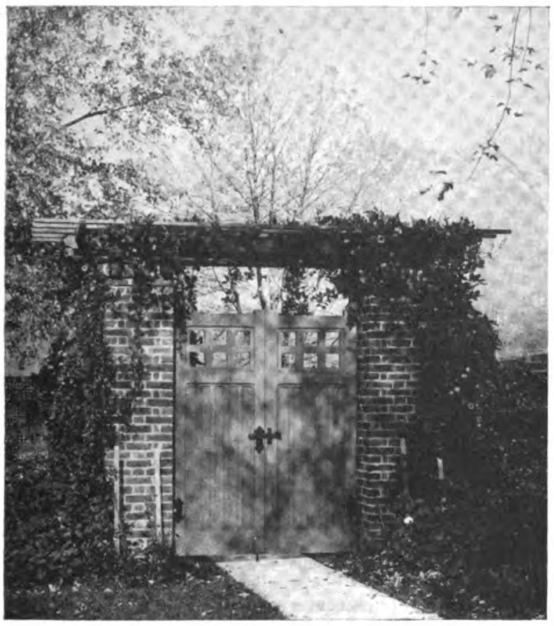
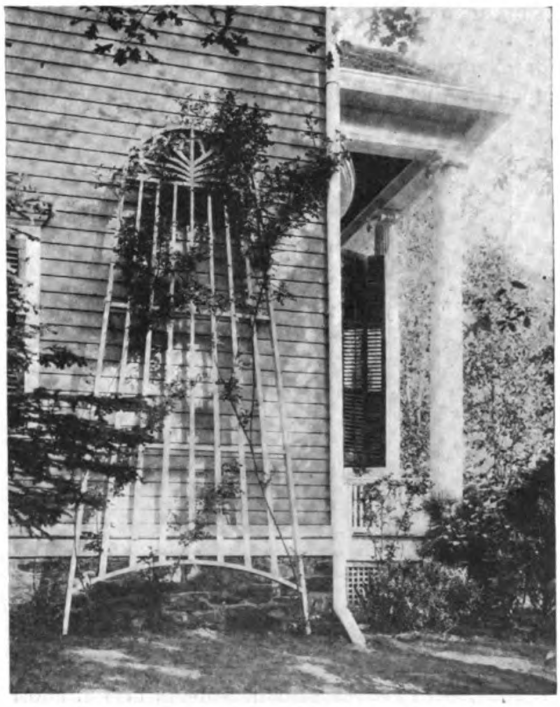
especially attractive or distinctive feature. (4) For house fences or screens to shut out from the street view unsightly places about the premises. (5) For the design of interior porches or piazzas.



GATEWAY WITH BRICK PIERS AND LATTICE OVER TO PRODUCE A PERGOLA EFFECT.

ON account of the lightness of its construction and its constant exposure to the weather it is undoubtedly true that lattice work is more perishable and short-lived than any other part of building construction. Dry rot and decay are constantly at work against lattice, and this fact will serve to emphasize the necessity if an idea of permanence is to be carried out that lattice must be structurally well put together. Naturally the question will arise as to the size of members of which lattice should be constructed, and, while this is a question not possible to answer so that it may apply correctly in every instance, it may be said that more lattice work is built up of strips ⅜ by 1⅛ inches in dimensions than any other size. The artistic design in lattice which may be used to serve a purpose will very largely depend on the ingenuity and artistic perception of the builder. There are certain features in design, however, that may be studied and which will suggest a variety of patterns that will relieve lattice of much monotony and create a very desirable effect. As a method of enlivening design and more especially where large surfaces are to be covered, and to give certain "snap" and variation to the motive of the usual criss-crossing of lines, a very successful method is the addition of small blocks to corners or the cutting away of the strips to leave irregular holes as shown in Fig. 7 and 8. The reader will readily see that opportunity is afforded for great variety of effects in this direction, all of which are to be recommended as adding a certain interest to the work and taking it out of the usual rule-of-thumb method.

Where lattice is used as a background for vines and plants the decorative effect need not be so seriously studied, but it at once becomes important that structurally it should be of the best character and that it should be sufficiently strong to carry the weight imposed. For such work the simplest lines should be sought. Strips should be placed a considerable distance apart and little or no attempt made to form designs or figures. In every case where lattice is placed against the building it should be made free-standing and at least six inches away to afford free circulation of air so that it may become dry at the back almost as quickly as it will on its outer or exposed surface. This is absolutely essential because if this free-standing character is not maintained, not only will the lattice soon rot and fall apart, the vines be thrown to the ground, but, what is more serious, the safety of the structure will be seriously impaired.



A SIMPLE FORM OF TRELLIS AS A SUPPORT FOR CLIMBING PLANTS.

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Decorating and Furnishing the Low-Cost House

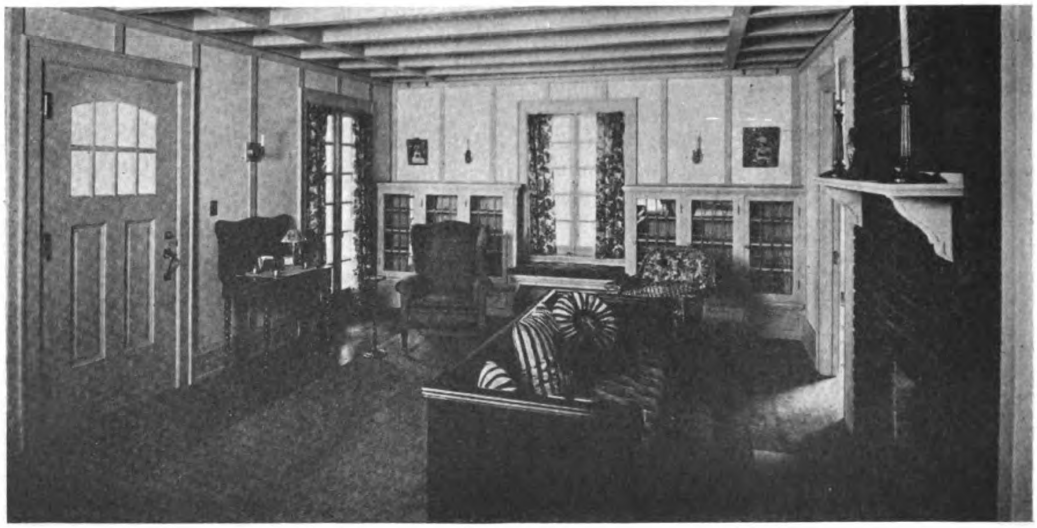
I.—THE LIVING ROOM

IN introducing to readers of BUILDING AGE a series of articles that will have to do with the furnishing and equipment of the low cost house, it becomes necessary at the outset to refer to the aspect of furniture throughout the entire house and its relation to the general design of the building itself. It is proposed in this series to take up separately the more important rooms of the house: the living room, the dining room, the bed chambers and the kitchen. Whatever is set forth will not include such items as built-in furniture, as these are structurally a part of the house and have become so important in their design and placement as to warrant separate articles which will be presented and fully illustrated in issues during 1920.

In selecting the furniture for any house it is always well to avoid those incongruities of improper relation between the architectural style of the house and the period style of the furniture placed in it. Failure to observe this very necessary element often results in inconsistencies and crudities which mark bad taste and reveal poor judgment in selection. For example, a house that has been carefully designed in the English Colonial or Georgian style should in its interior furnishings strongly follow this suggestion of style. The introduction of elaborately carved or fantastically designed pieces is absolutely out of place in a house of Georgian simplicity and dignity.

The question of economy in the selection of furniture will very largely influence the ultimate result. It is true here, as in every other detail of the well regulated house, that a certain unobtrusiveness should be sought. Anything that is unduly striking will detract from the repose of the surroundings and will in fact serve to create a sense of restlessness on the part of the beholder. This applies equally to the color and form of the equipment, so that the most satisfactory procedure will be found that which considers first the quality of the accessories and limits the quantity as far as may be necessary to get a good result. Economy as to the number of pieces is for another reason the best method. The room overcrowded with furniture is apt to lose its home-like aspect and only add to the crowded appearance when comfortably filled by the members of the family and their guests.

It is well to bear in mind that the small house is



A GOOD EXAMPLE OF THE MODERN LIVING ROOM IN A SUBURBAN HOUSE. THE BEAMED CEILING AND LIGHT COLORED WALLS GIVE AN ATMOSPHERE OF HOME COMFORT. THE BUILT-IN BOOKCASES AND BROAD, BRICK CHIMNEY BREASTS ARE WELL CONSIDERED STRUCTURAL FEATURES.

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AN INVITING LIVING ROOM. THE RECESSED WINDOW NICHE AND LONG WINDOWS ARE ARCHITECTURAL FEATURES

one that is lived in in every one of its few rooms. It differs from the more expensive and more formal residence in that it usually lacks the reception room or so-called parlor, and the combined purposes of both are usually served in the living room. This means hard usage and leads to a large amount of wear and deterioration in its furnishings. It thus would seem wise to avoid the selection of upholstered furniture not alone for the reason that it quickly shows wear unless it is of the most expensive type, but for the further and very good reason that it is an unsanitary feature in the house and unless carefully and frequently freed of dust becomes a lodging place for germs and vermin. Particularly in the English Colonial or Georgian house does the plain unupholstered furniture belong, and when carefully selected for its correctness of design as relating to its period it affords unlimited opportunity for the creation of a home-like and extremely livable domestic interior.

In selecting for the first of this series the particular room to be described as to its furniture equipment, the living room which really serves in a sense as an entrance hall-way in addition to its other functions, will naturally be first discussed. If the expression may be permitted, the living room is the club room of the house. Here it is that the family meets for social intercourse; here it is that the formal visitor or the more intimate neighbor will meet the family. It therefore becomes necessary that the furniture selected for this room possess the somewhat unlike attributes of semi-formality in respect for the visitor, combined with the utmost ease and comfort for its constant occupants.

The living room of the moderately priced house will usually have a large open fireplace. This particular location in the early spring, the fall and the winter will be the spot where the family will most largely congregate. A well-designed metal screen of close mesh will afford a fire guard to prevent the crackling logs from throwing sparks out on the floor or rugs, and will act as a safeguard against fire. When fireplaces are part of the room, mantel pieces may properly also be built. Care should be taken, however, to eliminate every bit of ornamental crockery and other adornment that is not of general artistic interest. The old-time mantel with its fifty-seven varieties of ornaments so long in vogue is rapidly and none too soon giving way to a quieter and more dignified treatment. Where there are no fireplaces, the tendency is entirely to eliminate mantelpieces, as they absorb wall space that would more advantageously be utilized as background for the larger and more important pieces of furniture.

The wall surface of the living room should be in some flat, even tone, never in any very large or assertive pattern of paper or decorative motive. If decorative design is introduced, the most permissible place will be in the draperies of the windows. Low priced cretonnes or figured material that will stand the strong sun light and resist the action of fading are the best. If the purse permits more expensive material, a very desirable one is the Japanese silk shot through with a rough texture and of a solid color. In connection with the walls of the living room, opportunity is taken to refer to the old pictures of the family forbears. As a general rule,



A SUNNY AND COMFORTABLY ARRANGED LIVING ROOM IN A LOW-COST HOUSE.

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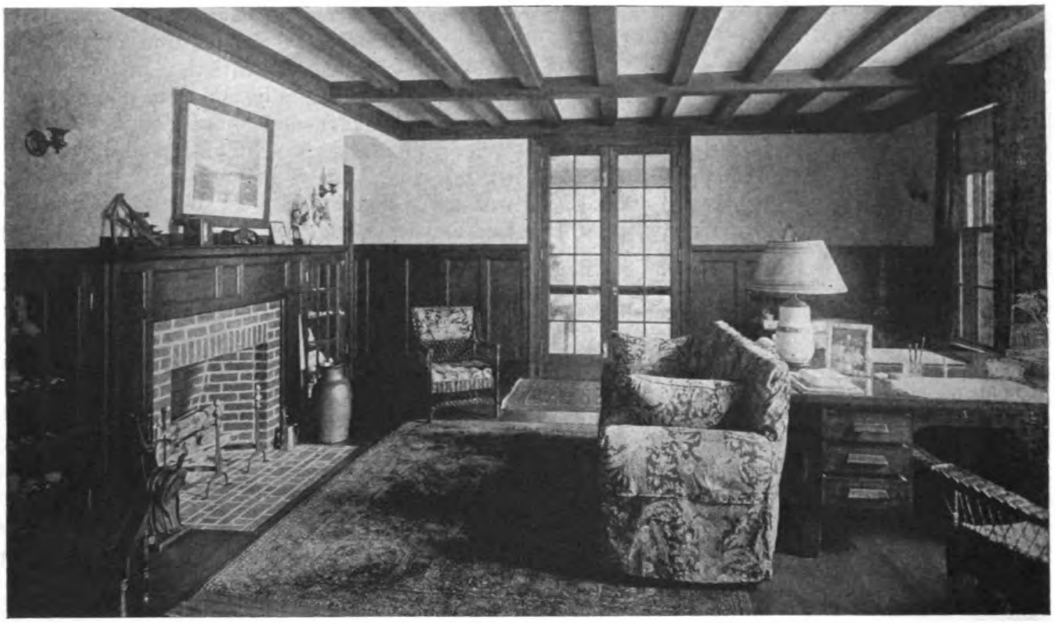
these should be placed in the chief bedroom, the den, or other private place. They are too sacred to be flaunted before the unsympathetic gaze of the casual visitor and might better stand as noble monitors over our more private thoughts.

It is presumed that the structural covering of the floor will be some hard wood that the careful house wife will bring to the best surface and will desire to protect as far as possible. Fortunately we have arrived at a period when the unsanitary quality of the old time carpet has practically relegated that to oblivion and rugs have become the logical successors. These should be selected with particular reference to their color and design and as a basis of economy should be as expensive as the purse will permit. As the living room will undoubtedly be well lighted naturally by windows, the tone of the rugs should be low; there should be no startling or pronounced effects in the primary colors. It is well to have one large centrally placed rug and smaller rugs at such places where the most wear will naturally occur. The shape of the rugs should also be considered, and should conform to the contour of the room and the objects in closest proximity. A long, narrow room should have a long, narrow rug; a piano bench naturally demands a rug and it should be long and rather narrow to follow the general outlines of the bench. Rugs should be placed neither in absolute regularity nor erratically. They should have consideration first as to need and second with relation to other surrounding objects and the shape of the room.

The table in the living room will be perhaps what might be called the literary center of the house. It is about this table that the family will group during its leisure hours and it should be somewhat of the library character, with spacious drawers to hold pamphlets and other things that naturally accumulate. The cloth covered top and the usual table cloth should be avoided. A well polished table top is more suitable than anything else, and if it is thought necessary to protect its surface, a thin rug or a well selected piece of drapery harmonizing in tone with the rugs on the floor may be thrown across the table. Opportunity is afforded to produce a closer contact with the outside world by the choice of books permitted on this table. A selection in which the different tastes, not only of all the members but of each member of the family individually, are represented, will usually include the particular type to suit the mood of the moment, and its very accessibility will lead to its perusal with enjoyment. A book case or built-in book shelves will always add warmth and refinement to a living room, and inasmuch as the family library is largely of common interest to all its members, it is desirable that it be located as part of the living room.

The chairs should partake of the character of ease and semi-formality. There should be very few straight back chairs in the living room and every



A HOME-LIKE LIVING ROOM IN THE HOUSE OF P. H. LOMBARD, POCASSET, MASS.
JAMES PURDON, *ARCHITECT*

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one should afford a comfortable resting place for each member of the family when either reading or indulging in conversation in this room. A couch of the serviceable kind with an abundance of pillows should also be a necessary feature of the living room. This can with advantage be placed parallel to and facing the fireplace and abutting on the center table so that at night the occupants of the couch may avail themselves of a centrally placed light for ease and comfort in reading.

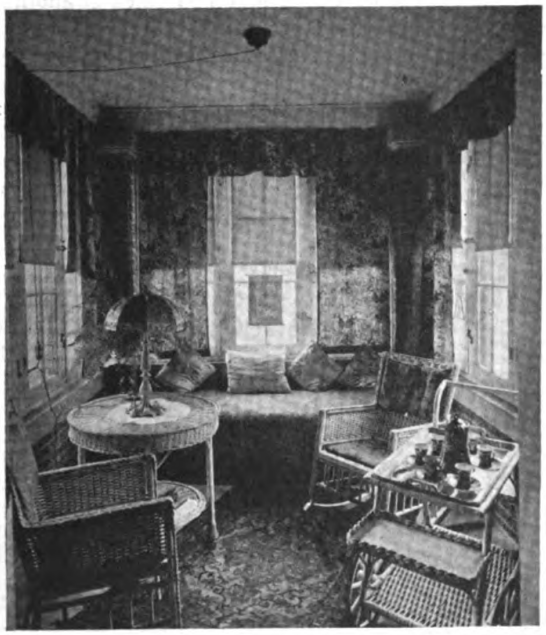
Comfort in the living room is synonymous with good lighting, either natural or artificial. It has been assumed that in the designing of the house the window spacing and window areas will give an attractive and home-like effect. It becomes necessary to see to it that in the artificial lighting of the living room the wires be so laid out as to make sufficient outlets to provide lights wherever they may be found necessary. Failure to attend to this necessary feature at the outset will lead to much after-expense and inconvenience and will also detract from the artistic aspect of the room by reason of long leading wires or make-shifts of electrical connections. So important is this item of artificial lighting that it will be treated in a separate article in a later issue. But with particular reference to the living room it may be noted at this point that the movable floor lamp is a particular convenience, and may at the same time serve as an object of considerable artistic interest. Generally speaking, the usual place for such a lamp would logically be on the side opposite the windows. Then when the failing afternoon light is insufficient for the whole room, the lamp may be used to economical advantage.

The living room in the low-cost house is also the proper place for whatever there may be of music. The victrola, the piano or the player-piano are eminently desirable where the dancing or singing or other musical performance may best go forward.

With this article there are presented some illustrations of living rooms of the low-cost house, together with examples of furnishing that are believed best adapted for the living-room. In the selection of furniture not only for this room but for any room in the house, good judgment will often accomplish a more home-like effect and one that indicates good taste and good breeding than will a long purse. In fact, it has often been noticed that in houses of even extremely low cost where the occupants have studied carefully the question of the furniture, a most excellent result has been obtained at a cost within that set by the dwellers of the house and in keeping with a well arranged budget.



A LIVING ROOM WHERE WICKER FURNITURE HAS BEEN USED TO GOOD ADVANTAGE.



A NOOK IN A MODERN LIVING ROOM. THE WINDOW SEAT AND WELL-SELECTED WICKER FURNITURE, TOGETHER WITH THE WINDOW DRAPERIES, COMBINE TO PRODUCE A MOST DESIRABLE RESULT.

It is possible to acquire a few small pieces, such as cigarette tables with their accessories for the men folk, or a formal sewing table that would not be out of place. Every room might well be equipped with a waste basket, and, stowed away out of sight, but in a definitely assigned place, scissors, pencils, paper and similarly often wanted and usually never found items.

Reference has already been made to the fact that good taste will often overcome the limitations of a short pocketbook and it is the object of this series of articles to indicate by well illustrated examples what the careful buyer may secure, place in his

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house and make it that home-like and attractive spot that should characterize the domestic atmosphere. Too fastidious or too loose a method of housekeeping can spoil all this. While disorderly and slovenly methods are to be discouraged, there is such a thing as too severe a formality. If the zealous housewife constantly goes about clearing things away, and overemphasizing an exact tidiness, she is likely to create a dislike for the very sight of the living room, and force the members of her family out of doors for their needed recreation.



A LIVING ROOM THAT SHOWS THE TASTE OF ITS OCCUPANTS. NOTE THE OLD PIANO AND THE ANTIQUE BRASS AND COPPER. THE BUILT-IN BOOKCASE FLUSH WITH THE WALL IS A GOOD FEATURE.

By combining in the living room something reminiscent of the interests of all the different members of the family it is possible to secure a unity in the home that can be obtained by no other means. Without a place where all may meet and find their own needs satisfied, a spirit of exclusiveness between members of the family may be engendered or fostered instead of the atmosphere of the interdependence which the home should properly beget.

The editors of BUILDING AGE have arranged for an expert who will answer fully and explicitly any inquiries that may be received from readers of this magazine. It is therefore urged that any reader who has a problem as to the furnishing of the low-cost house and its interior decoration communicate such question. The response will be given by mail and will be printed in the next succeeding issue of the magazine. The next room in the house to be treated in this series will be the dining-room.

Rhode Island Builders Organize

Master Builders Perfect New Organization to Promote Civic Welfare

Adjustment of local labor conditions to prevent, as far as possible, strikes in the future will be one of the chief objects of the newly organized Rhode Island Master Builders' Association. The organization, which hopes to include all other sections of the state, as well as Providence and Pawtucket, will co-operate in all possible ways with other organizations of a similar kind in other industries and with the Providence and other Chambers of Commerce in promoting civic welfare.

Ultimately it is hoped that the new organization, which really is a revival of the old Master Builders' Association, formed here nearly twenty years ago, will have affiliated with it such organizations in the building trades as the Master Painters', the Master Plumbers', the Master Masons' and Master Plasterers' Associations, and other associations of employers in the building trades.

Promotion of the common interests of the building trades generally, of both employers and employes, is the chief aim of the new organization.

While not insisting on the policy of the closed shop, most of the concerns now represented in the new association adhere to that policy, and many of them believe that it is essential to the promotion of the best interests of both capital and labor, at least locally.

Stabilization of wages at union rates is another part of the proposed program of the new organization. At present some concerns from outside the state, engaged in building operations, have been in the habit of upsetting the price of the local labor market by paying a slightly higher wage than those provided for in agreements entered into between building trades unions and individual employers. This has led, sometimes, to hard feelings and trouble has resulted. It is aimed to do away with this practice so far as possible after the new organization gets to running smoothly.

There has long been felt a need in this state for such an organization as has just been formed, it was said today. The master builders back of the move believe that through it they will be able to greatly help in many matters which vitally affect the community. They believe that through a central organization there can be effected a more perfect harmony between organized capital in the building trades and organized labor in the same business.

Officers of the association are: Peter A. Cruise, of Cruise & Smiley, president; George R. Humes, of the Humes Construction Company, vice-president; and A. W. Merchant, of Williams & Merchant, secretary and treasurer.

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Financing Building Operations

PART II

By G. P. WOODRUFF

REGARDLESS of the source from which the loan is sought there are certain standard things that every mortgagee, whether individual or corporation, will insist upon knowing, entirely apart from the matter of clear title which is taken for granted as the first fundamental. The clearer and franker the answers to these questions, the better.

Right here the observation may be made that in going after loans from individuals, the best procedure is to go through a broker or real estate agent, as the case may be. Not only is he a specialist and so more familiar with individual lenders, but he stands in a better position to represent the prospective mortgagor than the latter does himself. The agent's or broker's representations are those of a third party. While he is financially interested in the transaction to the extent of his commission, he has also a reputation to maintain as a real estate adviser whose opinions and statements are reliable and trustworthy. The prospective lender is likely to place more credence and faith in the statements of the broker or agent than in those of the party who is seeking the mortgage loan.

The value of the property is the first consideration in the mind of the prospective lender, for upon it depends not only his security but the amount he will be willing to loan. This amount varies, running as high as 66 2-3 per cent in the case of city property in excellent surroundings to a range of between 25 and 40 per cent in some sections of the country. Local custom determines largely the ratio to be loaned. Closely related to the intrinsic worth of the property is the suitability or commercial value of the building to be erected. Manifestly a residence or two-family house in a business district would not be regarded well by prospective lenders. Conversely stores situated on the streets out of the course of the business growth of the district or even on "the wrong side of the street" in small towns where one central street is the chief business thoroughfare cannot command as favorable consideration as buildings which are in harmony with their neighbors in character and construction.

The matter of construction is the third point that must be met, for upon it depends to a considerable extent the rate of the building's depreciation and the amount of income that will be taken each year to meet maintenance charges.

An intangible element, sometimes overlooked by small lenders, but one that every experienced individual and bank will consider, is that of the progress of the neighborhood. What was it ten years ago? What is it likely to be ten years hence? In large cities the sight is met constantly of fine old residences, once in good residential districts, now converted into cheap lodging houses because the residential district has grown away. In smaller towns the same changes are seen, though sometimes they are not so rapid. In a small town, not far from New York, business property on what was the main street fifteen years ago is now a drug in the market. Another street led more directly into the town from the railroad station. A new bank went up there, selecting the location because land was cheaper. A three-story office building arose near the bank. Now the street two blocks away from the former main business thoroughfare is lined with stores. Neighborhoods are always changing and the prospective lender, if he is prudent, will be inquiring not only, "Is this building suitable for its neighborhood to-day," but "Will it be suitable for its neighborhood ten years from now?" If it is a residence property, is the business district going to reach it and make it less valuable? If a business property, will the business district grow away from it or toward it—or remain stationary around it?

THE two matters of suitability of the building and growth of the town have a close relation to the fifth point—the matter of rentals. When the building is up the mortgagee will be looking to it chiefly for the interest on his money. Of course he does not care actually where the interest money comes from, but it is a favorable factor for the mortgagee to know that whatever takes place in the mortgagor's affairs, the income from rentals on the building which his mortgage covers is sufficient to pay the interest on his money. Of course the net rentals should show a margin over and above the interest requirements, and the greater this margin the greater the selling point for the loan. The character of the occupancy is a factor in this matter of rentals. A building occupied by concerns such as a drug store or a clothing store which remain in the same location year after year, in fact build up some measure of good will through location, has a better character to its rentals than a small apartment or to small residences where families may move in and out from year to year or oftener and where the chances for vacancies are greater.

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Finally there is the financial position of the builder himself. While it may be assumed that the lender estimates that his interest will be met from the rentals of the building on which he loans, what are its circumstances if rentals fall off and become insufficient for the purpose? It is here that the character, business reputation and financial position of the builder himself come in for consideration.

Straight mortgage loans may be of two kinds—building loans and permanent loans. They might be differentiated as temporary and permanent loans.

A BUILDING loan, as it is usually known, is an advance made primarily for the purpose of financing the erection of a building and it is paid in installments to the builder as certain prescribed steps in the building construction are completed. These steps are a matter of negotiation between borrower and lender and subject almost as a matter of course to unforeseen contingencies which may come up and make it necessary for the builder to have his money on a slightly different schedule or in different amounts. The mortgagee does not wish to take over the building and consequently is usually willing to make any necessary and reasonable concessions. Needless to say, in loans of this character, the reputation and standing of the builder are inquired into very carefully.

Permanent building loans are made by individuals and life insurance societies and title companies. They differ only from the strict building loan referred to above in that the term of the loan is longer. A loan of this sort, payable to the builder in installments as he completes various stages of his work, is one of the most advantageous forms of mortgage he can have. It is especially valuable for the builder who intends to sell his property. Since the mortgages do not call for amortization, his fixed charges are kept down and since the mortgages run for comparatively short terms, the buyer will have the option of continuing the mortgage if the arrangement can be made satisfactory to both parties or of making some other arrangement if he does not wish to continue with the loan on the property when he bought it. In cases where the mortgage covers a large tract and small parcels are sold as buildings are erected upon them, a most important point is the release of the small parcels as they are sold from the lien of the whole (or "blanket") mortgage. In such cases part of the purchase price goes toward paying off a proportionate part of the blanket mortgage. The holder has the net proceeds to devote to further operations.

An interesting development in the financing of sections where a large number of apartment buildings are erected is the plan of selling the houses, as erected, on the community plan of ownership. That is, instead of selling each house as erected, as a unit, the apartments are sold separately to tenants. Each tenant accordingly becomes the owner in fee of his own apartment and shares in the fixed charges, such as taxes, water rents, interest on mortgages, heating, etc., proportionately with the other tenants. The apartments may be paid for in a lump sum or on the installment plan, a certain proportion of the monthly payments going toward interest on the unpaid balance and the remainder being applied to the principal.

From the point of view of the builder, this has the advantage of moving his realty more rapidly and surely, since there are far more prospective small purchasers than large ones. The money coming in from such sales furnishes him constantly with further funds for continued building and keeps cutting down his share of operating expenses in the apartments so sold. It creates, too, an intangible element of good will in having a large and growing number of people who are actual owners of property in his section. For the tenant, it offers a plan of buying an apartment at payments only slightly in advance of the usual rentals with the knowledge that eventually he will own his own home.

LAST summer a bill was presented in Congress for the purpose of establishing a Home Loan Bank system, designed to accomplish for the realty man and builder what the Federal Land Bank system is accomplishing for the farmer. While the bill did not become law the discussion at the time of its framing served a helpful purpose in directing attention to the matter of real estate finance.

At present we are without any centralized or systematized means of financing real estate operations. The Building and Loan Associations and the title guaranty companies each have an important place in the field, but the major part of loans on real estate are secured by short time mortgages. These are not the most desirable from the mortgagor's standpoint, for, while the loan often is permitted to remain beyond the term of the mortgage, yet after that short term it may be called on an interest date by the mortgagee. The lender's security is not readily available for collateral and in the case of large mortgages it is more difficult to secure a lump sum from one source than from a number of individual lenders on a smaller scale.

Various large companies now make a practice of lending and issuing bonds against the individual security. This is an excellent arrangement, so far as it goes. What everyone interested in real estate and building affairs would find advantageous would be the general introduction of such a system so that bonds issued against real estate as security might

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in time become as popular and favorably regarded a form of investment as in continental Europe.

The bill referred to proposed to form a Federal Home Loan bank with which Building and Loan Associations might pledge their mortgagee, whereupon the bank would issue tax exempt debentures against them. There were several objections to the plan from an economic standpoint. The germ of an idea is there, however, and it is possible some similar plan may be worked out. At all events the plan of financing through bond issues against real estate is sound and one that is deserving of every attention and consideration.

With the improved tone in the building field attention is bound to be concentrated on financing for some time to come. The Building and Loan Associations with their provision for automatic amortization of loans occupy a strong position in the field so far as the individual home builder is concerned.

A Correction

In the review of the publication, "Brick, How to Build and Estimate," gotten out by the Common Brick Manufacturers' Association of America, Chicago, Ill., appearing in the November issue of BUILDING AGE, the statement was made that the book would be sent free to all inquirers. We have been advised that this was incorrect, a charge of 25 cents being made to architects, contractors and builders. To others not engaged in the building industry, the price is $1.00 per copy.

Building Trades Co-operate

Oregon Builders Seek to Perfect Closer Relations

Plans for closer co-operation between the architects and the building contractors of Portland, Ore., have been furthered through the adoption of a resolution protesting against submitting bids in segregated form. The resolution urges contractors not to become mere brokers for smaller contractors and urges further that the architect act not as a contractor, but be prepared to judge the competency of bidders and to give the contract to the lowest and best bidder.

The resolution in question, which marks quite a departure in local building relationships, was first brought forward by the Northwest Master Builders' Association at an executive session in Tacoma in November. Being passed there, it was presented to the local organizations in the Northwest for consideration. A short time ago the General Building Contractors' Association of Portland passed the resolution, and last week the local branch of the American Institute of Architects took similar action, with a slight proviso. The substance of the resolution is given below:

That bids should not be submitted in segregated form; that general contractors should not sublet work to the extent that they become merely brokers; peddling of bids should not be allowed and contractors should not furnish plans for heating, electrical or mechanical equipment or layouts on which bids are to be submitted by other contractors. Architects should determine the competency of all bidders in advance of taken bids and be prepared to give the work to the lowest bidder. Architects should not act as contractors.

The proviso passed by the architects when they accepted the resolution was as follows:

"All provided, however, that by segregated bids is meant that the brick, masonry work and carpenter work are to be classed as one contract, and that the right is reserved by us to take segregated bids for work done by the other trades."

The matter was presented to the architects by Carl Stebinger and O. G. Hughson, who were appointed a committee by the general building contractors to confer with the architects.

Announcement

The subject of heating is of such vital importance to the home owner, influencing as it does his health and comfort, in a large portion of the country, for six months during the year, that the editors of BUILDING AGE have believed it wise to present this subject to its readers in its entirety. To this end a series of articles fully covering all types of heating systems suitable for the moderate sized residences have been prepared by Charles L. Hubbard, an acknowledged authority on the subject. The first of these will appear in the April issue of BUILDING AGE.

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Editorial

The Builder in the Small Community

A Question of Patriotism and Civic Duty

THE sense of civic duty and a well-developed civic pride go hand in hand. Service to one's country during a time of war shows the right degree of patriotism and a realization of duties to be performed. But there are duties equally patriotic and equally necessary that every man owes in time of peace which have as far-reaching effect in the safeguarding and upbuilding of the nation as those he may have performed on the very firing line.

"Peace hath its victories, no less renowned than war" A grateful people will not in time of peace pin medals on the breast of citizens who have done valuable service, but they will by an attitude of respect and confidence so build up a man's reputation that he will hand down to his children a heritage of a patriotically gained power for citizenship.

It has always seemed that the average man finds better opportunities for public service in the smaller communities. It is in those localities where perhaps through many years of intimate association, often from birth, that there has grown up a relation more intimate than it is ever possible to attain in large cities.

Such types of loyal men in small communities, working a field in which they have long and faithfully delved, will naturally identify themselves with such civic betterments as by actual knowledge they are best fitted to understand.

LET us take for example the architect and the builder in the small towns and cities all over this country. With the return to peaceful pursuits of our citizen army of upwards of two million men, the majority of whom have had the rare opportunity of seeing the ways of living in European towns; and with the resumption by this large body of men of their former work in the small towns which they left to answer to call to war, it is natural to expect that they will have become broader, more progressive, and more efficient men.

Those of the number who before entering the service were engaged in any one of the many industries allied to building will have had opportunities to learn, far excelling those of a university. Their knowledge will be of the most practical character. It is on these men that there will devolve certain civic duties as insistent as those arbitrary regulations that ruled their military life.

The retardance of building operations during the war has created a scarcity of low cost houses that has been conservatively estimated at more than one million. Haste will be made to catch up with building needs and it is unfortunately true that in that haste good designs and proper planning will many times be sacrificed. It becomes the duty of every architect and builder living in the smaller towns and cities to watch the growth of the new buildings and to urge with all the power he has that feverish haste must not be permitted to create a commonplace type of structure which will be a menace to the growth of his town and a reproach to its artistic aspect.

A duty of good citizenship which becomes an obligation to the architect and builder in small communities is to see to it that the memorials proposed to be erected to our heroic dead become not a disrespectful reminder of an awkwardly expressed gratitude.

EVERY man of mature years recalls that after the Civil War there sprang up in all small communities so-called "soldier memorials." Undoubtedly the sentiment that was back of these was one of pure gratitude and patriotism. But one has only to view these cast-iron figures to feel that they are an inartistic impediment to the artistic growth of many civic centers and will not long be permitted to stand. So, then, it will be a patriotic as well as a civic duty to avoid as far as possible similar mistakes in our present war memorials.

BUILDING AGE urges its readers carefully to consider not only the matter of these memorial but also that of the proper designs and planning of the many town additions that are being made in countless localities.

As to war materials, the American Fine Arts Federation, through a large and well-composed committee, is prepared to give such assistance to these matters as will secure the very best artistic results.

In this connection BUILDING AGE will co-operate with its readers, as it will also co-operate in every way that it can toward the development of better design and planning of every type of structure that our enormous building program now makes necessary.

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Better Homes in Concrete

THE trend towards better homes is seen in the calling of a National Conference on Concrete House Construction in Chicago February 17, 18 and 19.

Compared with brick and timber, concrete has been used only in the construction of small homes to a limited extent. Many small houses that have proven satisfactory have been built during recent years of reinforced concrete. There seems to be no reason why this form of construction should not be more largely employed in building the small house.

In order to bring costs down, a certain degree of standardization will be necessary. Six room reinforced concrete houses of standardized types have been erected in various parts of the United States at prices ranging from $2,500 to $3,500. It seems impossible to duplicate these costs with any other type of construction. With reinforced concrete, the problem appears to be one of producing houses possessing an artistic appearance and a certain element of individuality without sacrificing the economy attendant upon standardization.

It is to be hoped that, as a result of this concrete housing conference, a movement tending to relieve the present shortage of houses and make for improvement and economy in construction will be initiated.

Modern practice in the execution of concrete housing projects will be one of the chief topics for consideration. During the same week the annual meetings of the American Concrete Institute, the Concrete Products Association, the Concrete Block Machinery Association, and the American Concrete Pipe Association will be held at the same hotel, so that an opportunity is offered each visitor for attendance at the sessions of most interest to him in the several conventions.

The purpose of the Conference is twofold: first, to consider the housing problem in the United States and Canada; second, to present, crystallize and make available information regarding the most modern practice in the construction of concrete houses and concrete housing projects. Every phase of the housing problem will be considered.

Building Operations During December

BUILDING operations during December, 1919, as compared with the corresponding period of 1918 show a remarkable increase and indicate a revival in building in the United States such as this country has never before seen.

The total number of permits supplied during December, 1919, amounted to 25,126. These had an average value of $6,103. For the corresponding period during 1918 there were 12,875 permits issued having an average value per permit of $1,703.

The total valuation throughout the United States as indicated by the special reports received by BUILDING AGE show for December the enormous total of $153,353,895. For last year in the same period, these permits amounted to $21,928,868.

It must be borne in mind, of course, that December, 1918, was the month that followed the signing of the armistice and this country so far as its building operations were concerned was absolutely at a standstill. The increase of more than 650 per cent indicates how quickly the country has recuperated from a building depression made necessary through competition with the Government's building during the war.

Even with this enormous figure before us, we are confronted with the fact that we are a year behind in building to meet the necessities of our rapidly growing population. Particularly is this true as to the small house. It is believed that the retardance in this particular field is being gradually overcome by a better means of financing these small operations. It can be assumed that the building next Spring, particularly of the low-cost-house, will reach proportions never before known in the United States.

A comparison is given below of the regional distribution of the valuation of building permits:

	December, 1919.	December, 1918.	Year 1919.	Year 1918.
Eastern.	$75,916,831	$8,051,133	$547,340,135	$149,540,314
Middle..	42,163,309	6,178,876	480,211,200	168,232,627
Southern	21,715,776	3,754,621	206,329,631	49,792,754
Western.	13,557,979	3,944,238	134,832,671	44,183,908
Total.	$153,353,895	$21,928,868	$1,368,713,637	$411,749,613
Excess..	$131,425,027		$956,964,024	

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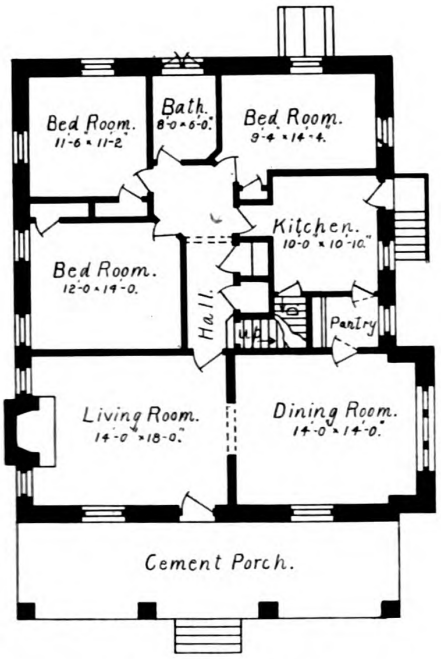
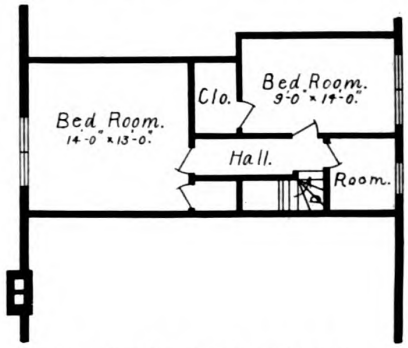


FIRST FLOOR PLAN

THIS attractive, all-the-year-around bungalow, is built of stone and is a good example of the ledge-stone work that is to be found in the vicinity of Philadelphia.

It is unusually commodious, having three bedrooms on the first floor and two in the second story. The closing of but one door shuts off the



PLAN OF SECOND STORY

strictly domestic part of the house from the living and dining room.

The ledge-stone chimney and the pergola lend a decorative aspect to the exterior.

A Stone Bungalow at Narberth, Pa.

Victor D. Abel, *Architect*

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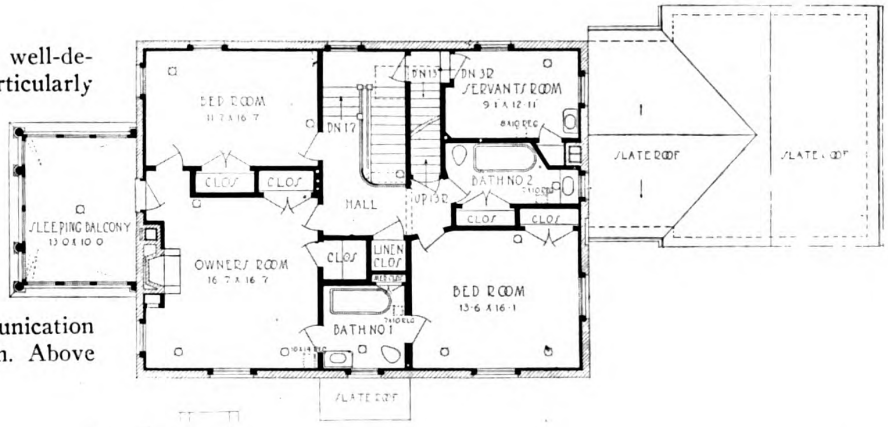
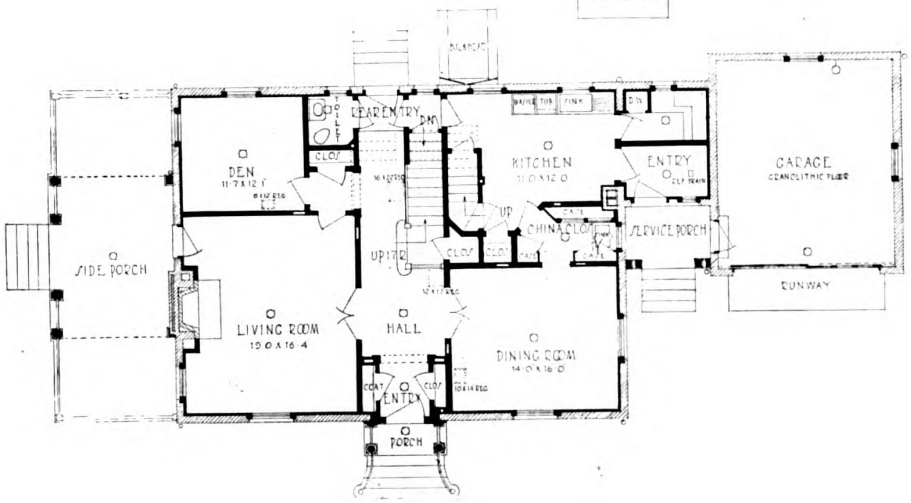
House of Mr. William Rogers, Braintree, Mass.

Coolidge & Carlson
Architects

THE plan of this well-designed house is particularly good. The centrally planned hall with the living room and dining room on axis is always a feature that makes for home comforts A feature of the first floor is the sun porch, with communication with den and living room. Above





the sun porch and on second floor is the sleeping porch, a feature that can with much satisfaction become a part of every suburban house. The design of the exterior presents a carefully considered example of the well built modern house.

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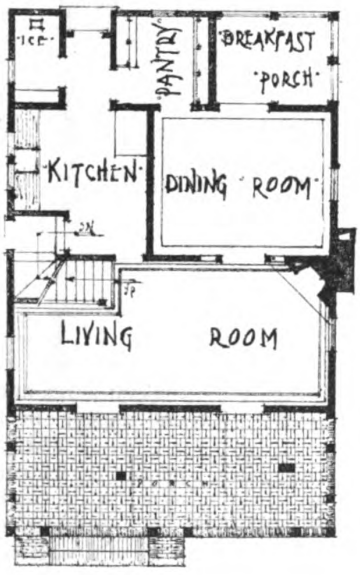
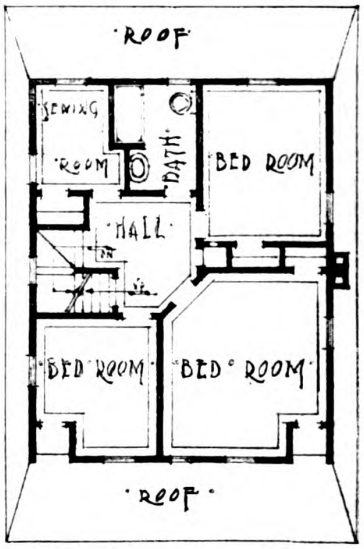
A Dutch Colonial House With Modified Gambrel Roof at Maplewood, N. J.



Kenneth W. Dalzell
Architect



THIS type of house admirably carries out the traditions of its neighborhood. The sweeping lines of the roof and the wide clap-boards suggest the early types of houses that existed at one time in this neighborhood, but are gradually disappearing owing to age and neglect.

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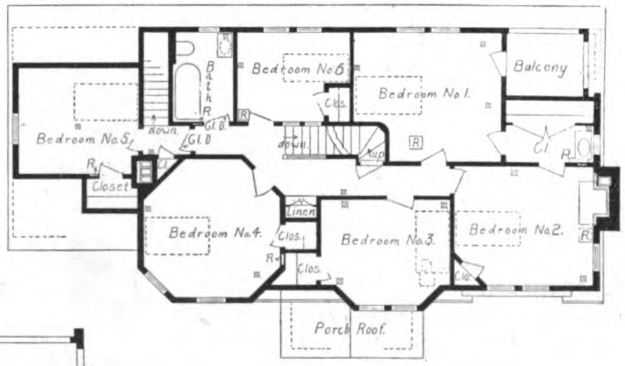
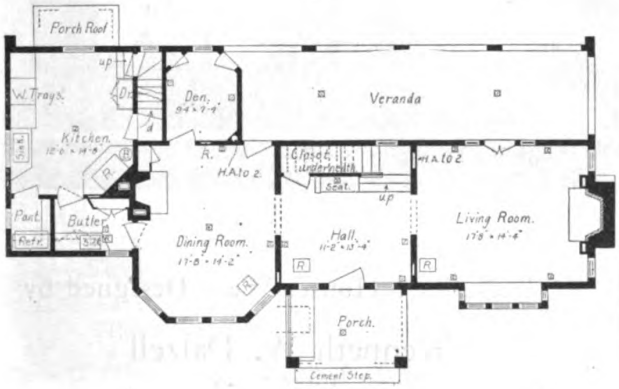
Stucco and Half Timbered
House at
Lawrence Park, N. Y.





Messrs. Bates & How
Architects

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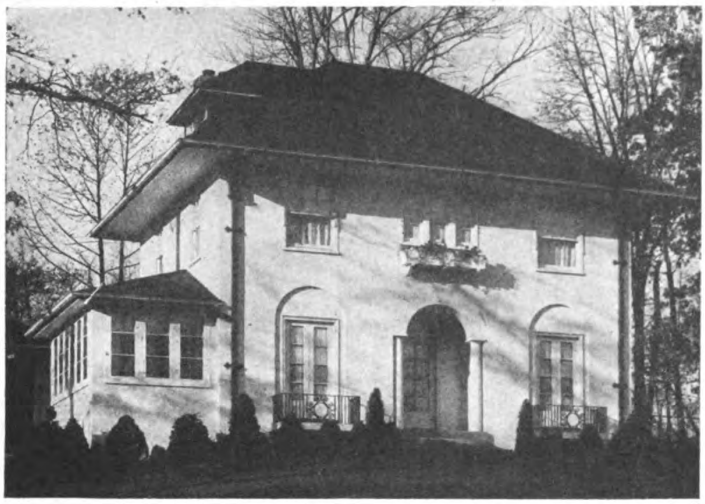
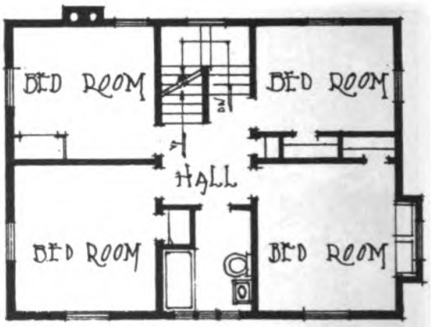


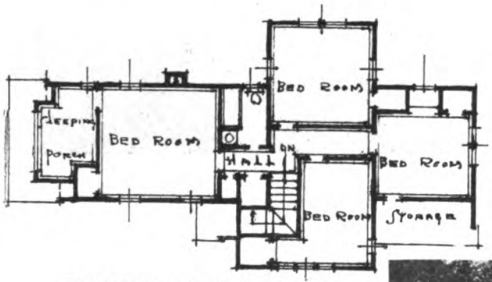
A House at Maplewood, N. J., With Seven Rooms. Note the Spacious Living Room and Sun Parlor



SECOND FLOOR PLAN



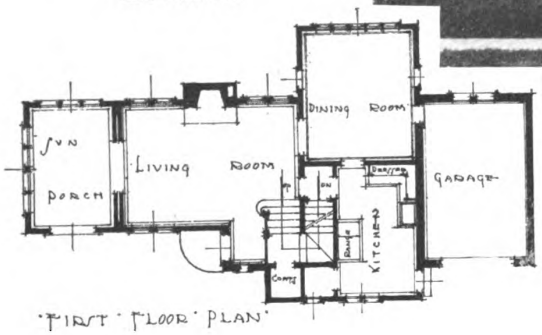
FIRST FLOOR PLAN



SECOND FLOOR PLAN



The House at Right is Also Located at Maplewood. Note the Convenient and Roomy Arrangement of First Floor, a Plan Very Desirable for a Suburban Location



FIRST FLOOR PLAN

These Two Houses Were Designed by

Kenneth W. Dalzell
Architect

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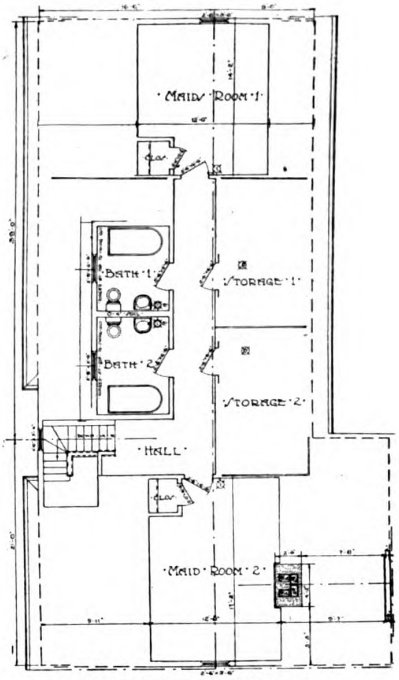
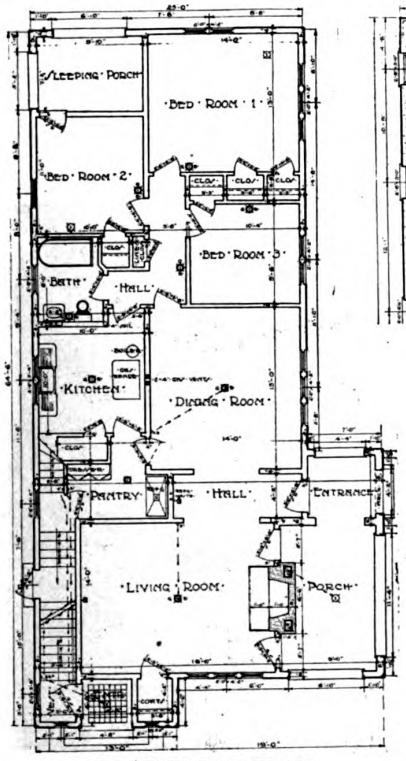
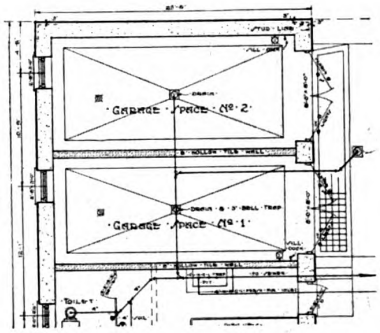


THIRD FLOOR PLAN

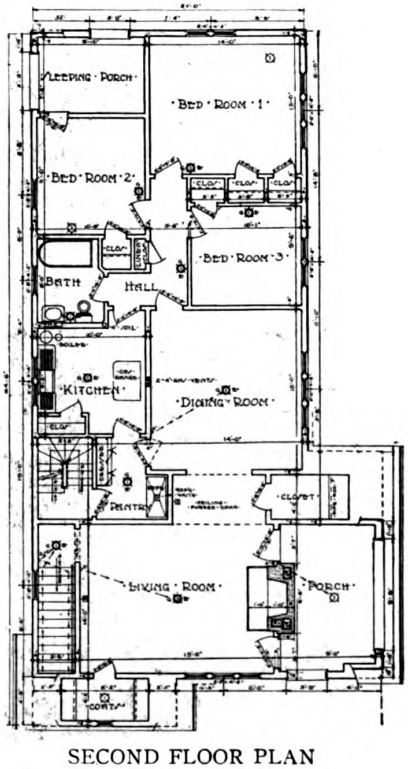


FIRST FLOOR PLAN



PLAN OF REAR OF CELLAR, SHOWING LOCATION OF TWO GARAGES

Lewis Bowman
Architect



SECOND FLOOR PLAN

A Two-Family House at Mount Vernon, N. Y.

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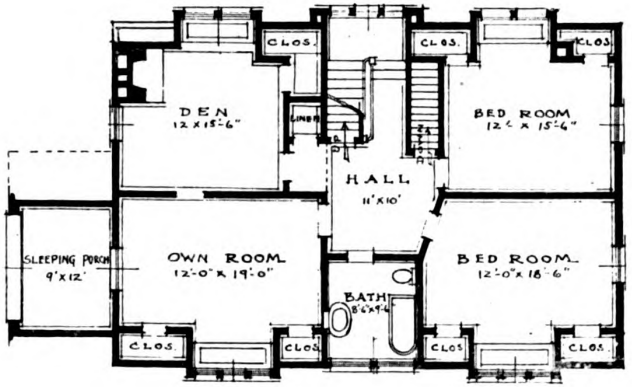
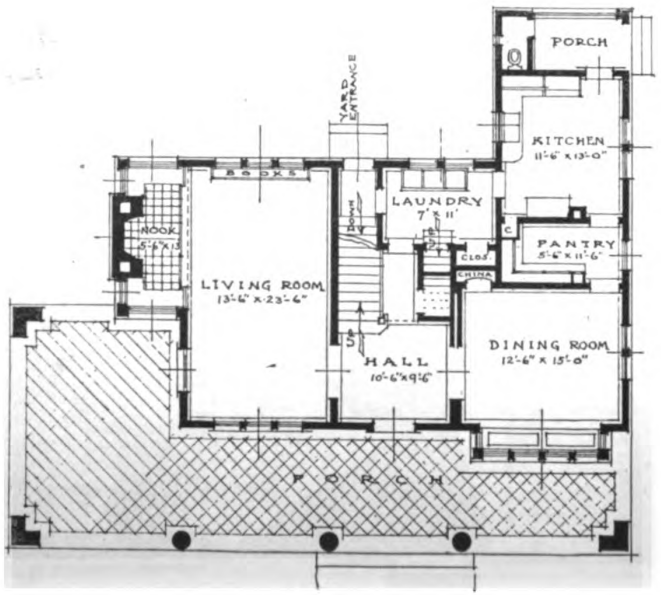


A Seven-Room House at Lansdowne, Pa.



Heacock
&
Hokanson
Architects



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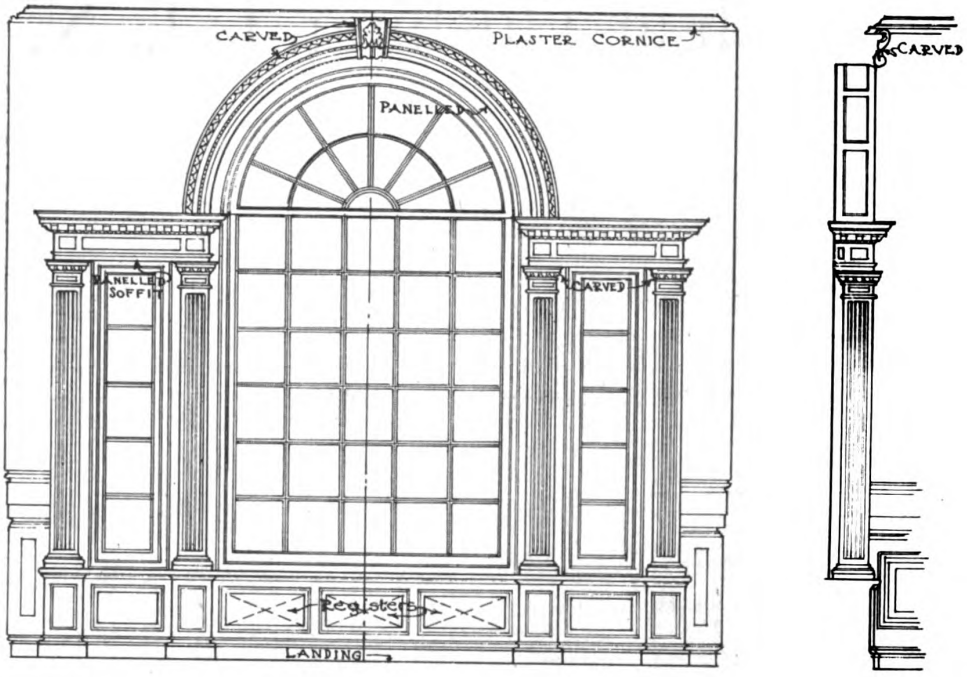

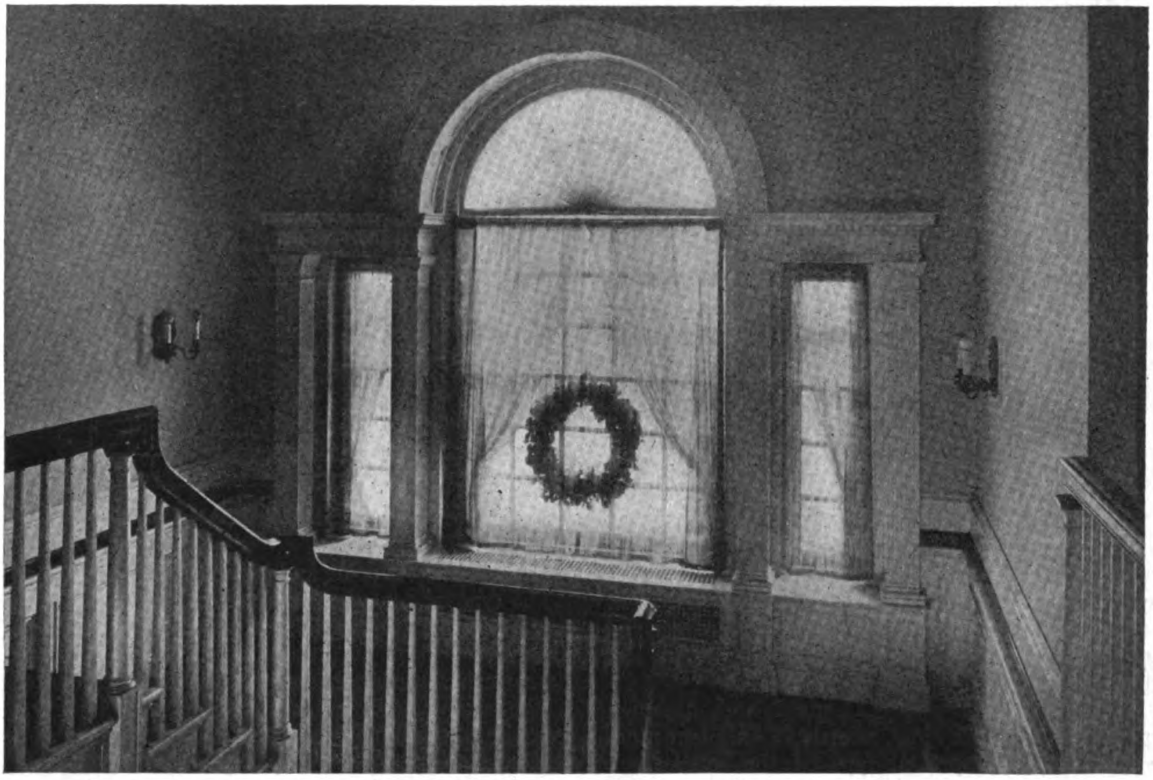

VIEW AND DETAIL OF WINDOW ON STAIR LANDING, HOUSE OF MR. CHAS. LeB. HOMER, PHILADELPHIA, PA.

WALTER T. KARCHER & LIVINGSTONE SMITH, *ARCHITECTS*

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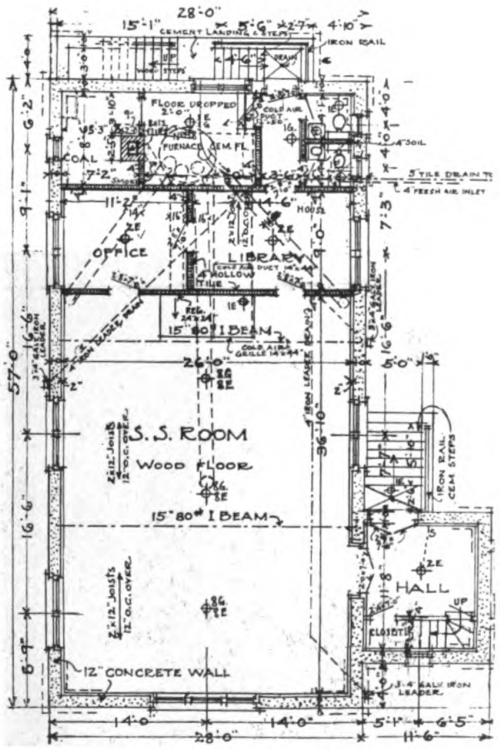
A Church at Flushing, L. I., N. Y.

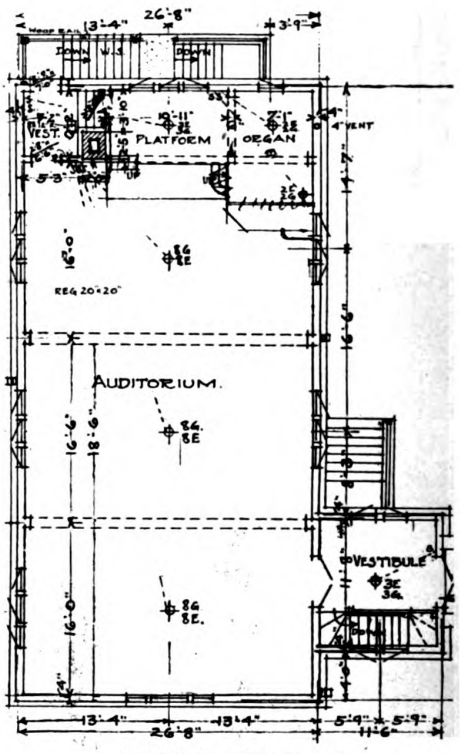
BATES & HOW, *Architects*

THE unmistakable tendency toward suburban life is causing many city dwellers to seek a home in nearby suburbs and to transfer to a location that affords better opportunities for social intercourse and the proper rearing of families with their usual social customs. There they will carry forward such duties recreative of the daily life as may suggest themselves. The small church in the suburban town has already felt the influence of this class of people, who, being bred to city ideals, have found it impossible entirely to dissociate them from their new surroundings. They have therefore seen to it that the churches, school houses and town halls and buildings of similar class have received very careful consideration as to their design and plan.

The church at Flushing, Long Island, designed by Messrs. Bates & How, affords an excellent illustration of the improved type of the small town church. Not only is it an exceedingly attractive building in its design, but it combines in its plan the necessary features which have to do with its ritual and forms of services and also affords opportunity to make the church, in a sense, a social center and meeting house on every appropriate occasion. The architects have designed and planned a most attractive church building and one in which the dwellers in the community may take a very proper pride. In fact, the attention which is being given to this type of building not only indicates a proper religious sprit, but it is also a very safe and sure expresson of civic pride and correct habits of living.



BASEMENT PLAN



MAIN FLOOR PLAN

The type of construction employed combines two very necessary things in the small town church, inasmuch as it is of durable construction, and as the materials used are low in cost. It is evidence of the artistic skill of the architect and builder, when he has completed a work at the lowest possible cost and has shown by a good knowledge of materials and their handling that he is able to

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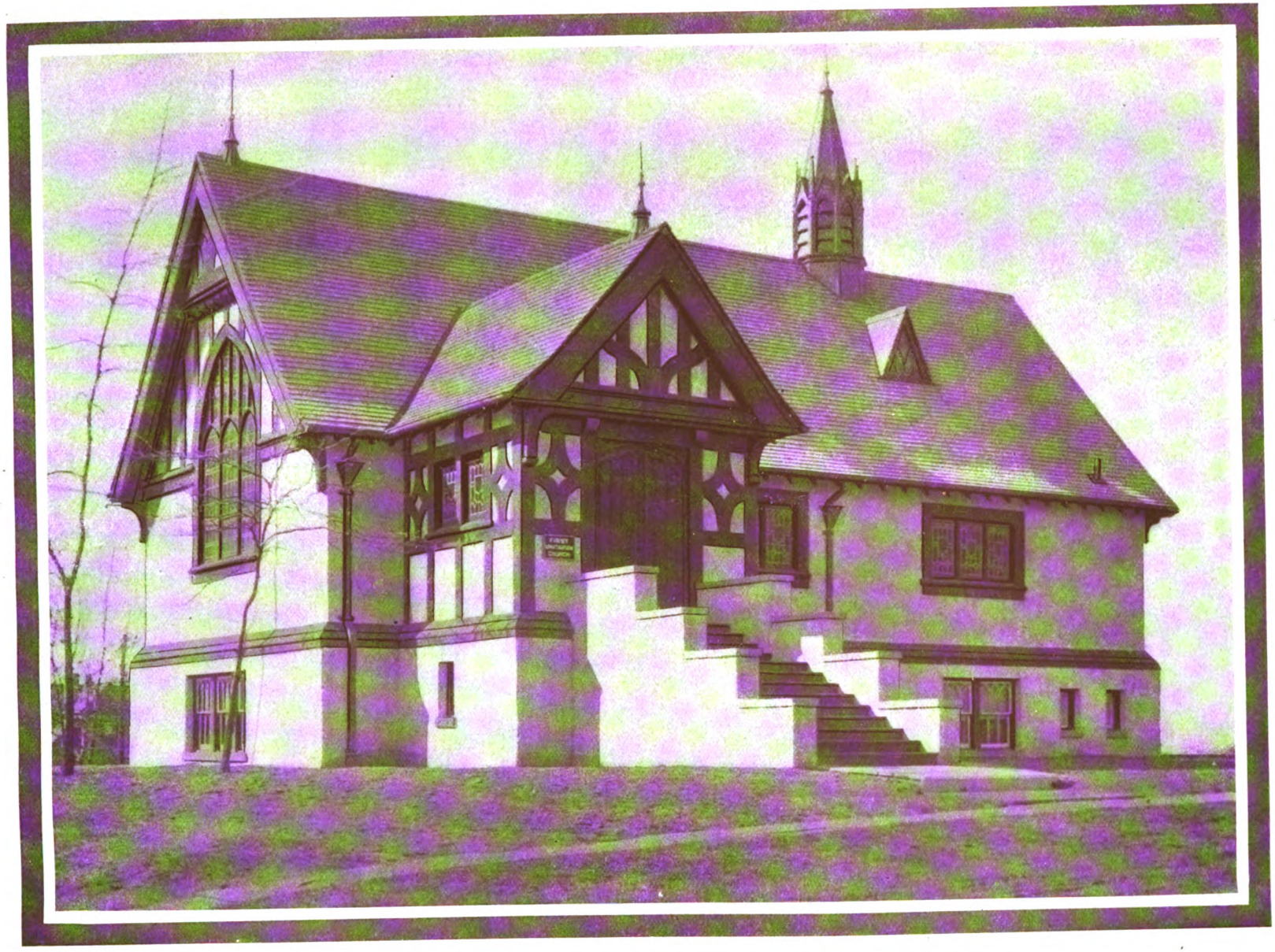

Building Age

Church at Flushing, Long Island, N. Y. Bates & How, Architects

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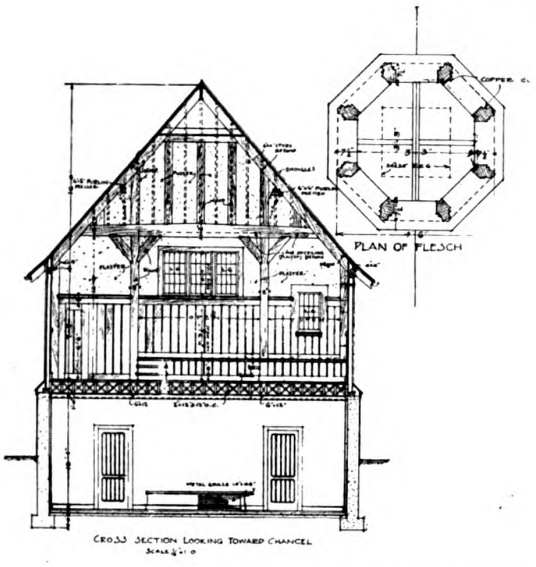
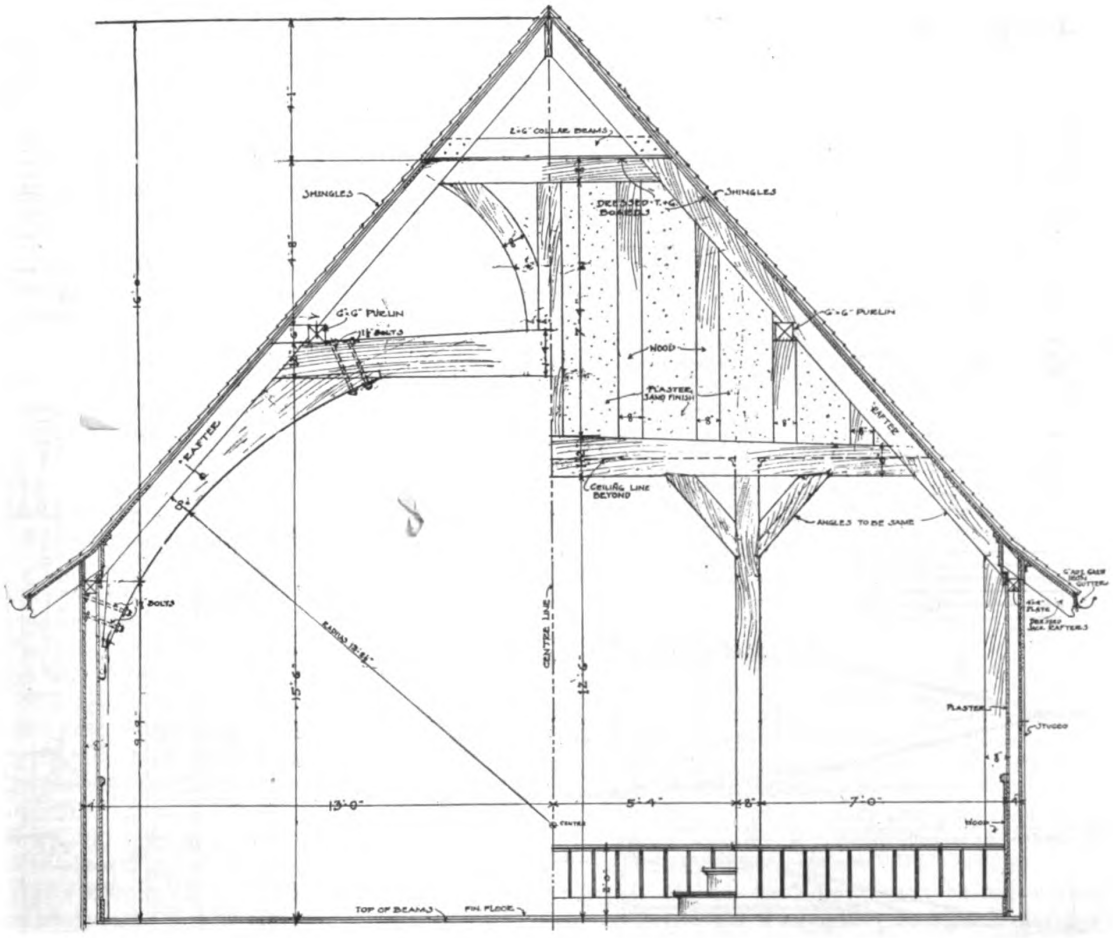


Church at Flushing, L. I., N. Y.

Bates & How
Architects



HALF ELEVATION OF TRUSS

HALF ELEVATION OF CHANCEL FRONT

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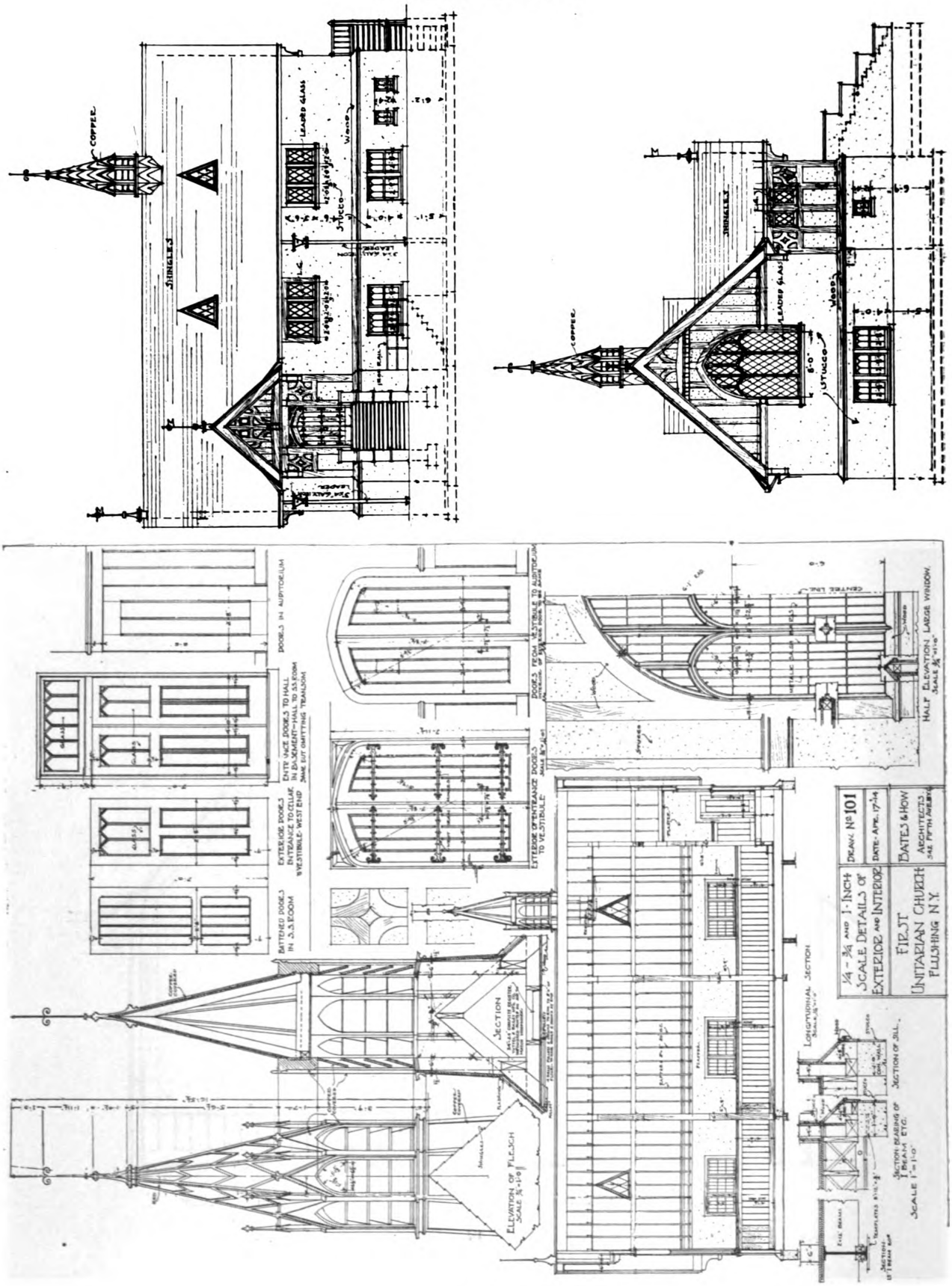

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combine the lowest possible price with the most artistic result.

Reference to the plans will show that ample provision for the needs of the congregation has been made, not only for the religious uses of the building but also the social gatherings, which are part of the community life that gathers about the church in small towns. On the basement floor, which is but slightly below grade, there is located a Sunday School room, an office and a library, together with the necessary toilet facilities and adequate room for the storage and furnace space.

Winter Work for Painters

How to Keep Your Men Employed During the Dull Season

The average master painter finds difficulty in keeping his journeymen employed during the winter. Because of the large amount of lost time suffered by all painters, many good men have taken advantage of the present abnormal demand for labor to take up other lines of work. As a result of this unfortunate situation there is, in some localities, a decided shortage of painters, and masters are prevented from promptly getting men in sufficient numbers when jobs are offered.

Someone once defined salesmanship as applied suggestion. Master painters could keep their men much more fully employed than they do, and with profit to themselves, too, if in their advertising they would first suggest the desirability of freshening up the interior woodwork of homes, and second, emphasizing the fact that the winter season is the ideal time to have it done. They might even frankly say that one of the objects was to keep the painters busy in what is usually their slack season. That's a talking point nowadays. There is greater interest to-day in the public welfare than there was a few years ago. Everybody likes to see everybody else employed. Production in contra-distinction to idleness, can always be stressed with success.

Many home owners watch their exteriors more or less carefully and paint when necessary. The painter has an opportunity to point out why interior painting is also a good investment. The master painter knows this; thousands of home owners do not.

Then, too, he may take advantage of the vogue for painted interior walls, using the now popular flat or gloss interior paints. Women, and men, too, for that matter, like changes in their homes. Suggest taking off the wall paper in some of the rooms and substituting painted walls. That will make work for the painters; then, when they tire of the paint, they can paper again, making work for the paperhangers. Everybody benefits; everybody gets a share of the work and the profits; the home owner gets the satisfaction of a change that will be pleasing.

You know our grandfathers did not believe they could have strawberries in winter. But a later generation found that not only the berries, but the demand for them, could be forced out of season. The same general principle can be applied to winter painting. The time will come when his Satanic Majesty may have ice cream and when the Eskimo may eat honeydew melon for his Christmas dinner.

Data on Furnace Heating

A Helpful Bulletin From the University of Illinois Experiment Station

A preliminary report of progress under the present co-operative agreement between the National Warm-Air Heating and Ventilating Association and the University of Illinois for an investigation of warm-air furnaces and furnace heating systems, has been issued by the Engineering Experiment Station of the University of Illinois as Bulletin 112, by Professor A. C. Willard.

The principal objects of the investigation are:

(1) To determine the efficiency and capacity of commercial warm-air furnaces under conditions similar to those existing in actual installations with leaders, stacks, and registers to form a complete system.

(2) To determine satisfactory and simple methods for rating furnaces so that the proper size and type of furnace can be definitely selected for the service required.

(3) To determine methods of increasing efficiency and capacity of furnace heating equipment and the advantages or desirability of certain types of design.

(4) To determine the heat losses in furnace heating systems and the value of insulating materials as affecting the economy of the furnace or the leaders and stacks, and finally of the system as a whole.

(5) To determine the proper sizes and proportions of leaders, stacks, and registers supplying air to first, second, and third floors.

(6) To determine the friction losses in the cold air of recirculating ducts and registers and their proper size, proportions, and arrangement or location.

(7) Eventually, to make a study and comparison of outside and inside air circulation as affecting the economy and operation of furnace systems.

Copies of Bulletin No. 112 may be had without charge by addressing the Engineering Experiment Station, Urbana, Illinois.

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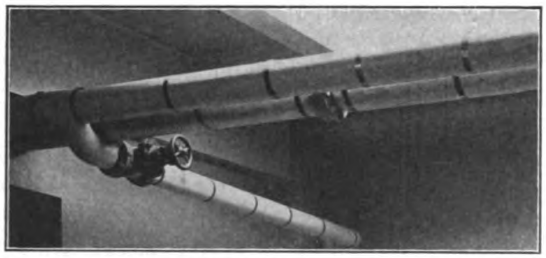
Stopping That Leak in the Coal Bin

Being a Description of Many Possible Economies Which Will Materially Reduce the Coal Bill

MANY a man is kept from purchasing an automobile, not because of the initial cost, but rather on account of the expense of its upkeep. It is surprising to find the average home owner interested almost exclusively in the initial cost of the home and paying but slight attention to the cost of operation after he has purchased and occupied it.

Probably no single item adds so much to the maintenance cost of the house of moderate size as the cost of fuel for heating purposes.

While the automobile purchaser is intensely interested in the type of engine and other mechanical features connected with the operation of the vehicle, the prospective home owner pays practically no attention to the type of heating system installed,



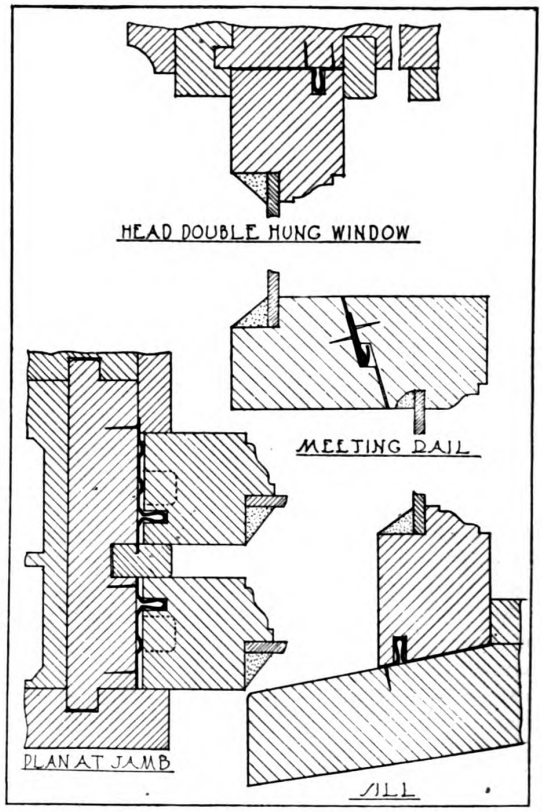
AN INSTALLATION ILLUSTRATING THE PROPER METHOD OF COVERING STEAM PIPES

its merits or defects, and assumes that the builder has provided everything necessary for proper operation—demanding at the same time the lowest possible cost of construction.

If all prospective home owners would give careful and intelligent attention to this one item they would reduce the cost of operation of the home by an appreciable amount annually.

It is not the present purpose to describe the correct methods of design and installation of heating systems, as these are covered in other articles in this and subsequent issues of BUILDING AGE. This article will deal with possible economies in the system already installed. It is doubtful whether in any dwelling the operation of the heating plant is conducted at the lowest possible cost, and with the greatest degree of satisfaction.

Statistical data show that the annual coal consumption for domestic purposes in the United States is approximately 120,000,000 tons, of which it is estimated that two-thirds, or 80,000,000 tons, are consumed for residence heating. A conservative estimate of the amount of fuel wasted is 20,000,000 tons per year. Just how much of this the reader is paying for is for him to determine, but there is



DETAILS OF CONSTRUCTION ILLUSTRATING METHOD OF INSTALLING METAL WEATHER STRIPPING

no doubt that almost every person owning a home is adding more or less to this tremendous waste.

The economies which can be effected divide themselves naturally into two phases: (1) Improvements in the heating equipment proper and in the construction of the building itself, and (2) improvements in the operation of the heating plant.

It will need but little argument to convince any-

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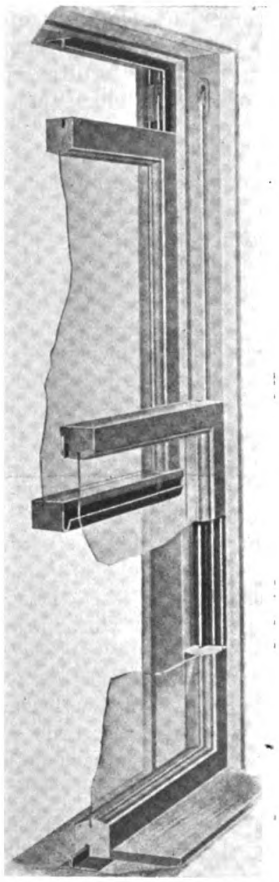
one of the fact that considerable heat is lost at window and door openings. The most efficient heating system will hardly produce comfortable conditions for a person sitting in a room alongside a window when the temperature out doors is zero. The average size window permits the same amount of air to blow through the crack between frame and sash as a clear opening of from fifteen to thirty square inches, depending upon the tightness with which the sash fits. How many persons would long permit a broken pane of glass containing a hole of this size to remain unreplaced? Consider this condition existing at every window and one will then realize the reason the heating system often produces unsatisfactory results when the mercury flirts with the zero mark.



DOUBLE HUNG WINDOW EQUIPPED WITH METAL WEATHER STRIPS

The remedy for this condition is weather-stripping. The old-fashioned type of weather-strip was often an eyesore, and at best only partially successful in keeping out the draft. At the present time there are on the market several types of metal strips which will give entire satisfaction and prove a most excellent investment.

With all windows and exterior doors thus properly weather-stripped a considerable decrease in the heat lost and therefore in the coal consumption will be effected. At the same time the dwelling will be more comfortable for the occupants.

Another experience of Mr. Home Owner, all too common, is this:

The day is cold without, and, in fact, conditions within are really not very much better. Sitting reading in the living room is found too chilly for comfort, so a hasty trip to the cellar is made to determine why the furnace isn't coming up to expectations. As the cellar door is opened a warm breeze is wafted from below that gives visions of Palm Beach or perhaps the Sahara desert. In many cases this high cellar temperature is considered due to the furnace being located therein. This, however, is not entirely the case.

WHERE a hot air furnace is provided the large heating ducts radiate therefrom in the cellar just below the first floor beams, and in the case of the steam or hot water heating system the mains circulate around the cellar ceiling. As a matter of fact the excess heat which occurs in the cellar is heat which was intended to be transmitted through the heating ducts and flues or by the pipes to the upper stories, but which has been lost in transit. Almost all of this heat can be delivered to its proper place by covering with heat insulating material all ducts or pipes in the basement. Hot air ducts should be covered with asbestos at least ⅛ in. thick or with air cell covering. For steam or hot water pipes any of the types of covering illustrated will give satisfaction.

In the case of the steam or hot water boiler, this should also be covered with magnesia or at least 1½ inches of asbestos cement wired on to prevent cracking. The proper covering of boiler and mains will result in a considerable saving.

During the months that the average steam heating system is in operation there is a sound which by its frequency becomes most familiar. It is commonly known as the whistling radiator air valve. A procedure gone through every morning by thousands of home owners is to arise early, shake the fire, put on the drafts, go through all the rooms unscrewing the caps on the air valves and then to quickly retire under the covers until the house warms up, only to be awakened a little later by the whistling air valves. This necessitates a hurried trip through all the rooms, again screwing on the valve caps, an operation often accompanied with the burning of fingers as well as damage to the nearby furniture and wall decorations from the escaping steam.

Unless the architect distinctly specifies one of the better types of air valves, the cheapest type is used. These valves, while supposed to work automatically, that is, to close when all air in the radiator is exhausted, are in almost every instance a constant source of trouble. If screwed tight enough to prevent the escape of steam they later cause the radiator to become air bound. There are at the present time many good makes of air valves available which will give entire satisfaction. These permit the escape of air, but close automatically just as soon as the steam fills the radiator. They do not whistle nor sputter, and form an asset to any heating system not already provided with them.

Usually the radiator valves which govern the sup-

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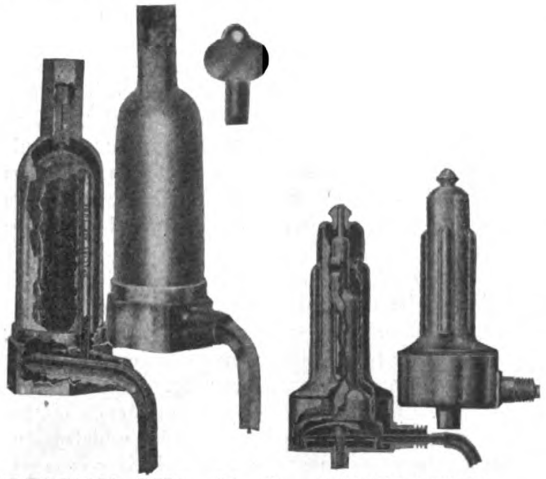
ply of steam to the radiator are of a cheap or moderate priced type, provided with a stuffing box, and not tight after a continued use of several years. It is a simple matter to repack these valves, and this should be done to every radiator supply valve which shows any indication of leaking. Of course in the original installation one of the better type of valves would be desirable, but it is doubtful whether it would pay to remove all of the radiator valves after the heating system has been installed, and repacking will usually keep the valve tight for a number of years.



ADJUSTABLE TYPE. TO ADJUST, KEY IS NECESSARY

NON-ADJUSTABLE TYPE

TWO TYPES OF RELIABLE RADIATOR AIR VALVES

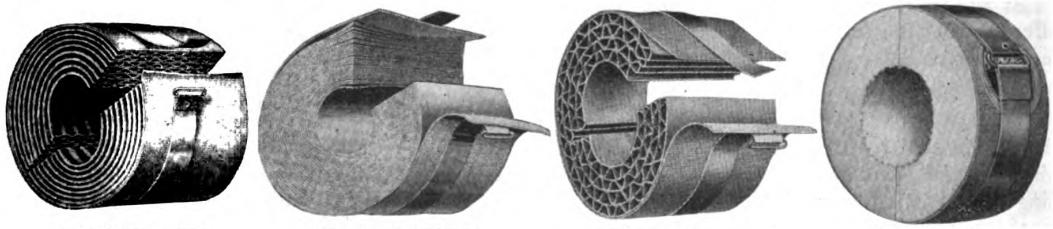
In the operation of the heating system the human element should be eliminated as far as possible. One person may think that a room is cold and open the furnace drafts to get more heat, whereas another will think that the room at the same temperature is altogether too warm. By installing thermostatic control the human element is eliminated. This device is set at the desired temperature and by it the furnace drafts will work automatically. Thus the proper temperature will be maintained irrespective of any one's individual feelings. If set at, say, 68 degrees, then as soon as the temperature in the room drops below this point it will automatically open the drafts of the furnace and maintain this increased draft until the temperature rises above 68 degrees, when it will again close the drafts. This precludes the possibility of opening the drafts and forgetting all about them until the fire has burned out. The thermostat is adjusted so that at a certain time at night, usually after 10 o'clock, the temperature control automatically drops to 50 or 55 degrees and this temperature is maintained during the night until a set time in the morning, say 6 o'clock, at which time the 68 degree temperature is again restored.

This feature eliminates the necessity of getting up early in the morning and turning on the drafts. It also produces a uniform temperature condition and acts as a fuel saver.

FINALLY, the elimination of leaky chimneys and boiler settings is necessary. A heater cannot deliver heat to the system unless a draft strong enough to first generate the heat for full fuel combustion is maintained. A weak draft actually changes the heater from a heat producer to a gas producer. The combustible gases escaping up the chimney unburned are the same gases that are purchased from the gas companies for cooking and lighting. Therefore, the construction of all chimneys should be tight so as to prevent air leakage, and it is essential that the furnace setting also be tight so that the draft can be properly controlled by the ash pit door. This can be easily ascertained by going over the construction with a lighted candle. A draft will immediately deflect the flame and indicate an air leak; wherever such is found it should be stopped up with cement or other suitable material.

THE second phase relating to possible economies due to operations may be sub-divided into several parts.

In many homes all of the rooms are not utilized during the winter. When this is the case, the register or radiator (as the case may be) in the



ASBESTOS CELL

ASBESTOS SPONGE FELT

AIR CELL

MAGNESIA

VARIOUS TYPES OF PIPE COVERINGS

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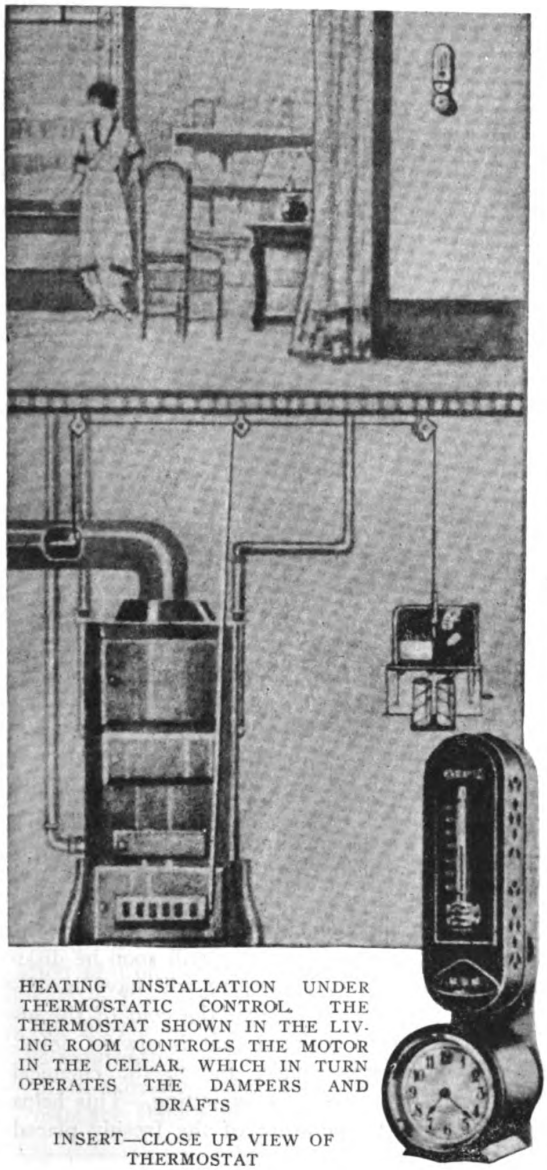
unused rooms should be turned off and the rooms closed off from the rest of the house.

Next in order is the determination as to what constitutes the proper temperature to maintain in the home. Seventy degrees is usually considered correct, but a reduction of five degrees can be permitted without any uncomfortable effects provided the proper humidity is maintained. When the air is too dry, a higher temperature is required for comfort and a less healthful atmosphere is provided. The maintenance of a slightly lower temperature and an increase in the humidity will result in a fuel saving.



HEATING INSTALLATION UNDER THERMOSTATIC CONTROL. THE THERMOSTAT SHOWN IN THE LIVING ROOM CONTROLS THE MOTOR IN THE CELLAR, WHICH IN TURN OPERATES THE DAMPERS AND DRAFTS

INSERT—CLOSE UP VIEW OF THERMOSTAT

One of the most important things is the cleaning of the flue passages in the boiler itself. On every steam and hot water boiler there are small doors marked "Clean Out." It would seem as though many persons translated this into some such notice as "Not to be opened under any conditions," since, from one year's end to the other, they never investigate the purpose of these doors. Now the heat from the fire bed is absorbed by the cast iron sections above containing the feed water of the boiler, this heat being transmitted to the water through the cast iron shell. After a little usage the boiler sections become coated with soot and very fine ashes. This material is an excellent insulator against heat, and the thicker the coating becomes the less possible is it for the water to absorb the heat passing through the flue passages. It is advisable, at least once every fortnight, to open these clean out doors and completely clean the flue passages. Probably the first time this is tried the amount of accumulated soot and fine ashes will be found rather great, but subsequent cleanings at frequent intervals will be accompanied with less disagreeable experiences than the first cleaning.

Northwest Builders Meet in February

Builders and contractors of Portland are looking forward with interest to the annual session of the Northwest Master Builders' Association, which has been set for Portland, February 26, 27 and 28. The association has a membership throughout Oregon, Washington, Idaho and western Montana, and more than 100 delegates are expected to be in attendance, besides another hundred or more builders as visitors.

The convention program committee is headed by C. J. Parker, of Portland, vice-president of the association for Oregon, and the other two members are D. L. Thacker, of Yakima, and J. H. Mimmac, of Bozeman, Mont. Plans for the convention are being arranged by this committee and will be prepared within a short time. It is already known that at least two days of the convention will be given over to business sessions and discussion of trade problems, while on the last day a trip up the Columbia highway is planned.

The General Building Contractors' Association of Portland has named a committee to have charge of the entertainment of the visitors, while the Portland Builders' Exchange has also named a committee for this purpose, the two committees working in harmony. The former committee is composed of Carl Stebinger, chairman; James Quinn, Thomas Muir, and the latter committee is S. E. Gilmer, J. A. Currey and Frank Stebinger.

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Don't Stop Work When the Mercury Drops

Some Hints on Concreting in Cold Weather

WHEN reinforced concrete was in its infancy, it was customary to discontinue all work as soon as freezing temperatures were encountered and only to resume operations when continued mild weather seemed certain.

This custom caused inconvenience and financial loss. To-day there is no reason why concrete work should not be carried on throughout the entire year, regardless of temperature, as numerous experiments leading to the success of concrete work carried on at temperatures below freezing have been made and the results found satisfactory.

All that is necessary is the careful observance of simple and easily applied rules for the preparation of concrete mixtures, the use of simple means of protecting the freshly placed concrete and the keeping of the forms in place slightly longer than would be necessary during mild weather.

MARKING TIME POOR POLICY

Probably at no time has it been necessary to so rush construction work as at present. Conditions this season, with a big building year just ahead and the attendant possibility of labor and material shortages, require the contractor to use all available methods of expediency to complete his work. There is no doubt that a large volume of new building may be confidently expected during the year 1920. The additional expense of conducting cold weather operations will be more than offset by the ability to promptly release capital tied up in the work. Contractors have found in the past that prospective owners have usually been willing to pay a slight extra cost for work done in cold weather in order to obtain the benefit of early completion and the financial advantage of occupancy at an early date.

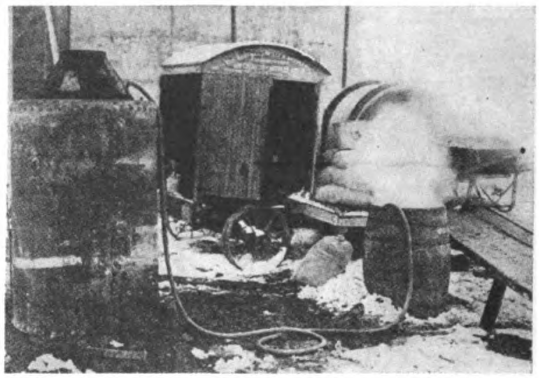
COLD RETARDS SETTING OF CONCRETE

It should be borne in mind that in concrete work high temperatures hasten the hardening or setting of the concrete, whereas low temperatures delay it. The effect of cold does not become noticeable in this respect until the temperatures are below 50 degrees Fahrenheit. It becomes especially so when the temperature drops below freezing.

It is now generally believed that freezing will not occur in concrete that has first had opportunity to harden under favorable conditions for at least 48 hours. If, before the initial set takes place, the concrete has been allowed to freeze and thaw at short intervals, there is no doubt that a deteriorating and damaging action will later take place.

HEATING OF MATERIALS

The first precaution to be taken is with the materials to be used. Fine and coarse aggregate as



DISCARDED BOILER USED FOR GENERATING STEAM, HERE SHOWN PIPED TO THE WATER BARREL

well as the mixing water should all be heated and immediately mixed with the cement; the concrete should be placed as soon thereafter as possible. Thus the concrete mixture will be so warm that early setting will be facilitated. Many contractors have believed that heating the mixing water was sufficient. The best practice does not prove this, as, if the sand and broken stone or gravel are cold, the heat contained in the water will soon be dissipated and the resultant mixture will have insufficient heat to protect it against the cold of the atmosphere. Some additional heat is always developed in the concrete mass due to the chemical action which takes place in its setting. This helps to maintain the temperature of the freshly placed

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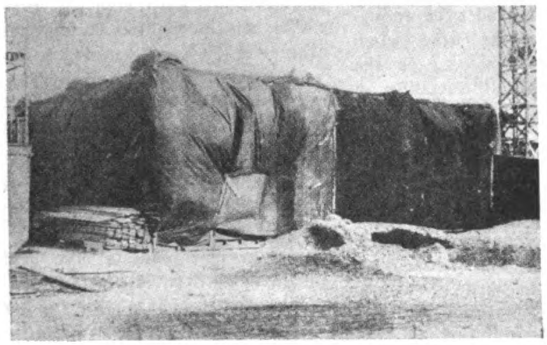
concrete. The cement, which forms the smallest proportion of the mix, need not be heated, but should be stored under cover and protected from both dampness and extreme cold.

The Mixing Water—Mixing water should be heated to about 150 degrees Fahrenheit and used at that temperature. The water may be heated by either of three methods, the choice depending upon local conditions:

(1) If live or exhaust steam is available from a heating plant its use provides the quickest method.

(2) If not, the water must be heated in tanks or kettles over a fire, or



FRESHLY PLACED CONCRETE PROTECTED BY CANVAS

(3) The water may be heated by running it through a pipe coil similar to a radiator coil set in place above a fire. The water is allowed to flow slowly through the coil and is heated during this operation.

Aggregates—The sand and coarse aggregate usually contain a small amount of dampness, and if stored outdoors they are almost certain to contain frost. Heating these to a temperature not exceeding 150 degrees Fahrenheit will give satisfactory results. A higher temperature may prove detrimental to certain varieties of sand, pebbles and broken stone.

The usual method used in heating such material is to pile it over and around sheet-iron cylinders, such, for example, as an old smoke stack or a section of iron pipe. Often corrugated sheet iron is bent in the form of a semi-circle and used. The fire is built within and most of the heat generated is transmitted to the material piled above. Sometimes a heating stove is constructed by building a masonry foundation about eighteen inches to two feet high, which is covered by a piece of sheet steel. The material to be heated is piled on top. In any case, two stoves are usually necessary, one for heating the sand and the other for the coarse aggregate.

If exhaust or live steam is available, the sand and stone may be heated by this method, either by direct application or by piping the material through coils placed in the sand and coarse aggregate.

USE OF SALT DETRIMENTAL

A common method to prevent concrete freezing and one not to be approved is the use of salt in the mixing water. Such use naturally lowers the freezing temperature, but if more than 10 per cent. of salt is used, it will affect the final strength of the concrete and at best will only protect the mixture if the temperature remains above 20 degrees Fahrenheit. Salt acts as a corrosive agent on the reinforcing metal and often causes efflorescence after the concrete has been in place some time.

When the concrete is being placed, care should be taken to see that the forms are entirely clean of ice and snow.

PROTECTION OF FRESH CONCRETE NECESSARY

After the concrete has been placed, it should be protected in one of several ways, depending on whether it has been used for walls, floors, etc. When the concrete is used for floor slabs, columns, sidewalks, etc., which have a large surface area, more careful protection is necessary. Such surfaces should first have building paper or canvas laid over them, and from six to twelve inches of straw placed thereon. Very often manure is available and can be used to advantage. If this is done, however, care should be exercised in placing, as it should never be permitted to come in direct contact with the concrete.

Protection of concrete foundations is more simple, since the greater proportion of the material is in the excavation and only the top surface need to be covered.

REMOVAL OF FORMS

Forms should not be removed until it is absolutely certain that the concrete has thoroughly set and is sufficiently strong. If in doubt, a small section of the form should be removed and the surface inspected.

Observance of these rules will give satisfactory results.

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Country House Details

Double Hung Windows in Masonry Walls and Construction of Lintels, Jambs, Etc.

By A. Benton Greenberg, *Architect*

A COMPARISON of this plate with the three preceding ones on double-hung windows will show that no matter what the material of the wall may be, whether frame, brick or terra cotta, the general design and construction of the frame and sash are similar. Whatever changes do occur are those necessitated by adaptation to new conditions.

In Fig. 1 the segmental arch of face brick which spans the masonry opening on the exterior is the principal feature which distinguishes it from the window illustrated in the October issue of the BUILDING AGE; otherwise they are identical. The inner 8 inch of wall spanned by a wood center constructed of two-inch timbers; the two rowlock relieving arch turned over this center; the frame set back so as to give a 4 inch reveal; and the construction of the head of the window frame, are all details which have been sufficiently emphasized in previous articles to make further comment unnecessary. The only point, perhaps, that needs explanation is the treatment of the space directly underneath the exterior segmental arch. In better class work, the head of the window frame is made segmental in shape. In that case the head is carried around the soffit of the arch, resulting in a neat, straight-forward job. But when the frame has a square head, as here shown, a finishing piece is needed to conceal the rough framework of the wood center. This piece should be carried up behind the front arch or lintel, and the joint between the two hidden by a quarter round. This will make a weather-proof joint.

Method of spanning window opening in masonry walls

Still another method of spanning a window opening in a masonry wall is presented in Fig. 2. A stone lintel similar to the one here illustrated has a depth equal to the height of four or five courses of brickwork, a thickness of not less than the reveal of the window, and a length sufficent to give the bearing of about 4 inches on the wall of each side of the opening. Behind this stone lintel is constructed the usual wood center supporting a brick relieving arch. At this point it might be well to state that, regardless of the form the head of the opening may take, whether arched or square, the relieving arch in back is always made segmental in shape, with a 1 inch rise for every 12 inch or 18 inch in width of opening.

In neither Fig. 1 nor Fig. 2 no mention has been made of the jamb, sill, meeting rail, etc., because these details have been discussed in previous articles. The drawings on the plate and others in this series are intended to show some of the more common ways of constructing typical building details. From these details one can easily make variations to suit any given case.

Using an I-Beam instead of a relieving arch

In Fig. 3 the inner 8 inches of wall is supported on I-beams, instead of a relieving arch. Steel lintels are used when there is not sufficient room between the head of the window and the ceiling in which to turn a relieving arch, or when the lintel is called upon to support the floor joists.

The window frame is constructed in the usual manner, with a moulded staff bead to cover the joint between the brickwork and the wood frame. The staff bead should be moulded as to form a shadow line, this concealing any unevenness of the brickwork. In the section through the jamb the casing and pulley stile are here shown made of ⅞ inch material, although the use of 1½ inch stuff would give a better job.

Immediately below the jamb section is illustrated a section through a mullion with a partition in the center to separate the weights of the different windows to prevent them from clashing. The mouldings planted on the mullion conform with the corresponding mouldings of the rest of the window.

The last part of Fig. 3 that we will consider is the section through the sill. Where a stone sill is used on the exterior of a window opening the wooden sill need be only 1⅛ inches thick, although a 1⅜ inch sill gives a more satisfactory job. For large windows a 1¾ inch sill is recommended. The face of the wood sill is usually set flush with the face of the outside casing. Sometimes, however, it is made to project to the outer edge of the staff head. There is no particular advantage in the latter practice except, perhaps, that a narrower stone sill is needed.

Required thickness of stone sill

The stone sill should be of a thickness to accurately lay up the brickwork being generally made two courses high. It is 8 inches longer than the width of the opening and is made deep enough to extend at least 2 inches under the wood sill and to project about 1 inch beyond the face of the wall. This projecting portion should be undercut for a water drip. The upper surface of the stone sill is cut with a wash and has a lug or seat at each end to receive the brick impost. The joint between the wood sill and the masonry, in fact all spaces between the window frame and the wall, should be well filled with scratch mortar or mineral wool, or, as is done in finer class work, hand caulked with oakum to make a weather tight connection.

A lower initial cost is the chief advantage of brick veneered construction over solid masonry. As compared with an all-frame house, a brick veneered house is not only durable but distinctly more sanitary. The double air chambers, one between the brick and the sheathing and the other between the studs, assure a warmer house in winter and a cooler house in summer. The useful air space between the brick facing of veneer and the sheathing affords the additional advantage for correcting and hiding any inequalities or unevenness in the framework. In all veneer construction the veneer should be securely tied to the backing with wall anchors or galvanized iron clips, of which there are a great variety in the market.

The details of brick veneered walls, one with tile backing and the other with frame, as shown in Fig. 4, fully bear out our statement made at the beginning of this article, that, irrespective of the kind of material used in a wall, the construction of a window frame is practically the same in all cases.

Construction of lintels

What interests us most in our study of the head of the window is the lintel, which is made up of brick set vertically on end, and is known as a "solder course." This is a very common way of forming a lintel. It requires no cutting of the arch bricks and is very easily and cheaply erected.

Terra cotta hollow tile as building material has made possible an absolutely fireproof house at a cost slightly in excess of one constructed of wood and about equal to that of brick and other masonry. Its superior advantage over the other masonry materials is the presence of air chambers in the blocks themselves. All the exterior faces are specially grooved to afford a solid, unbreakable key for the plaster, inside as well as outside. The chambers make furring unnecessary, and the grooves do away with the necessity of laths.

Hollow tile as a back for brick veneer is shown in Fig. 4. In Fig. 5 detailed sections, in isometric projection through the sill and head of a window frame for double hung sashes, built in a stucco covered wall constructed of hollow blocks. The lintel of this window is made of tile set on end and has the lowest chamber filled with concrete reinforced with rods of steel. The sill is also formed of special tiles, which project beyond the face of the wall. The whole is then covered with stucco, and a wash or drip is run under the projecting portion of the sill, as shown.

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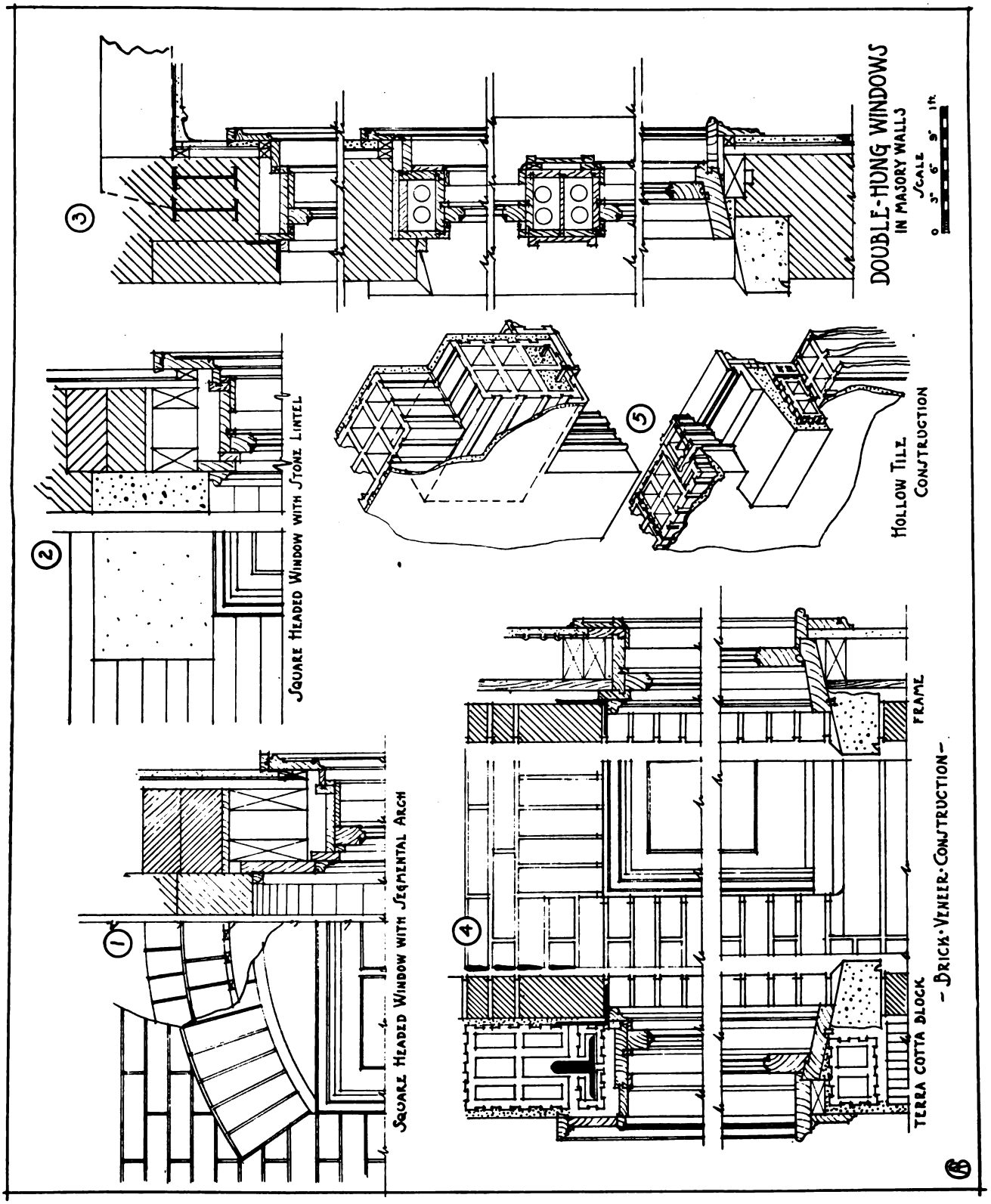

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Late Quotations in Building Material Markets

(Price quotations now current on building materials and supplies as quoted by dealers and jobbers for delivery in New York, Chicago, San Francisco, Seattle and Birmingham follow. The quotations set forth are placed before readers of BUILDING AGE to afford an accurate review of market conditions, rather than for use as a basis for actual purchase. They will not only provide knowledge of the exact state of the market as to items quoted but will also present a basis to judge conditions as affecting correlating materials.)

	New York	Chicago	San Francisco	Seattle	Birmingham
BRICK					
Common	$30.45	$14.00	$15.00	.....	$22.75
Face brick	55.00 to 60.00	30.00 to 40.00	46.50	.....	32.00 to 50.00
BURNED CLAY (Delivered on Job)					
Block partition:					
3 in., per sq. ft.	0.13	0.10	.....	.....	.....
4 in., per sq. ft.	0.15	0.11	.....	.....	.....
Wall coping (single slant):					
8 in., per lin. ft.	0.16	0.14	.....	.....	.....
12 in., per ft.	0.26½	0.22	.....	.....	.....
18 in., per ft.	0.54	0.36	.....	.....	.....
(Corners and angles four times the price of one foot of coping the same size.					
CEMENT					
Per bbl. in 15-cent bags (rebate 60 cents per bbl. for bags)	3.40	3.10	3.63	$4.25	4.50
FINISHED IRON AND STEEL (Mill Shipments)					
Bar iron, refined grade	.....	.....	.....	.....	.....
Bar iron, double refined	.....	.....	.....	.....	.....
Soft Steel bars	2.62 to 4.27	.....	.....	.....	.....
Shapes	2.72 to 2.82	.....	.....	.....	.....
GLASS (Discounts from Manufacturer's Price Lists)					
Single strength, A quality, first three brackets	75%	77%	.....	.....	.....
Single strength, B quality	75%	77%	.....	.....	.....
Double strength, A quality	77%	79%	.....	.....	.....
Double strength, B quality	79%	81%	.....	.....	.....
GYPSUM					
Plaster Board:					
27x28x1	.....	.....	.....	.....	.....
27x48x ½	0.45	.....	.....	.....	.....
32x36x ¼	0.28	0.20	.....	.....	.....
32x36x ⅜	0.29	0.21½	.....	.....	.....
32x36x ½	0.35	.....	.....	.....	.....
Plaster blocks:					
2 in. solid, 12x30, per sq. ft.	0.13	.....	.....	.....	.....
3 in. hollow, 12x30, per sq. ft.	0.13	.....	.....	.....	.....
4 in. hollow, 12x30, per sq. ft.	0.14	.....	.....	.....	.....
6 in. hollow, 12x30, per sq. ft.	0.21¾	.....	.....	.....	.....
HOLLOW TILE					
2x 8x12 partitions, per 1,000 sq. ft	102.70	102.70	75.00	.....	96.00
3x12x12 partitions, per 1,000 sq. ft	102.70	109.60	105.00	.....	96.00
4x12x12 partitions, per 1,000 sq. ft	114.75	150.00	113.00	.....	108.00
6x12x12 partitions, per 1,000 sq. ft	153.00	205.20	142.00	.....	132.00
8x12x12 partitions, per 1,000 sq. ft	.....	.....	208.00	.....	192.00
10x12x12 partitions, per 1,000 sq. ft	.....	.....	258.00	.....	216.00
12x12x12 partitions, per 1,000 sq. ft	.....	.....	.....	.....	.....
2x12x12 split furring, per 1,000 sq. ft	.....	.....	105.00	.....	.....
LATH					
Eastern spruce, per thousand	20.00	16.00 to 18.00	18.00	.....	.....
No. 1 white pine, per thousand	18.00	16.00 to 18.00	20.00	.....	10.00 to 18.00
No. 1 hemlock, per thousand	18.00	.....	18.00	.....	10.00 to 18.00
No. 1 yellow pine, per thousand	18.00	16.00 to 18.00	18.00	.....	10.00 to 18.00
LIME					
Common, 200 lb. bbls., per bbl.	3.80	1.60	.....	.....	.....
Finishing, 300 lb. bbls., per bbl.	19.50	18.00	.....	.....	.....
Hydrated, in paper bags, per ton	4.00	.....	.....	.....	.....
LUMBER (Retail Prices per Thousand Delivered)					
Yellow pine, No. 1 boards, 1x6	80.00	75.00	.....	.....	49.00 to 100.00
Yellow pine, B, and better flooring (plain)	130.00	125.00	.....	.....	105.00
Douglas fir, 6x6 to 12x12	80.00	71.00	60.00	.....	.....
Oak, quartered, 1 in., F. A. S	325.00	285.00	430.00 - 530.00	.....	175.00
Oak, plain, 1 in., F. A. S	225.00	210.00	290.00	.....	150.00 - 250.00
Oak flooring, ⅞ quartered, white	220.00	295.00	470.00	.....	250.00
Maple, 1 in., F. A. S	180.00	185.00	220.00 - 280.00	.....	.....
Maple flooring, ⅞ clear	175.00	150.00	225.00	.....	.....
Mahogany, 1 in., F. A. S	.....	350.00	400.00 - 440.00	.....	.....
Spruce, 10 in.	85.00	85.00	86.00	.....	.....
Cypress, 1 in., F. A. S	150.00	130.00	.....	.....	.....
METAL LATH					
Under 100 sq. yd., per sq. yd.	0.40	.....	.....	.....	.....

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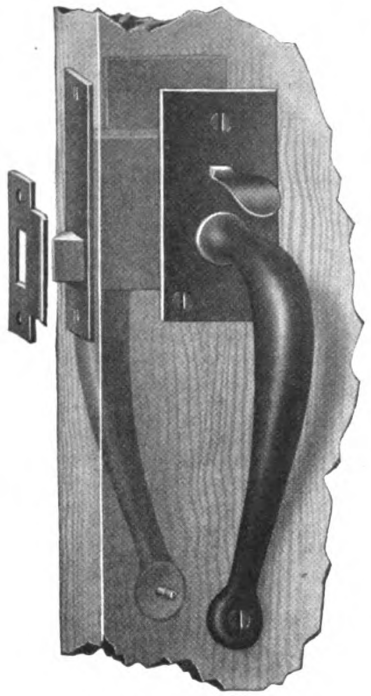


No. 27—Garage Door
Latch for Swinging Doors

BETTER FIXTURES

For eighteen years the National line of Builders' Hardware has been serving the trade. Time-tried and endorsed everywhere, these goods today have an enviable reputation which we are jealously guarding by injecting into our products the same high grade materials, workmanship and mechanical design that have applied to them from the beginning.

We are proud of the position which our hardware has gained in the building world, and offer our Better Fixtures to you secure in the knowledge that none better can be obtained.

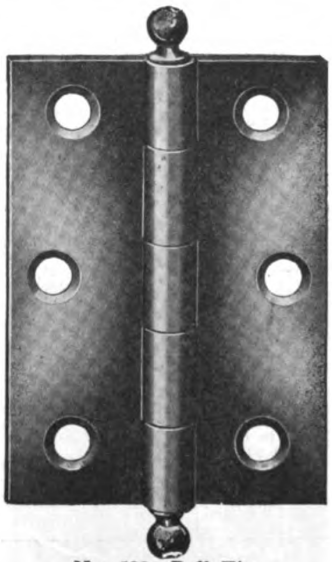
Above we show the No. 27 Garage Door Latch which adds to the appearance of any garage. There are no complicated parts to get out of order and the handles have long, graceful lines. This latch is reversible for use with either right- or left-hand doors. It is furnished in Japan, Dead Black Japan, Sherardized and Dead Black Japan, or Sherardized and plated any finish.

At the right is a typical National Light Narrow-Butt Hinge with ball tips. From 2 to 3 inch sizes, any finish.

These are but two of the National line.

National Mfg. Co.

Sterling, Ill.



No. 528—Ball Tip
Cut full size of 2½-inch

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Late Quotations in Building Materials Markets—*Continued*

	New York	Chicago	San Francisco	Seattle	Birmingham
PIPE					
Cast iron:					
6 in. and heavier	$67.30	.....	.....	.....	.....
4 in.	70.30	.....	.....	.....	.....
3 in.	.....	.....	.....	.....	.....
(And $2 additional for Class A and gas pipe)					
(Discounts to jobbers for carload lots on the Pittsburgh basing card; freight rates from Pittsburgh to New York, and also from Pittsburgh to Chicago, in carloads, per 100 lbs., are 27c. An additional 5 per cent discount is allowed to large jobbing interests over those listed below.)					
	F. O. B. Pittsburgh	F. O. B. Chicago			
Wrought: BUTT WELD					
Steel:					
Black, ⅛ to 3 in.....	47 to 54 %	42.6 to 49.6%	.....	.....	.....
Galv., ⅛ to 3 in.....	20½ to 41½%	14.6 to 34.6%	.....	.....	.....
Iron:					
Black, ⅛ to 1½ in....	29½ to 34½%	19.6 to 29.6%	.....	.....	.....
Galv., ⅛ to 1½ in....	2½ to 23½%	9.4 to 11.6%	.....	.....	.....
LAP WELD					
Steel:					
Black, 2½ to 6 in.....	50 %	45.6%	.....	.....	.....
Galv., 2½ to 6 in.....	37½%	31.6%	.....	.....	.....
Iron.					
Black, 2½ to 6 in.....	34½%	24.6%	.....	.....	.....
Galv., 2½ to 6 in.....	21½%	9.6%	.....	.....	.....
PLASTER					
Neat wall cement in 15-cent bags, per ton	23.50	19.00	18.50 to 20.00	22.50	22.00
Finishing plaster	25.00	19.50	19.50 to 21.00	24.00	30.00
Lath mortar, in cloth bags, per ton	16.50	.....	.....	.....	.....
RADIATION					
Discount from list on standard heights	45%	44.3 to 45.9	.....	.....	.....
REINFORCING BARS					
High carbon steel from mill	48.50	.....	4.00	.....	.....
Medium steel from mill	48.50	.....	4.00	.....	4.25
ROOFING MATERIAL					
Tarred felt paper:					
No. 1—25 lbs. to 100 sq. ft., per ton	81.00	85.00	.....	.....	.....
No. 2—16 lbs. to 100 sq. ft., per ton	81.25	85.00	.....	.....	.....
No. 3—12 lbs. to 100 sq. ft. per ton	81.63	85.00	.....	.....	.....
Rosin sized sheathing, per ton	75.00	79.00	.....	.....	.....
Corrugated roofing, galvanized, 2½ in. corrugation, over flat sheets, 30 cents per 100 lbs	0.30	.....	.....	.....	.....
SHINGLES					
Red cedar, 5 to 2, clear, per thousand	15.00	.....	.....	.....	.....
White cedar, extra star, A star, per thousand	16.00	.....	.....	.....	.....
SLATE ROOFING					
	F. O. B. Cars Quarry Station				
Pennsylvania:					
Best Bangor	$7.75 to $9.00	.....	.....	.....	.....
No. 1 Bangor Ribbon	6.75 to 7.00	.....	.....	.....	.....
Pen Argyl	6.50 to 7.25	.....	.....	.....	.....
Peach Bottom	10.50 to 12.50	.....	.....	.....	.....
No. 1 Chapman	6.25 to 7.25	.....	.....	.....	.....
Vermont:					
No. 1 Sea Green	5.00 to 8.50	7.31 to 11.06	.....	.....	.....
Unfading Green	9.00 to 10.50	.....	.....	.....	.....
Red	12.00 to 20.00	.....	.....	.....	.....
Maine:					
Brownsville, U'f'g Black, No. 1	12.00	.....	.....	.....	.....
Slaters' felt, 30 lb. roll	0.92	.....	.....	.....	.....
Slaters' felt, 40 lb. roll	1.22	.....	.....	.....	.....
STRUCTURAL STEEL					
Beams and channel, 3 to 15 in	3.47	3.47	4.45	.....	5.50
Beams and channel, over 15 in	3.57	3.57	4.45	.....	5.75
Angles, 3 to 6 in	3.47	3.47	4.45	.....	5.00
Zees and tees	3.57	3.47 to 3.52	.....	.....	.....
Steel bars, half extras, from mill	.....	.....	4.60	.....	4.25
STUCCO					
In cloth, per ton (white, mixed)	22.50	19.50	.....	.....	.....
STUCCO BOARD					
Medium weight stucco board, plain, per thousand sq. ft.	42.50	45.00	.....	.....	.....
Medium weight stucco board, creosoted, per thousand sq. ft.	50.00	50.00	.....	.....	.....
Heavy weight stucco board, plain, per thousand sq. ft.	55.00	55.00	.....	.....	.....
Heavy weight stucco board, creosoted, per thousand sq. ft.	60.00	60.00	.....	.....	.....
Medium weight stucco board, plain, narrow key, per thousand sq. ft.	50.00	50.00	.....	.....	.....
Medium weight stucco board, narrow key, creosoted, per thousand sq. ft.	55.00	55.00	.....	.....	.....
Insulating board, heavy felt background, per thousand sq. ft.	50.00	50.00	.....	.....	.....
SHEATHING BOARD					
Heavy weight sheathing board, per thousand sq. ft.	50.00	50.00	.....	.....	.....
Medium weight sheating board, per thousand sq. ft.	46.00	45.00	.....	.....	.....
Stucco or plaster board, sheathing board and insulating board are in rolls containing one sheet 25 ft. long and 4 ft. wide (100 sq.					
WALL BOARD					
Wall board, shipped any length, 4 ft. wide, per thousand	45.00	40.00	.....	.....	.....
Packed flat in cars if ordered in less than car lots. Add $5.00 per thousand ft. for crating.					

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MURPHY IN-A-DOR BEDS

This is Mr. Lewis' home. The five Murphy In-A-Dor Beds are arranged as follows: ¶Two in the sun parlor. Two in the room of his two boys. One in the room of Mr. and Mrs. Lewis. ¶Those in the sun room are for outdoor slumber—or for guests. The boys' room in the daytime is free of obstruction and is used for a fine, big play room. ¶The other chamber, also clear in the day-time, is easy to clean and is used as a sewing room or for any purpose as the occasion requires.



An Ex-Employe Builds a Home —*and Installs Five Murphys!*

CHARLES R. LEWIS formerly was an employe of the Murphy Door Bed Company. Then he severed his connections and engaged in another line of business.

But when he built his six-room home, recently, in Webster Grove, Mo., he installed five Murphy In-A-Dor Beds.

Here is a case of a man who came to know Murphy Beds thoroughly. A man who then became an entirely disinterested person. A man who then chose Murphy Beds of his own volition, to furnish the sleeping accommodations in his handsome home.

Mr. Lewis knew Murphy Beds. Enough! Murphy Beds' best friends are those who know them best.

Can you afford to build without installing Murphy In-A-Dor Beds?

MURPHY DOOR BED COMPANY

22 WEST MONROE STREET, CHICAGO

Chemical Building, St. Louis

469 Fifth Ave. New York
912 Kresge Bldg. Detroit, Mich.
659 Leader News Bldg. Cleveland
205 O'Connor St. Ottawa, Canada
Crocker Bldg. San Francisco
305 City Club Kansas City
204 Peach Tree Atlanta, Ga.
111 Murphy St. Dallas, Tex.
1103 First Ave. Seattle, Wash.
1435 Blake St. Denver







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New Catalogs of Interest to the Trade

These catalogs may be secured direct from the manufacturer. If you prefer, write the date of this issue and the numbers, of any catalogs on a postal and mail it to "Building Age," 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.

23. Sash Chains. Smith & Egge Mfg. Co., Bridgeport, Conn.—Booklet illustrating and describing various kinds of chains for use on windows and for other purposes.

24. Dumbwaiters and Sidewalk Lifts. J. G. Speidel, Reading, Pa.—Booklet illustrating and describing dumbwaiters for use in houses, hotels, etc., together with a brief description of sidewalk lifts. Detail drawings showing method of installation are given.

25. Stanley Improved Leveling Stands. Stanley Rule & Level Co., New Britain, Conn.—Folder describing this device which can be used with a wood or iron level and is an inexpensive substitute for the more expensive surveyor's instruments.

26. Stine Screw Holes. Stine Screw Holes Co., Waterbury, Conn.—Leaflet describing the advantages of these screw holes and illustrating sizes in which they are furnished.

27. Service Sheets Showing Construction with Tin Roofing. N. & G. Taylor Co., Philadelphia, Pa.—Sheets giving large sized details showing application of tin roofing to decks, dormers, ridges and various types of roof, also hip, valley and gutter construction.

28. Upson Board Interiors. Upson Co., Lockport, N. Y.—Booklet illustrating interiors finished with Upson board, and a brief description of the advantages of this product.

29. Forms for Building Reinforced Concrete Double Monolithic Walls. Van Guilder Double Wall Co., Inc., Rochester, N. Y.—Booklet describing these steel forms which permit the construction of reinforced concrete walls with air space between.

30. White Tools. L. & I. J. White Co., Buffalo, N. Y.—Catalog describing various kinds of tools manufactured by this company.

31. Slate Surface Roofing. Sta-So Milling Co., Poultney, Vt.—Literature descriptive of the slate surface roofing manufactured by this company.

32. American Wall Board. Bird & Son, Inc., Dept. B., East Walpole, Mass.—Folder describing this wall board and giving some pictures of interiors.

33. Stanley Garage Hardware for Rolling Door. The Stanley Works, New Britain, Conn.—Booklet describing hardware manufactured in wrought steel. Illustrations of various types of doors are given, together with different types of equipment furnished.

34. Hercules Kerosene and Gasoline Engines. The Hercules Gas Engine Company, Evansville, Ind.—Booklet describing these engines.

35. Troy Slow-Speed Trailers. The Troy Wagon Works Co., Troy, Ohio.—Broadside giving various types of trailers manufactured by this company.

36. Bowlus Closets. The Bowlus Mfg. Company, Springfield, Ohio.—Folder describing various types of tank closets, etc.

37. The Troy Book on Tractor Hauling. The Troy Wagon Works Co., Troy, Ohio.—Booklet illustrating and describing various types of wagons for contractors' use. Many different types of bodies are illustrated.

38. How to Keep Food Without Ice. Galesburg Cornice Works, Galesburg, Ill.—Booklet describing iceless refrigerators and principle on which they operate.

39. Expanded Metal Construction. November issue. North Western Expanded Metal Company, 407 South Dearborn Street, Chicago, Ill.—House organ, the principal feature of which is an announcement and description of Nemco Presteel Lumber which can be used for studs, floor joists, steel plate, etc.

40. An Analysis of the Transportation Requirements of Contractors. Motor Car Company, Detroit, Mich.—Booklet describing Packard motor trucks and various types of bodies adapted to the use of contractors. Table gives weight of various materials and space they occupy.

41. Boss Labor Saving Construction Machinery. The American Cement Machine Company, Inc., Keokuk, Iowa.—Booklet illustrating and describing various kinds of mixers, hoists, pumps, saw rigs, carts, etc. Tables giving aggregates required per cubic yard of rammed concrete with various mixtures.

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Appreciation of DETAILS



DABS of color artistically applied on canvas result in beautiful paintings. Bits of glass are inlaid to produce mosaic. And nimble fingers working in and out create rare and costly lace.

Yet dabs of color, bits of glass, and thread are details. They are important!

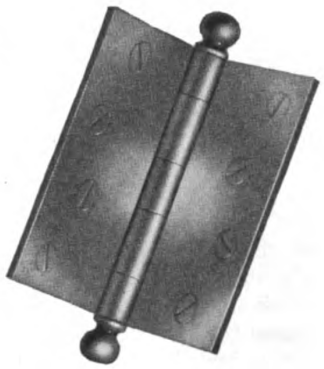
In construction, hinges and butts are equally as vital to the architectural masterpiece. Hinge consideration is worthy of your most careful thought.

For more than fifty years McKinney hinges and butts have filled every hinge need. The name "McKinney" on a hinge or butt stamps it as the standard product—fit to serve effectively and silently without sagging or repairs.

When considering hinge needs remember the name McKinney. If the McKinney illustrated catalog is not in your files we will be glad to forward you a copy. Architects and builders find it valuable in meeting standard hinge needs and matching artistic plans.

McKINNEY MANUFACTURING CO., Pittsburgh
Western Office, State-Lake Bldg., Chicago Export Representation

McKINNEY
Hinges and Butts



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Method of Reducing Width of Mullions

From H. Z., Conn.—I am designing a building the front of which has large openings in which I intend to use double and triple frames with mullions. The mullions for these frames would be about 8 inches in width on account of space required for weights, which will look clumsy. Is there any way that these mullions can be reduced in width?

For Twin Windows

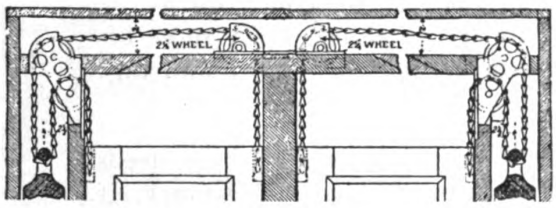

FIG. 1

Answer: The mullions you speak of could be slightly reduced in width and still take care of the double weights from the sash on either side. If cast iron weights are used, mullions 7½ inches over all would work and this dimension could be further reduced by the use of lead weights.

For Triple Windows

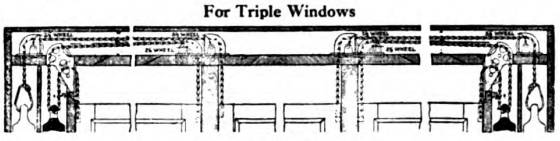

FIG. 2

However, if you desire to use a very narrow mullion, that is, one less than 6 inches in width, the only solution would be the use of overhead pulleys as indicated on sketches showing the arrangement of such pulleys and chains, "For Twin Windows" and "For Triple Windows." You will notice on these sketches that for triple windows the center sash is weighted back of the weight for side sash with chain running on overhead pulleys.

With this arrangement, you will be able to work out a mullion of any width and one that will suit your purpose.

Trouble With Porch Columns

From C. B., Ill.—About a month or so ago I built a new porch, the roof of which is supported on circular columns with composition caps. The columns were built up of clear seasoned W. P. and I know that they were properly primed before they left the shop.

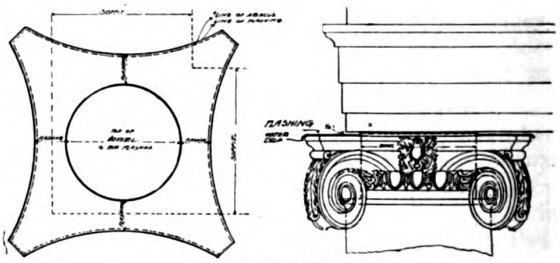

FIG. A

When first put up these columns looked live, but very shortly they started to open up. Can you give an explanation of what might cause this condition and how it could be remedied?

Answer: At a glance I believe I know what your trouble is. From your description of the columns as built and mention being made of them being pointed before leaving the shop would indicate to us that the trouble is not with the columns but has resulted through an omission of a very important item in connection with their erection, that being the flashing on top of the caps, or if they were flashed it was not done properly.

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The proper method of flashing column caps as you describe yours to be of composition is as indicated in Fig. A.

When flashing is not provided to the top of column caps, at every rain the water will run down the inside of the column, causing it to swell and the joints to open. A condition of this kind permitted to exist will make a column go from bad to worse.

My advice to you is to examine the top of the column caps and if they are not properly flashed, flash them as indicated in Fig. A. After the caps have been properly flashed or reflashed so that water can no longer get into the inside of the columns, let them stand for a week or ten days of good weather to dry, after which time the open joints can be schimed and white leaded and the columns made as good as new.

Finish for a Conservatory Wall

From I. S. H., W. Va.—I would like to have some information as to what kind of a wall would be suitable for a conservatory as a finish. The conservatory is off the dining room and it will be largely made up out of glass. I am at a loss as to what material the remaining wall space should be finished in.

Answer: If the conservatory will merely be of the same approximate humidity as the rest of the house, almost any standard finish can be used.

Ordinarily, a conservatory has a relatively high percentage of humidity; that is, there is a great deal of dampness present in the air. When such a condition is present, ordinary plaster is likely to swell. You can, however, use ordinary Portland cement stucco and give it an oil paint. This will make a wall that will resist considerable dampness and cause no trouble. You can also use Keen's cement, tile or any other materials that have a fairly high resistance to moisture.

Roof Trusses for a Garage

From G. B. E., Nebr.—I am going to build a tile addition onto a garage, the size of the addition being 35 ft. 7 in. long by 50 ft. wide. The old part is a frame building, flat roof, and the owner wishes to continue the fall to the alley. It is desired to support the roof of the addition with trusses so as to have no posts, and to entirely remove the rear wall of the present building. The height of the walls is 9 ft. 6 in. Can you advise me as to the best method of construction and what kind of trusses to use?

Answer: There are two points to consider in the problem you have to work out. One is to tie together two walls of different materials, the other is to secure "lap" of some kind so the wind, frost and rain cannot work or beat through the joint where the two walls join.

The walls being only 9 ft. 6 in. high, very little tieing will be required. It will be advisable, however, to put in a couple of ties in each wall. One similar to that shown in Fig. 1 may be used, or any stock patterns such as are used by masons will be found satisfactory. The stem can be given a quarter turn so the metal band will lay flat against the studding, as shown in Fig. 2. It will be noticed that the sheathing in Fig. 2 laps over the tile wall a few inches. This will prevent wind and rain blowing through. If the frame wall is to be shingled, or sided, a finishing strip similar to a corner board or angle strip

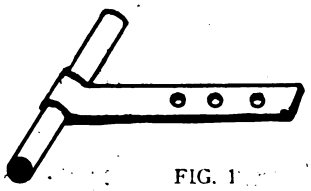

FIG. 1

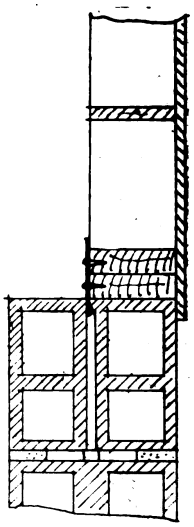

FIG. 2

can be nailed on vertically for a finish.

There are many ways that two walls of dissimilar materials may be brought together. Wing-walls at right angles, for instance, might be required; but they can be tied together in the way illustrated, simply adapting the tie iron to the changed condition, by bending or twisting it as the case may be, and making sure there is a lap to break joint, as it were, and keep out the elements.

In regard to the truss, it would be necessary for you to give us a little bit more information in order that your question might be answered to best advantage. What type of truss do you feature over the old building? You show a tri-angular shaped truss and state that the roof is flat. We cannot quite reconcile this. Can you give us a cross section through the building, showing the type of truss used in the old building, how it is supported on the wall, etc.

Also, do the trusses frame the 50 ft. of 37-A way? Usually a tri-angular truss (Fink, English or Belgian type) will prove satisfactory, and if a fair pitch is given, very little snow will be retained on the roof.

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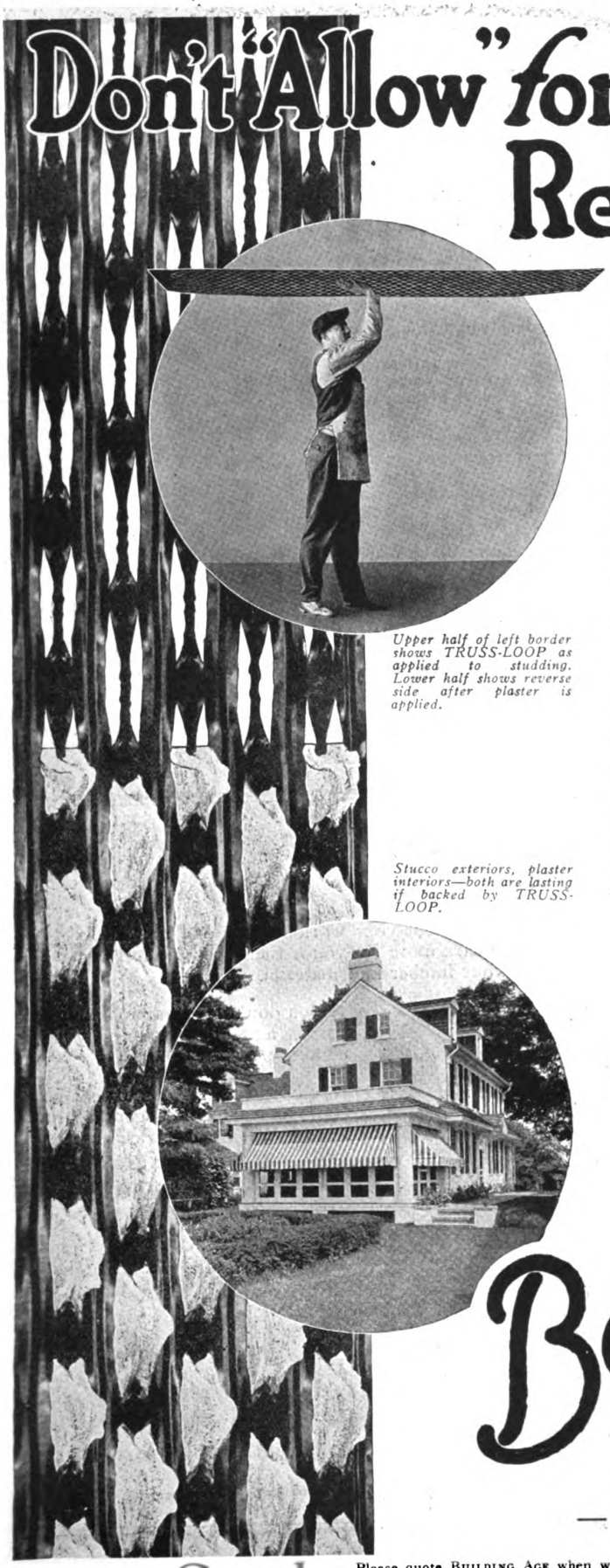

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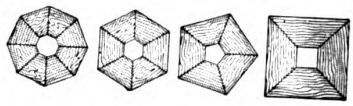

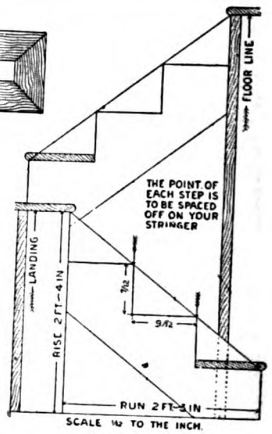

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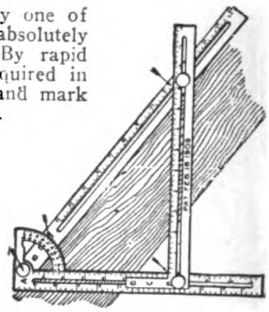



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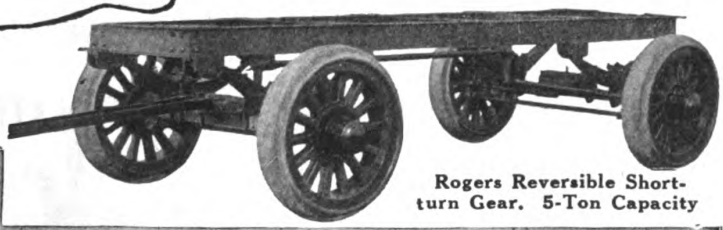

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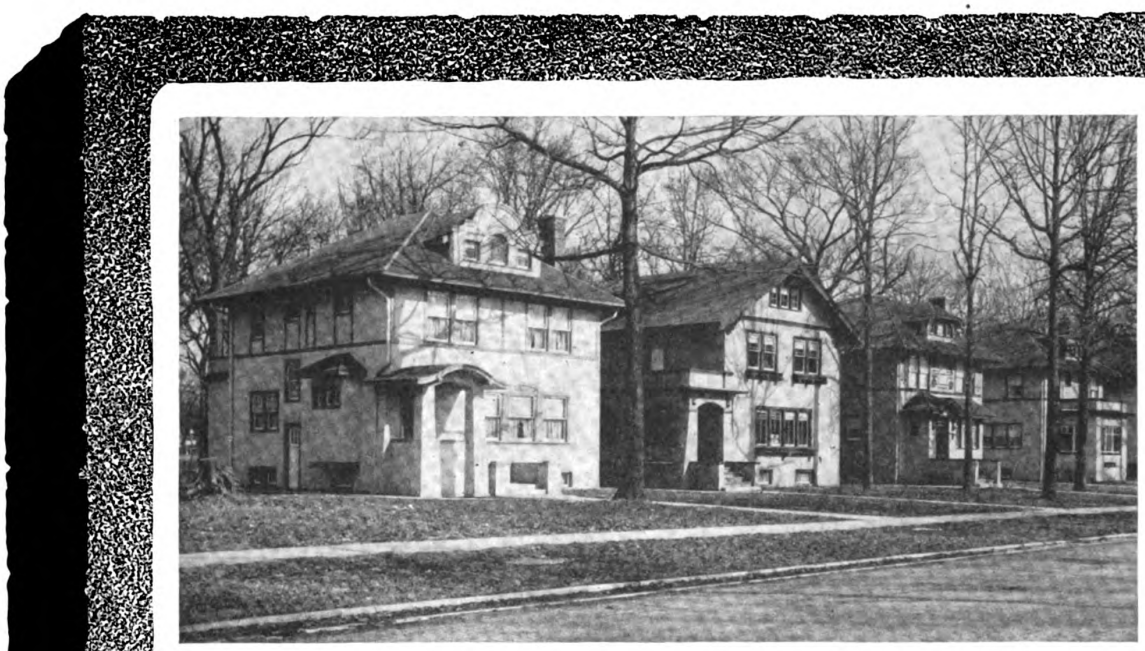

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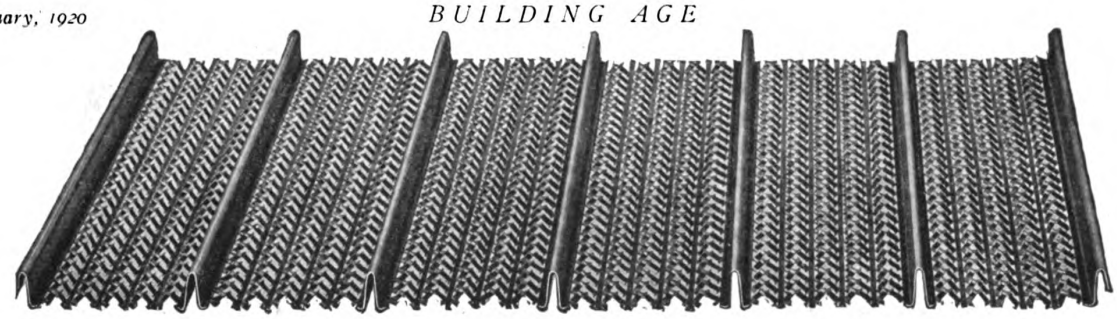

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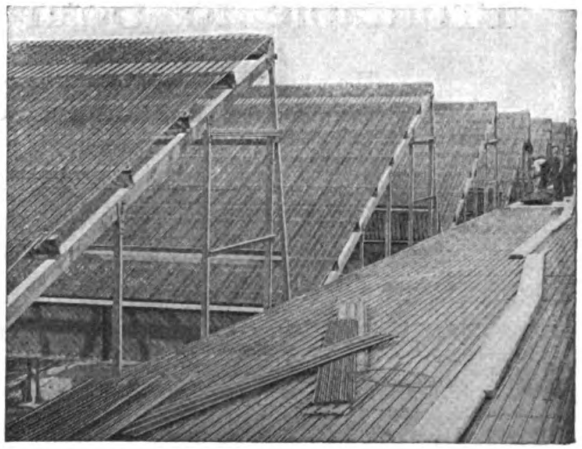

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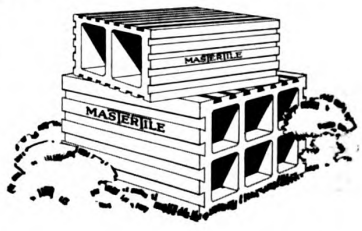

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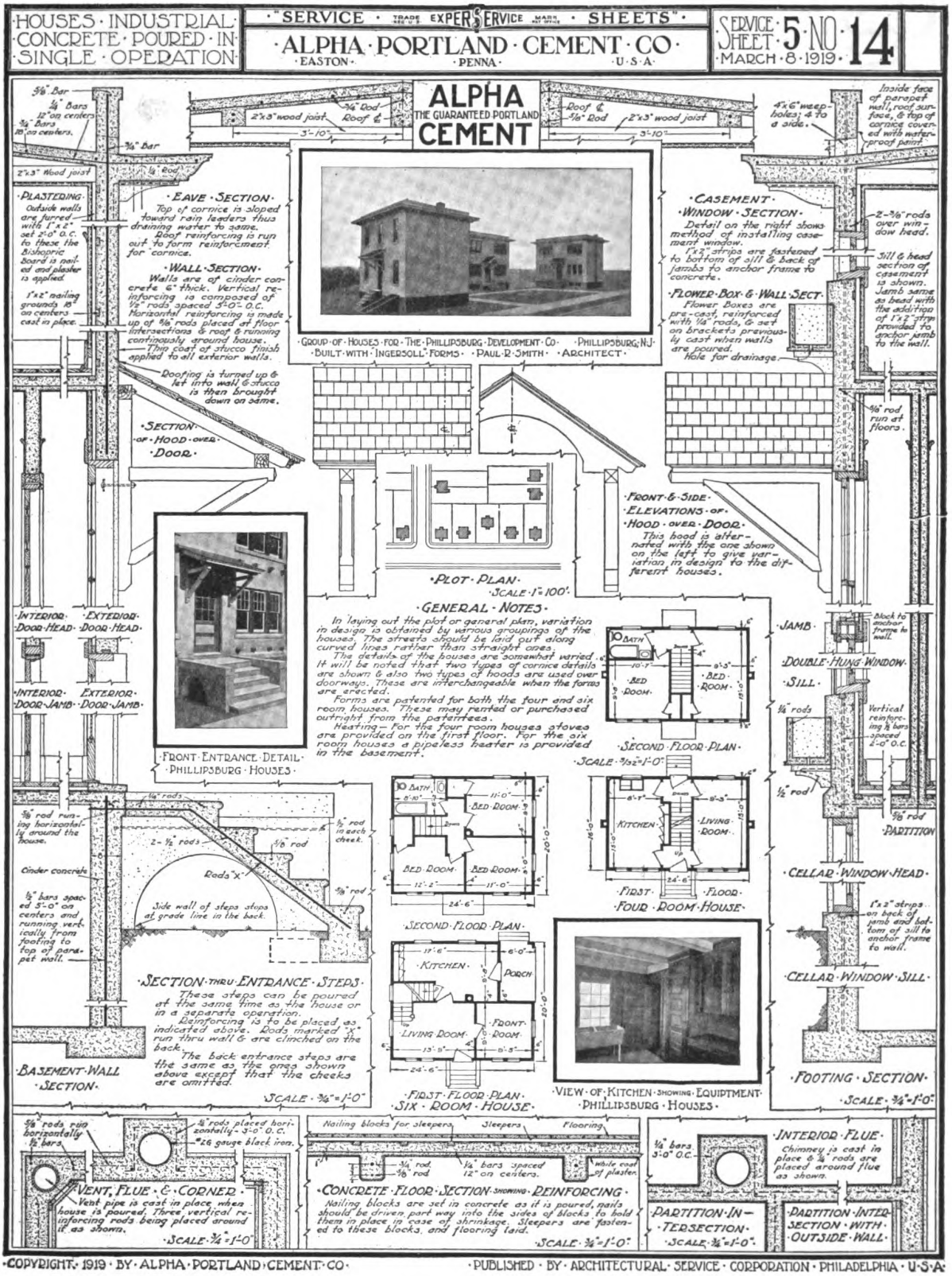

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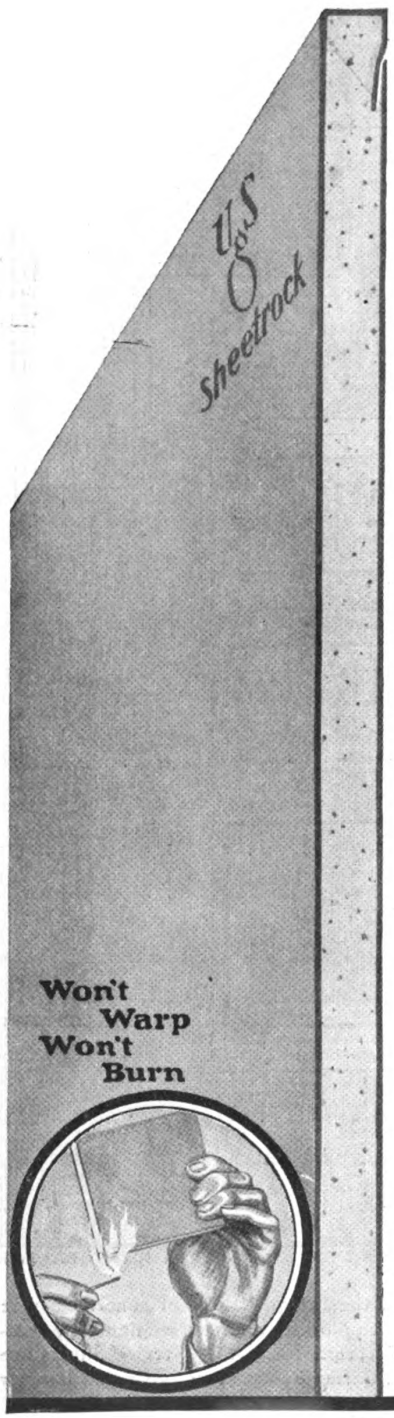

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Johns-Manville Asbestos Roofings are approved by the Underwriters' Laboratories, Inc.

List of roofings—*Asbestone, Johns-Manville Standard and Colorblende Asbestos Shingles, Johns-Manville Asbestos Ready Roofing, Johns-Manville Built-Up Asbestos Roofing, Johns-Manville Corrugated Asbestos Roofings.*

H. W. JOHNS-MANVILLE CO., New York City
10 Factories—Branches in 63 Large Cities
For Canada, Canadian Johns-Manville Co., Ltd., Toronto

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Through—

Asbestos

and its allied products

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Heat Insulations, High Temperature Cements, Asbestos Roofings, Packings, Brake Linings, Fire Prevention Products

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NIAGARA WALL BOARD

places in your hands the kind of board a builder likes to use—the kind a dealer likes to sell, and *does sell* most readily.



Why it is different, why it is built right and priced right, will be explained to you when you receive the sample.

You will be interested in Niagara Wall Board because it is sold on an exclusive basis at an interesting price—and all the cooperation goes with it that can be extended by a wall board maker to wall board dealers and wall board users. Mail the coupon at once.

Builders, Carpenters, Contractors and *Architects*—you will want to know about Niagara Wall Board—write for a sample today.

NIAGARA WALL BOARD COMPANY,
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GENTLEMEN:—Without obligating me in any way, kindly forward complete details about Niagara Wall Board with prices and explain your exclusive plan, forwarding a piece of the actual board.

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WALL BOARD
COMPANY

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FIBRE MILL AND FINISHING PLANT
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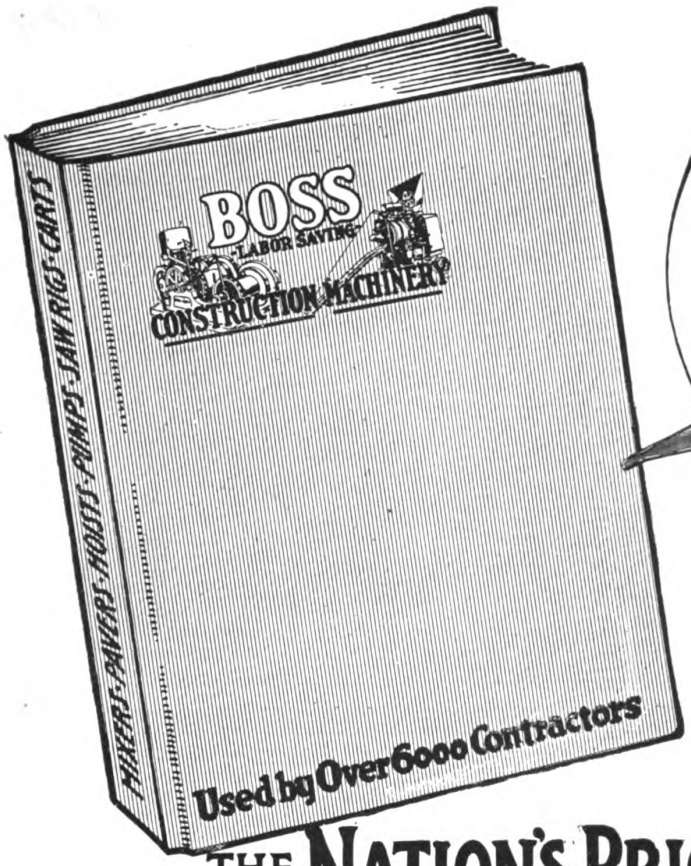
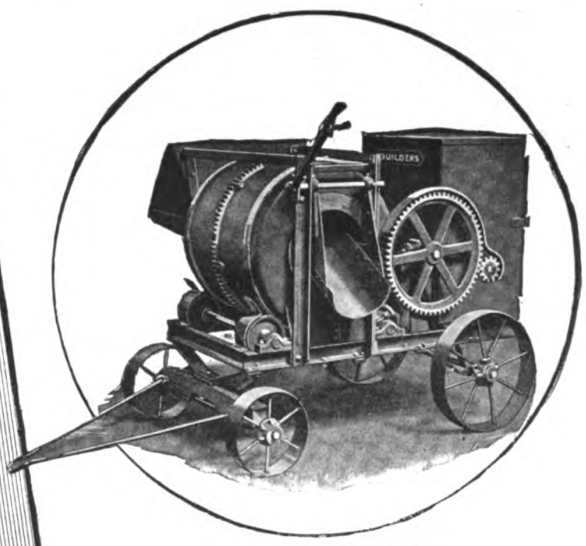
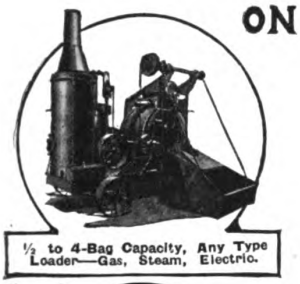




$245 BUYS THIS HALF-BAG LOW CHARGER WITH NOVO ENGINE

Just one of the many real bargains in this book.

THE NATION'S PRICE MAKER ON CONSTRUCTION MACHINERY



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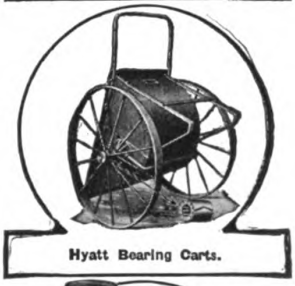
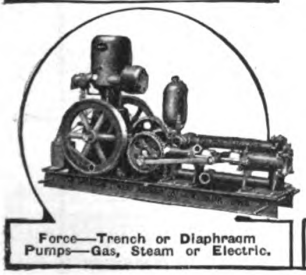
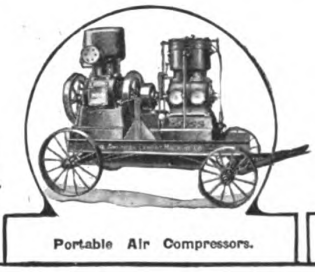


Hyatt Bearing Carts.



Force—Trench or Diaphragm Pumps—Gas, Steam or Electric.



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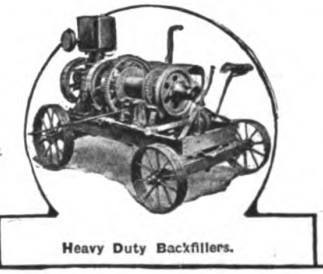
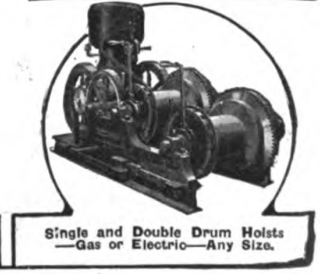


Heavy Duty Backfillers.



Single and Double Drum Hoists—Gas or Electric—Any Size.

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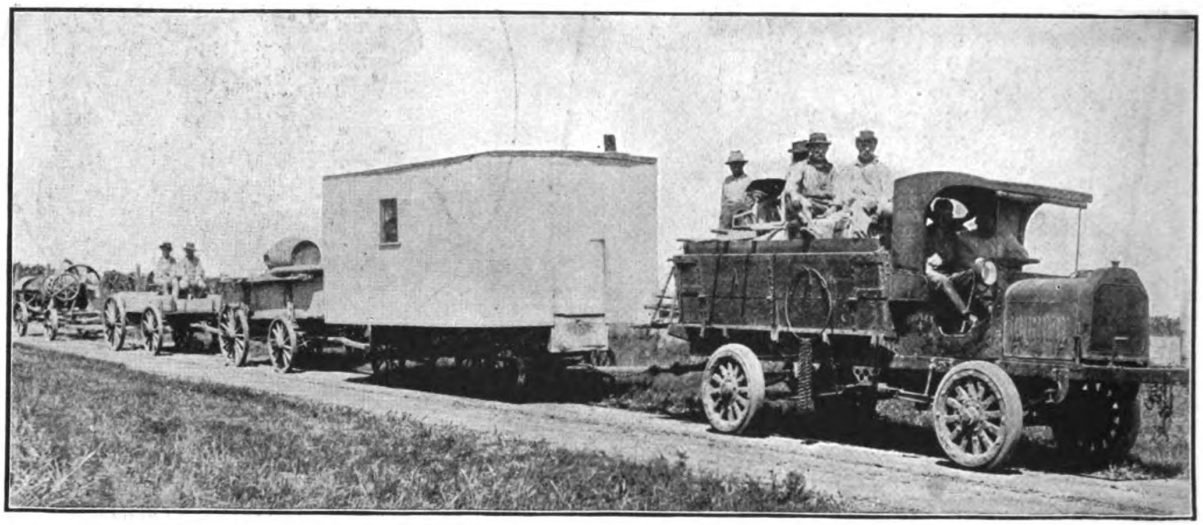
DUPLEX TRUCKS

BUILT FOR BUSINESS



W. C. BESS
DEALER IN YELLOW PINE AND HARDWOOD LUMBER

Altavista, Va.
December 30, 1918

Dear Sirs:

In answer to your inquiry of some days back asking about the satisfaction with which I have operated a Duplex Truck, I take pleasure in saying that after operating this truck since November, 1917, I feel that I venture nothing in the statement that it is *the* truck for heavy hauling. I have been hauling a distance of 10.6 miles and a part of the road is unusually bad for dirt roads—very heavy grade and poor roadbed, but we have been handling 4,500 feet of green oak lumber, approximately 25,000 pounds per day, at a cost of $3.50 per thousand feet. The same lumber, if hauled by a team, would cost $8.00 per thousand feet.

I regret that I have no photographs of this Duplex in action and at present I cannot get them made.

Very truly yours,
(Signed) W. C. Bess

Duplex Limited
Medium Capacity—Two Wheel Drive—High Speed
$2575 F. O. B. Lansing



DUPLEX BUILT FOR BUSINESS

DUPLEX 4-Wheel Drive Trucks are typical examples of American progress. They occupy a prominent place in every line of the building business and their prestige is permanently fixed in the minds of business men.

Yet it is little wonder that increasing numbers of contractors are learning about Duplex performance and applying it to their own business. Merit soon establishes a standard and the buying public are quick to sense a leader.

Duplex truck success is due to a number of things but mainly to their performance—their dependability. Profitable truck operation can come only from constant service.

Get all the facts about Duplex Trucks. You will find them interesting and perhaps profitable.

Duplex 4-Wheel Drive
3½ Ton Capacity. Price $4250, f. o. b. Lansing

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One of the Oldest and Most Successful Truck Companies in America

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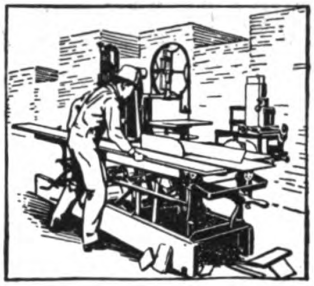
Prosperous Carpenters Have Their Own Equipment

THEY tackle the work as it comes and get it done! No waiting for anybody. They double the value of their own time and their men's time by having machinery which turns out the finished materials speedily.

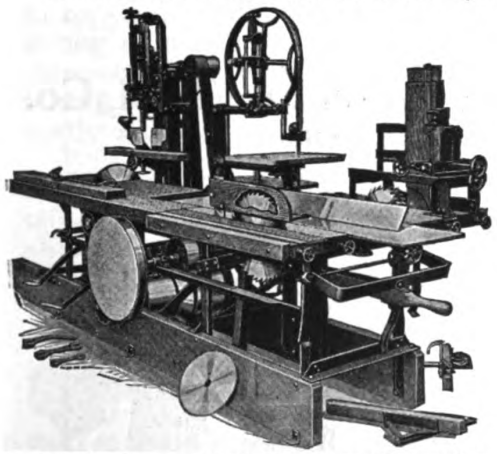


The Parks Planing Mill Special

is a prime favorite with carpenters everywhere. It is a complete woodworking outfit. Eight machines in one, it planes, saws, joints—performs almost every operation in the production of exterior, interior and dimension material. It saves hours of time on every job; converts timber ordinarily wasted into good, usable timber.

It's a hard, steady, efficient worker. No "waves" or planer marks on your trim—the machine is practically vibrationless. Light, but not too light, it can be moved from job to job and used winter and summer. The operating cost is next to nothing, and repairs won't worry you.

You can't lose on a Parks—you can't go wrong by buying one. They have been making good for 25 years. Made with stout angle steel frames, completely reinforced, and produced in quantity, their cost is surprisingly low.



Eight machines in one—a Double Table Rip and Cross-cut Saw, Swing Cut-Off Saw, 12-inch Jointer, Tenoner, Upright Hollow Chisel Mortiser and Borer, Reversible Spindle Shaper and Sanding Machine. 550 r. p. m. 4-5 h. p.

Every day you let pass without investigating Parks equipment is a day of profit lost forever. Get ready now for the spring boom! Handle more jobs and make more money!

Write for a Parks catalog.

The Parks Ball Bearing Machine Co.

Fergus Street and C. H. & D. R. R. Cincinnati, Ohio



W. C. Niehaus operating a Parks Woodworker in his woodworking shop at Bogota, N. J. In 7 years, Mr. Niehaus has never paid out a penny for repairs.

WOODWORKING PARKS MACHINES

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The FAMOUS "31" UNIVERSAL WOODWORKER

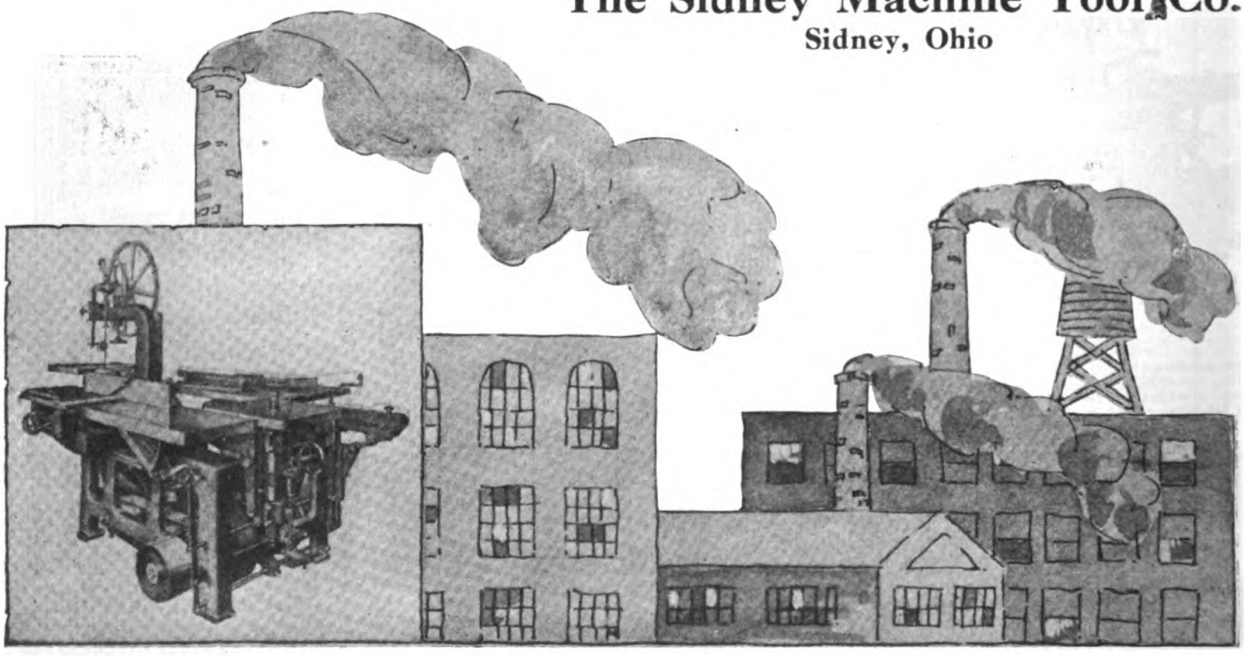
Cuts the cost of building because it saves much of the time that would otherwise have to be spent in sawing, shaping and boring by hand.

The Famous "31" Universal Woodworker is an absolute necessity in any building work, for it combines in the one machine the three most important operations connected with the construction. From the time when the heavy framework is being put up until the last moulding is applied the Famous "31" is indispensable.

With labor costs where they are today, you, as a progressive builder, cannot afford to overlook this modern machine. It will soon pay for itself in the saving it will effect.

Let us send you complete details of this modern money maker, together with specifications and list of satisfied users.

The Sidney Machine Tool Co.
Sidney, Ohio



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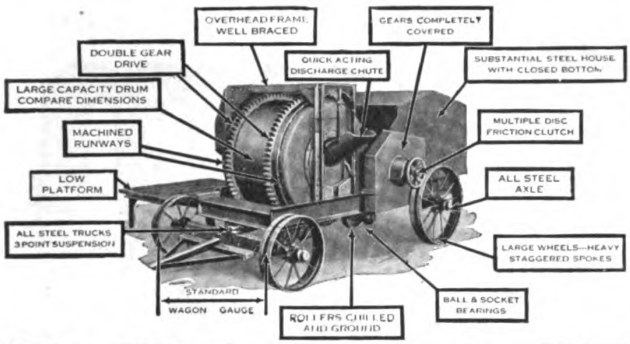




DANDIE

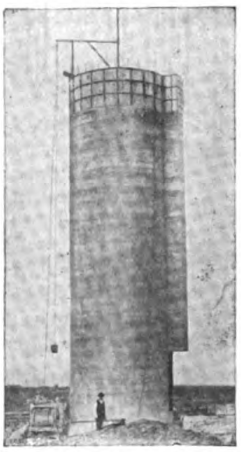
The Big Value Light Mixer

Send back the coupon at the bottom of this page—and get the full facts about the remarkable value of the light mixer field—the light mixer built first for **reliability,** and then built in **volume** to keep the price down.

No, Sir, the Dandie is not the cheapest mixer—it is the first light mixer built as strong as a light mixer can be built. It stands up to all the work you can give it—is dependable to stick on the job without costly delays.

But the price is within the range of light mixer prices—that is why it is the **remarkable value**—you are surprised that you could get such construction for the price. It is only made possible by scientific design, big production and standardization of every part. This is how we get the price down, not by skimping.

Get the Dandie Catalogue—get the full details of how volume production has put new reliability into the lighter mixer field—see for yourself why the Dandie is the remarkable value of the industry.



4 cu. ft. and 7 cu. ft. capacities Wet Batch Rating. No. 104-S, gasoline, No. 107-S, steam or gasoline. *May be equipped with low charging platform, power charging skip, automatic water-measuring tank and light duty hoist,*

The Big Yardage Mixer for Footings, Sidewalks, Silos, Culverts, Etc.

SEND BACK THIS COUPON

KOEHRING MACHINE CO., Milwaukee, Wis.

Please send, without obligation, your Dandie Big Value Catalog M 5, and advise me where I can see a Dandie Mixer.

Also send me information on items marked X in ☐ ☐ *Bar Benders* ☐ *Bar Cutters*

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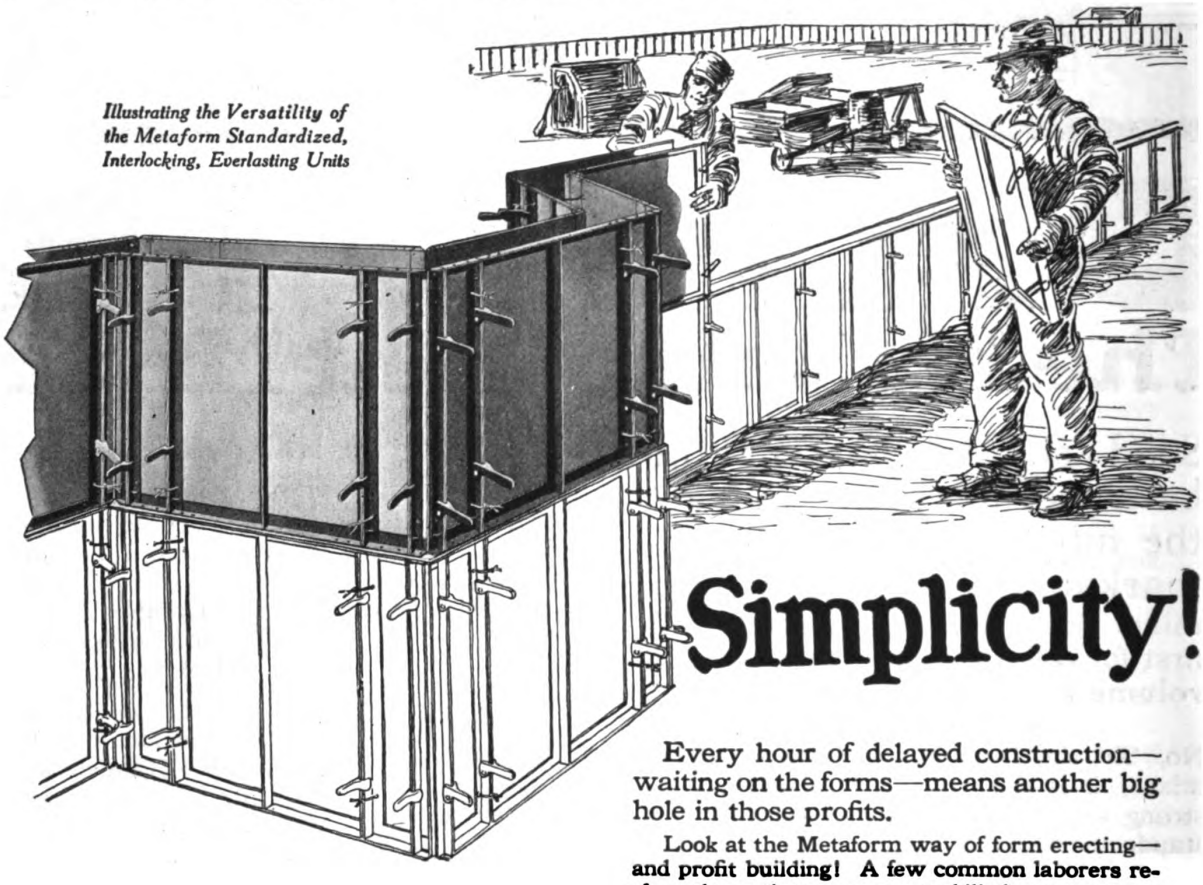
Metaform



Illustrating the Versatility of the Metaform Standardized, Interlocking, Everlasting Units

Simplicity!

Every hour of delayed construction—waiting on the forms—means another big hole in those profits.

Look at the Metaform way of form erecting—and profit building! **A few common laborers replace three times as many skilled carpenters—there's a substantial saving on your pay roll. (Estimate it—for one season.)**

Those common laborers erect the strong, simple, Metaform units with a speed that could never be approached with wood forms. Metaforms are always on the job—ahead of the mixer.

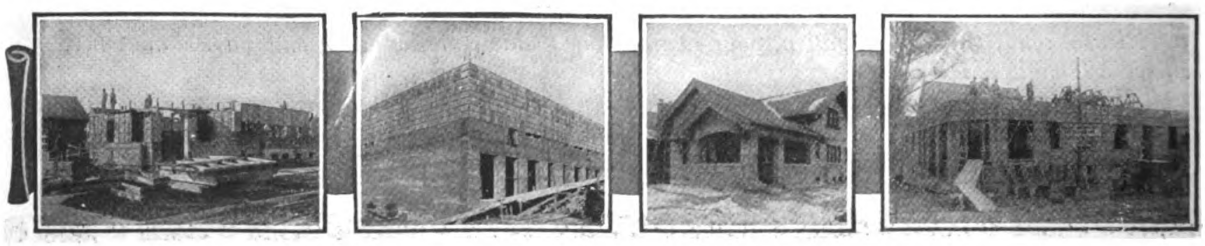
Metaforms are a permanent investment—there is no continual replacement cost—as with wood.

IT'S the excessive cost of wood forms that is eating up the profits on your concrete work! It's the wages you pay skilled form carpenters to erect the forms which must be ripped down—destroyed—as soon as they have served their purpose—

And your rightful profits are spent in the huge wastage of expensive form lumber, a large percentage of which must be replaced after every job.

The Simplicity of Metaforms

A Metaform outfit consists of a number of standard Metaform units, each unit constructed of sheet steel, strongly reinforced with angle iron.



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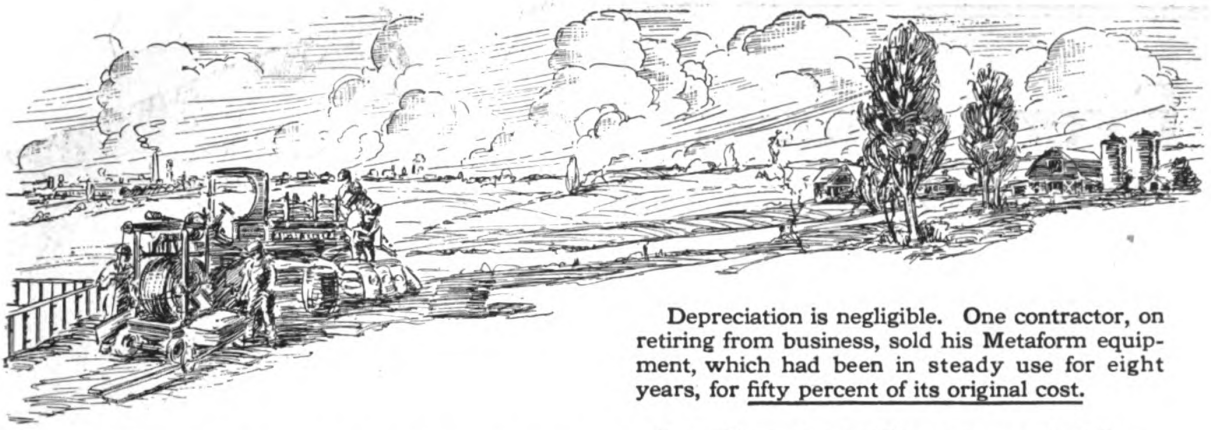


Every unit is standardized and interchangeable, and is equipped with all necessary clamping and automatic aligning devices.

These units are assembled in a remarkably short time into two-foot courses, each course consisting of an inner and outer shell.

A few fractional and adjustable units furnish the necessary variation to fit different dimensions.

Limited Equipment Necessary

Even on the most extensive work three courses of units are all that is necessary. As fast as the pouring proceeds, the bottom course of plates is taken off and erected on the top course.

After the first course has been laid, there is no chance for even the most ignorant laborer to go wrong on further set-up.

An Example of Metaform Savings

Carefully kept records on six average residence foundations proved total savings through the use of Metaforms, of $1026.72.

Metaforms reduced the cost of $1976.64, using wood forms, to $949.92. Circular B, describing these jobs and giving the authentic figures, will be forwarded to all interested contractors on request.

Startling as these savings are, they are by no means extraordinary. Hundreds of contractors in every part of the country are earning proportionate profits from the use of Metaforms.

Metaforms are Permanent Equipment

No other equipment you can buy will "stand the gaff" like Metaforms. No one knows how long they will last—the first ones, built fifteen years ago, are still in daily use.

Depreciation is negligible. One contractor, on retiring from business, sold his Metaform equipment, which had been in steady use for eight years, for fifty percent of its original cost.

For Silos, Grain Elevators and Other Circular Construction

Standard Metaform circular equipment has created a huge demand for monolithic concrete silos, coal pockets, elevators, water-tanks and other circular structures.

The simplicity and speed of these circular outfits have overcome every objection to concrete for this type of structure.

Many contractors are averaging better than twenty-five silos during the building season with a single Metaform outfit. Several contractors keep three or four outfits constantly at work.

Get the Metaform Books

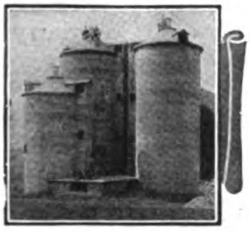
Find out right now, before you get into the rush of the season's work, just how much extra profits Metaforms will produce for you.

Metaform methods on straight wall concrete construction and on circular work are completely described in two Metaform books. These books are worthy of a place in every contractor's files. Fill out the coupon and the books will be mailed to you—free, of course.



Metal Forms Corporation

Milwaukee, Wisconsin



You want the Metaform Facts *NOW.* Send the coupon, or a post card or letter.

FILL IN COUPON, AND DETACH HERE

METAL FORMS CORPORATION
Booth Street, Milwaukee, Wis.
Send me the two Metaform Books

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City_____

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Every Builder
Needs This Hoist

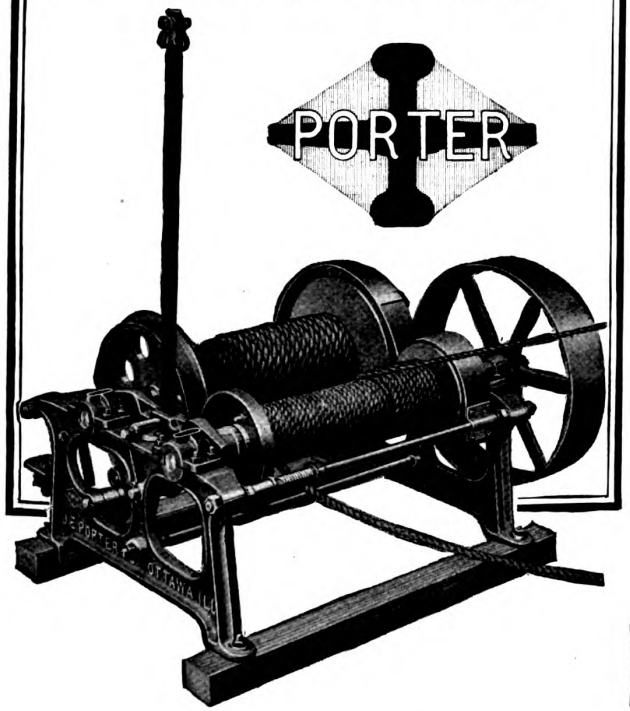
Here is the simplest, strongest hoist made. It has fewest parts — fewest to pay for—and its simplicity insures dependability. Taken apart or put together in ten minutes by the most inexperienced man. A few cents a day will operate it.

PORTER
Single Lever Hoist

One lever controls the operation. Cannot be thrown into gear accidentally. Ball-bearing thrust collars absorb friction. Frame is as sturdy as metal can make it — heavier than other hoists, and absolutely break-proof. Like all Porter products, it is fully guaranteed.

Write for complete illustrated details of construction and operation.

J.E. PORTER CO., 801 Guion St., Ottawa, Ill.





A Square that Calculates

Measure off your Hip, Valley, Jack or common rafters and the Sargent Framing Square will calculate the lengths and cuts as you measure. All figuring on the part of the carpenter is eliminated, also all possibility of error.

Owing to the great variety of markings, the Sargent Framing Square is adapted for almost any purpose that a carpenter might require. A description of these markings and the uses of the various tables is given in the Sargent Steel Square booklet. Send for one.

Sargent Auto-Set Bench Plane

Lightness, ample handle room, ease and positiveness of adjustment, combination of clamp and cap into one part and ease of operation are all advantages.

The cutter can be removed, whetted and replaced to exactly the same position without adjustment — a great time-saving feature. Made in six sizes. Descriptive booklet free on request.



Sargent & Company
Hardware Manufacturers
53 Water Street
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SARGENT
LOCKS AND HARDWARE

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"Lined Up" for a Purpose



THIS pyramid of men is standing, one upon the other's shoulders, for the sole purpose of proving that stability depends entirely upon alignment.

Should one get out of line, this human column would totter, perhaps come tumbling down.

Alignment, then, is essential to any structure, human or otherwise, if it is to stand.

And to insure the greater stability of complete alignment, build with Natco.

Note how Natco Hollow Tile lays up in a wall—all webs and shells in perfect alignment — partitions directly over each other.

Natco "lines up" this way for a purpose—to provide a wall of **maximum** strength. **Actual tests** have proved **that end construction gives to Natco a strength unequalled by any** tile laid on **its side.**

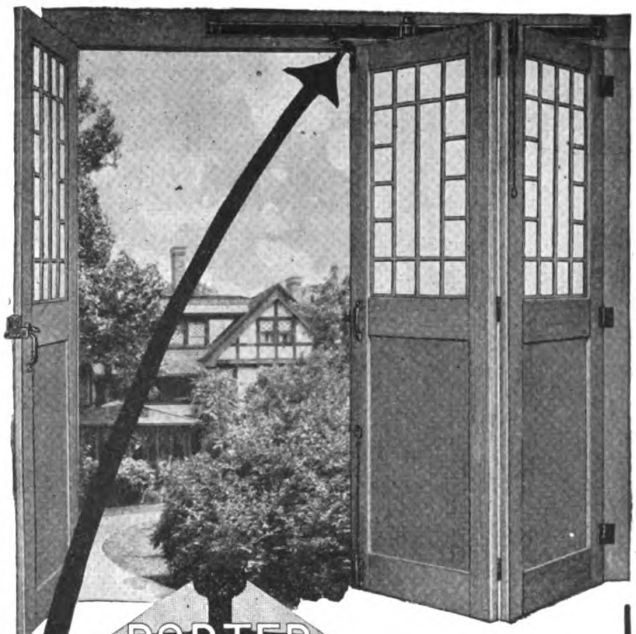
Furthermore, Natco reduces dead **weight, insures** economy and **banishes the** fire peril.

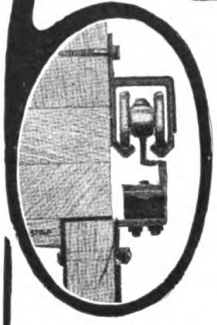
Be up-to-date on Natco—write for our new Wall Bulletin No. 174, just off the press.

National Fire Proofing Co.
222 Federal Street **Pittsburgh, Pa.**
Branch offices in principal cities

NATCO

Made the Skyscraper Possible





These Doors Shut Tight

In the oval is shown the reason why the Porter "Straight-Away" Garage Door Track and Hanger insures a perfect fit of doors against jamb and weatherstrip. The offset swivel, an exclusive Porter feature, makes it impossible for doors to sag, spring or bind.

THE STRAIGHT-AWAY
No Sag Garage Door Track & Hanger

No other garage door hanger has as many important advantages. It is storm-proof and every door keeps rigid alignment whether open or closed. The straight track saves space because the doors are folding-sliding. The "Double V" construction reduces friction to the minimum.

Use the Porter "Straight-Away" in the garages you build, and you will be sure of satisfied clients. Every "Straight-Away" is fully guaranteed. Write for our illustrated descriptive literature.

J. E. PORTER COMPANY
800 Guion St., Ottawa, Ill.

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GOOD work demands good tools—Starrett Tools for choice. Accuracy, utility and quality are just as much a part of any Starrett Tool as the Starrett trademark.

Write for catalog No. 21 "P."

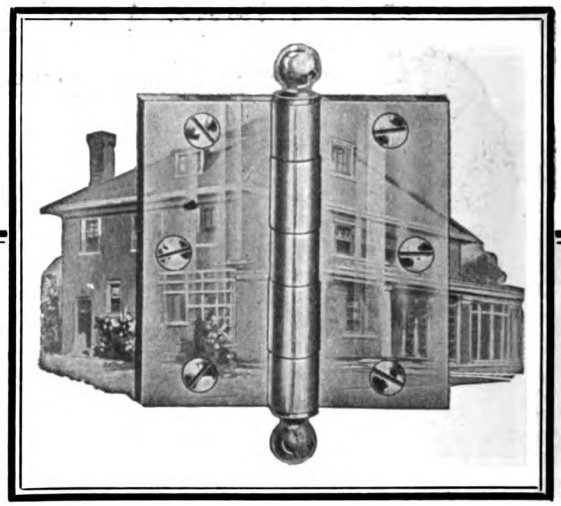
The L. S. STARRETT CO.

The World's Greatest Toolmakers

Manufacturers of Hack Saw Unexcelled

Athol, Mass.





Your

ATTENTION!!

is called to the hinges on the door. To some people door hinges may seem rather small and unimportant—nevertheless, their mission in helping to make or mar the appearance of the rooms in a modern home is worthy of serious thought. The

GRIFFIN

"The Door Butt of America"

is designed along lines that insure both beauty to the home and *service* whenever the doors are opened and closed.

The Griffin operates freely and easily, it is amply strong for heavy doors and it is such a pleasing fixture that architects and home builders are glad to specify and use it.

Being finished in the various Griffin hardware finishes, it is in wide demand for the better class of houses and office buildings.

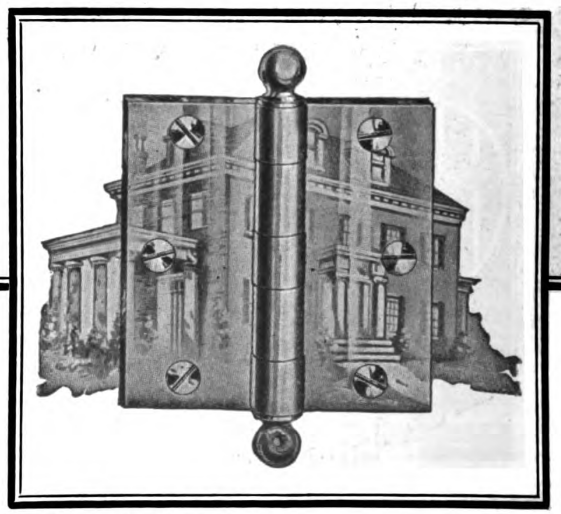
Send for illustrated catalog and circulars.

The Griffin Manufacturing Company

ERIE, PENNA.

45 Warren Street
New York

17 E. Lake Street
Chicago



Please quote BUILDING AGE when writing to advertisers

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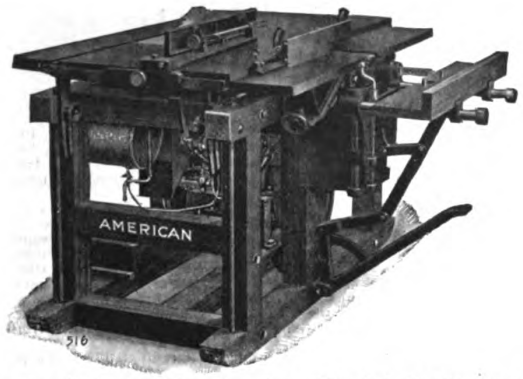


"American" Variety Woodworker—Furnished with Built-in Gasoline Engine, Self-Contained Electric Motor, or for Belt Drive

ORDER These "AMERICANS" For Spring Work, NOW

You'll need them—to keep down labor costs and to put speed into your work. And you'll want them ready, when the season opens.

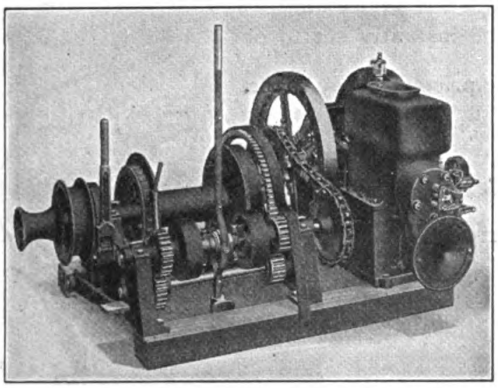
Hundreds of contractors have proved the time-and-labor-saving capacity of these "Americans"—the Variety Woodworker to get out high-class work quickly and cheaply, and the Contractors' Hoist to handle it with speed and economy.

The best equipment you can buy is the cheapest in the long run.

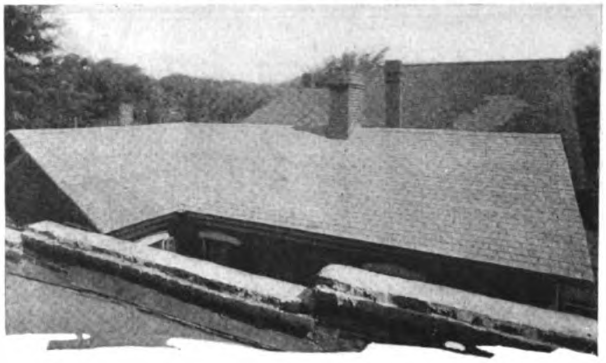
Write for Bulletins 77 and 10

American Saw Mill Machinery Co.

HACKETTSTOWN, N. J. 62 Main Street — **NEW YORK CITY** 1362 Hudson Terminal



"American" No. 4 Hoist with Self-Contained Gasoline Engine; Also Furnished with Electric Motor or for Belt Drive



In the Background: Ordinary wood shingles, faded, worn, unbeautiful—the kind of roofing that brings you complaints. In the Foreground: Sta-so-surfaced roofing; as colorful, beautiful and new looking as when laid—the kind of roofing that brings you compliments.

Compliments or Complaints

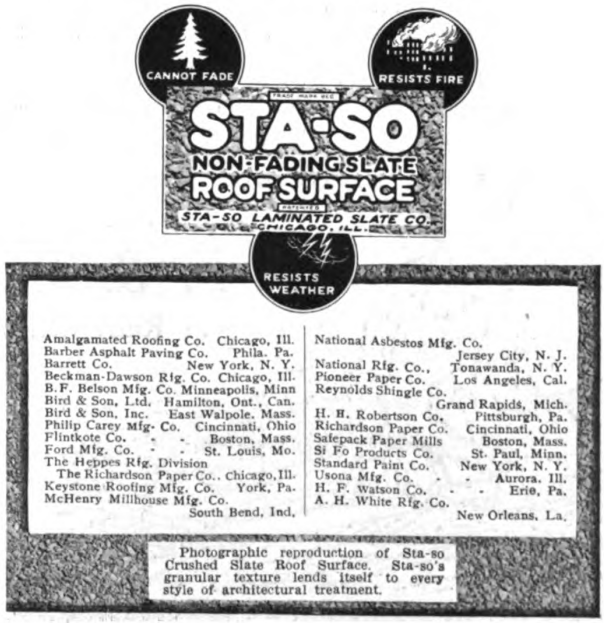
Which Do You Want?

COMPLIMENTS make money for you; complaints COST you money. Dealers get compliments about Sta-so crushed slate roof surface.

The reason is that Sta-so's colors of deep Indian red and cool sage green are positively permanent. The sun can't fade Sta-so; the elements can't fade it. That's why the house covered with Sta-so'd roofing will have as beautiful a roof in 1945 as it has today.

Do your customers know that? Advise them to beautify the home, church, clubhouse, office building or farm building with Sta-so'd roofing. They can afford it, and it is easy and economical to lay.

The roofing manufacturers listed below bought enough Sta-so in 1919 to cover a city of 42 square miles. They carry the Sta-so label on their asphalt roofing. Insist on it as a guarantee to your customers that the roofing will not fade.



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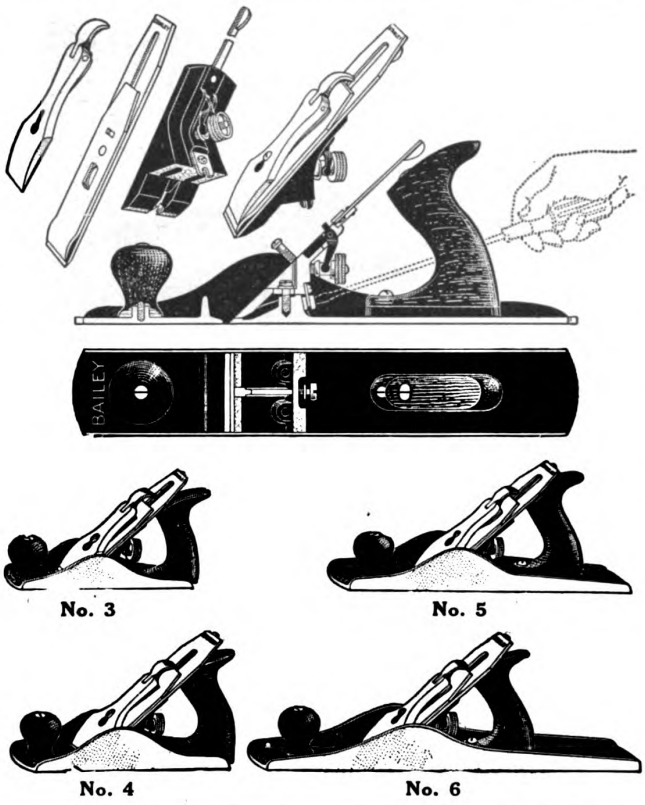


Stanley Tools

"BAILEY" ADJUSTABLE IRON PLANES

"BAILEY" IRON PLANES have been in use for nearly fifty years and are the recognized standard for planes of this type. While retaining all the original features, many valuable improvements in construction have been added from time to time.

In the illustration the detail of construction is very clearly shown. Note that the frog has a support directly at the rear of the mouth, making practically one solid piece from the cap to the bottom. The sides and bottom of the plane are stiffened by means of the cross ribs. The screw bosses on each side of the center rib are very deep, allowing a number of threads to engage, thereby securely holding the frog. The design prevents the plane being drawn out of true when the face of the frog is screwed up hard.

The width of the mouth may be regulated and made wider or narrower as coarse or fine work may require.

The cutter, which is thin and of uniform thickness, is a prominent feature of the "BAILEY" Plane.

Briefly, its advantages are: 1. Ease in grinding. 2. Less grinding, as a thin cutter can be kept in condition by honing. 3. Less tendency to "stub off" the cutting edge when honing, hence the original bevel is kept much longer.

It is adjustable endwise and sidewise, made of the finest quality English steel, tempered and ground by an improved process, and honed ready for use.

The handle and knob are made of highly finished, thoroughly seasoned rosewood.

All genuine "Bailey" Planes have the name "Bailey" cast in the bottom, and the name Stanley is stamped on the cutter. Planes with bottoms either flat or corrugated furnished as desired.

For Sale by All Hardware Dealers

Manufactured by

STANLEY RULE & LEVEL CO.
NEW BRITAIN, CONN. U.S.A.

Why Don't You Get a
Barnes Hand Circular Rip Saw?

Sawing by hand is "backbreaking" work—sawing with our machine prevents the aches and requires no skill.

One man with a Barnes Hand Circular Rip Saw can easily rip (line measure) 600 feet of one inch pine in an hour, or 6,000 feet in 10 hours.

It will rip boards or planks of either soft or hard wood, of any thickness up to 3¾ inches and any width up to 19 inches.

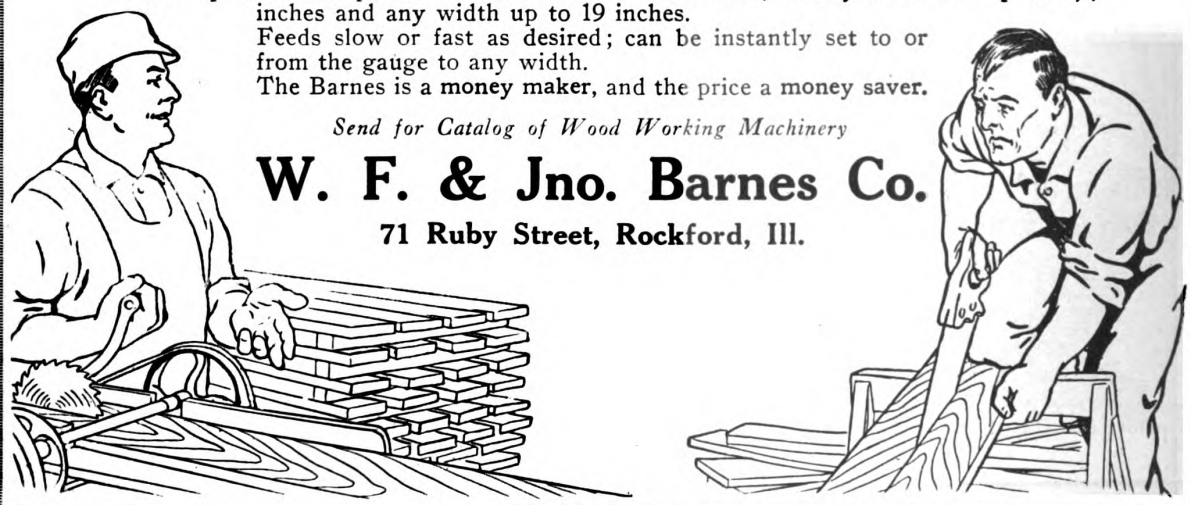
Feeds slow or fast as desired; can be instantly set to or from the gauge to any width.

The Barnes is a money maker, and the price a money saver.

Send for Catalog of Wood Working Machinery

W. F. & Jno. Barnes Co.

71 Ruby Street, Rockford, Ill.



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NEW PLAN BOOKS



KEITH'S

SERVICE TO BUILDING CONTRACTORS

The successful contractor is the man who is building Better Homes, which means well planned and artistically designed. He is also busy with his several jobs going at once and cannot afford to spend his time making plans. The service of our entire planning organization is at your call. Use it—Get our new set of Home-builders Plan Books—special low rates on Plans to contractors.

Another big help is KEITH'S Magazine on Home Building, monthly. Shows designs contributed by well known architects, and gives many practical and helpful articles on construction. "KEITH'S has been published twenty years and is a recognized authority on up to date home-building.

BIG $3.00 OFFER—We will mail you, post paid, a set of 5 PLAN BOOKS giving you a refreshing and splendid collection of well planned Homes in Bungalows, Cottages and Two Story Houses; a total of 160 plans, and enter your subscription for one year to Keith's Magazine.

KEITH CORPORATION, 110 Abbay Bldg., Minneapolis, Minn.

$5.00 BRINGS IT TO YOU

DO YOUR OWN LEVELING WITH YOUR OWN LEVEL



Sold On Easy Monthly Payments

Now you have the opportunity to own a strictly high-grade, accurate Convertible Level on Aloe's Easy Rental Purchase Plan—and without previous experience, or technical knowledge, you can put it to work so that it will make big money for you. Only $5.00 brings it to you—then put it to every possible test. If you are pleased with it, pay the small monthly installments and the level is yours.

Aloe Convertible Level

It is a combination transit and level, quickly converted to the use of either. It is absolutely accurate—satisfies the requirements of the most exacting contractors—yet is so simple that anyone, without technical education can use it. Sights above and below the horizontal can be taken. **You can use it for leveling up foundations, walls, piers, running boundary lines, fences—in fact, a thousand and one jobs you meet every day that require an accurate level.**

FREE *Write for This Book*

BE A BIGGER BUILDER

You Learn To Use It In An Hour

No technical knowledge necessary. No previous experience is needed. With our simple and complete instruction book included free with every level, you can immediately put the instrument to work. It starts to pay for itself immediately and continues to be a permanent money-making investment.

Write For Free Book

It tells you how to increase your income, how to get the profitable jobs and become a bigger man in your community. Don't doubt or delay—write for this book at once.

A. S. ALOE CO.

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Ten Days' Free Trial

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.

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Without obligation, send me your free book, "Be A Bigger Builder". Also full particulars about the Aloe Convertible Level and details of your easy payment plan.

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Address .....

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DISSTON
SAWS AND TOOLS

The Famous Saw and Tool House of America

All high-grade workmen know the world-wide reputation of Disston Saws — Disston leadership for 80 years is one of the traditions of the trade.

As to Disston tools, it is easy to understand why they, too, should be in such demand, for the same quality that has made Disston Saws the world's standard is found in all Disston Tools.

Henry Disston & Sons, Inc.

"America's Largest and Longest Established Makers of Saws and Tools"

PHILADELPHIA, U.S.A.

This is the day of the
EMPIRE PIPELESS

AN efficient, inexpensive heating system for homes, schools, churches and stores, without pipes in walls and floors, without the danger of fires present where stoves are used, and which burns any fuel — hard or soft coal, coke, wood or gas. Only one fire to attend to once or twice daily. Easily installed and fully guaranteed.

Write for Folder.

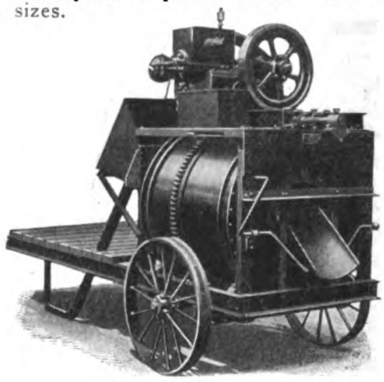


CO-OPERATIVE FOUNDRY CO.
ROCHESTER, N. Y.
Western Branch: 505 S. Clinton St., Chicago
Makers of the famous Red Cross Stoves & Ranges

You need fewer men with
ARCHER MIXERS

FEWER MEN—The Archer will do away with three or four men to every gang. It is the original end-discharge mixer. No wheelers needed.

SPEED—Works faster, mixes better. One man can move it and it does not need a team to take it from place to place. Made in one-bag and half-bag sizes.



Why worry about men? Get an Archer Mixer and get along with a smaller crew.

SEND FOR FREE BOOKLET

Let us tell you how much more profitable it is for you to have one or two small Archers do your work than one big expensive machine.

ARCHER IRON WORKS
Makers of the Archer Dump Body and Hand Hoist
2442 W. 34th Place **Chicago, Ill.**

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A Growing Number of People Prefer Sheldon's Slates to any other roofing

WE are constantly receiving inquiries from owners for names of roofers who lay slate. This shows that there is a growing number of people who prefer slate to any other kind of roofing. We are selling more Sheldon's Slates than ever before.

SHELDON'S
RED GREEN. PURPLE, BLACK
SLATES

cost no more than an ordinary shingle roof—or a roof of Asbestos or asphalt shingles—and their life is immeasurably longer; they never wear out.

The booklet illustrated contains interesting facts for the man about to have a new roof put on or an old roof repaired. It is also a splendid thing for the roofer to give to his roofing prospects. Copy on request.

F. C. SHELDON SLATE CO.
GRANVILLE, N. Y.



DON'T let your handiwork fade into mediocrity. Have Bay State Brick and Cement Coating rescue the walls from ruinous weather. To old buildings of brick, concrete or stucco, "Bay State" can bring back the bloom of youth and the vitality to *ward* off wet weather.

Bay State Coating comes in white and a variety of charming tints.

Our Book No. 19 and samples will be gladly sent to you.

WADSWORTH, HOWLAND & CO., Inc.
Paint and Varnish Makers
Boston, Mass.

New York Office: Architects' Bldg.
Philadelphia Office: Weightman Bldg



BOYLE'S BAYONNE ROOF AND DECK CLOTH

THE ARCHITECT, CARPENTER OR BUILDER

who appreciates a tough, lasting and serviceable covering for low-pitched or flat roofs or for the roofs or floors of porches, sun parlors, conservatories, etc., should investigate

Boyle's Bayonne Roof and Deck Cloth

Manufactured by

JOHN BOYLE & COMPANY, Inc.

An experience of 60 years in manufacturing is back of their guarantee that BAYONNE is reliably waterproof

It requires no white leading yet lays flat and stays flat

It will not crack, buckle, peel or shrink

Write for sample book "R" which also contains prices and directions for laying

JOHN BOYLE & CO., Inc.
Established 1860
112-114 Duane St. NEW YORK 70-72 Reade St.
Branch House: 202-204 Market Street, St. Louis, Mo.



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THE ONLY SCREW HOLES IN THE WORLD

You drive the screw holes with a hammer in any material.

The screw holes are made for wood screws or machine screws to fit all sizes of screws. The head is removed and you leave a permanent screw hole.

The Stine Screw Holes Co.

Once a Screw Hole, Always a Screw Hole

Manufacturers
WATERBURY, CONN., U. S. A.
DEPARTMENT 7

The Biggest Little Thing in the World

Some of the Reasons Why Screw Holes Will Be Bought and Used and Not Become Dead Stock for Anyone

1—They can be used without damage to receiving material
2—They enable you to standardize to wood or machine screws in all material.
3—They are made of brass and will not rust under atmospheric or moisture conditions.
4—ECONOMY—They save more time value than the holes cost.
5—You get them for nothing and are paid for using them when you count time saved.
6—Screw holes have been needed ever since the first screw was used.
7—Special tools are NOT needed in using them in any material.
8—They can be used in any place a screw can be used.
9—By using screw holes, screws can be used in many places, and in many materials where it is impossible to use screws without them.
10—These are the only ready-made screw holes in the world
11—No special screws are needed. These screw holes fit any wood screw or machine screw now in stock.
12—They make the neatest possible job in any material.
13—Every store where screws are sold must carry them in stock, because the line of screws is not complete without screw holes for them.
14—Every shop and factory where screws are used must also have these screw holes to fit the screws.
15—They are endorsed by all dealers in screws and by all users of screws
16—Screw holes are entirely new and the world supply is yet to be furnished.
17—This is a progressive Old World of ours, and every active person in it must adopt all improved methods, and all new articles that will help him keep in the front line of progress.
18—Be among the first to stock up in screw holes if you are a dealer in screws.
19—Be among the first to install screw holes in your shop or factory, as you begin to save money soon as you use them.
20—In spite of the high cost of brass, screw holes are yet cheap.
21—We are letting the world know that screw holes can now be secured, by means of extensive advertising in all the principal Trade Journals that have the largest circulation among dealers in screws as well as users of screws.
22—Do not let your customer ask you for screw holes before you have them in stock. BE A LIVE WIRE.
23—They make everlasting holes in any material.
24—They mean "Plug-No-More" screw holes.
25—They are the result of Necessity being The Mother of Invention.
26—Anyone who can drive a nail can use screw holes.
27—Send for a sample and convince yourself.
28—Mechanics who see them say, "What do you think of that?"
29—In fact there are NO REASONS why screw holes should NOT be used.

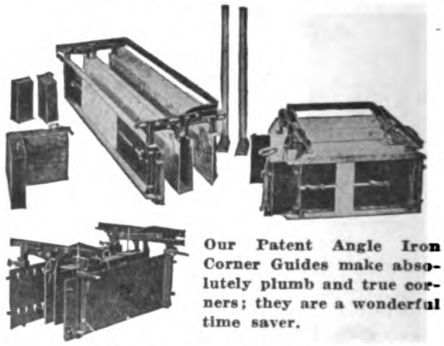
Each of these reasons are enough to sell Screw Holes. There are many other reasons.

Write at once for our handsome **Color Card** showing screw holes in various materials which will be sent on request, together with samples and price list.

Van Guilder Outfit

for building reinforced concrete

Double Monolithic Walls



Our Patent Angle Iron Corner Guides make absolutely plumb and true corners; they are a wonderful time saver.

The window frames are set in place and cemented tight, with air space brought up to frame by the sliding plates on sides of machines—no solid wall anywhere to carry dampness through.

Our wonderful New Window Machine gets into all the small places and short angles, and follows complex architectural designs. Our special exclusive features are time and money savers, and are worth the cost of our entire system.

BUILD ANYTHING

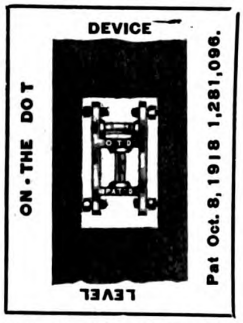
from cottage to mansion; chicken house to full dairy plant including Double Wall Silos that will not freeze; garages, factories, theaters; triple wall store houses and cold storage plants. Concrete construction at the cost of wooden buildings and even less.

VAN GUILDER DOUBLE WALL CO., Inc.

20 Wagner Bldg. **Rochester, N. Y.**

"Built Like a Thermos Bottle"

ON THE DOT
LEVEL DEVICES



This remarkable little leveling device is just the instrument carpenters, builders and mechanics have long been waiting for.

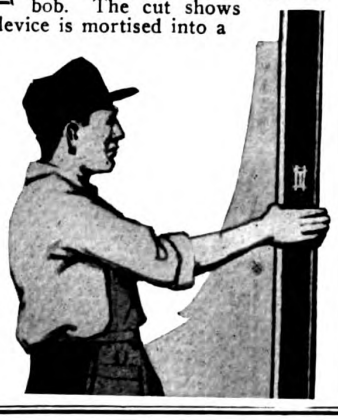
Where the job requires a level bar of considerable length and absolute accuracy, O-T-D level devices are of particular advantage.

O-T-D is a small instrument about three inches in length that can be mortised into any board (picked up on the job) making a perfect level or plumb bob. The cut shows how the O-T-D level device is mortised into a board of any length desired and is adjusted by four set screws—one at each corner—which hold it firmly in place.

O-T-D does away with the old-fashioned inaccurate plumb bob—saves time and trouble and makes for speed and accuracy.

Price $3.00 at your dealer or direct

Write us today

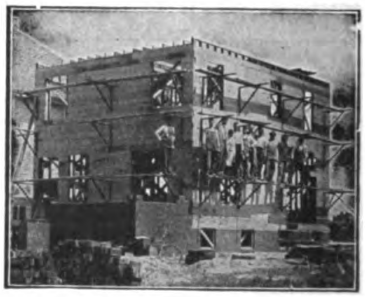


CHAS. M. NEIMES SALES COMPANY

30 North Dearborn Street
CHICAGO, ILLINOIS

SAVES BUILDING SCAFFOLDS

Insures safety of workmen. Saves storage and trucking space. Saves money.



RICHARDS-WILCOX
Steel Collapsible Builder's Bracket

made entirely of steel in two styles and sizes. The strongest bracket made and the most easily applied.

Costs no more than a wooden bracket and will last a lifetime.

Write for leaflet N F—3 which describes and illustrates this desirable appliance.

Richards-Wilcox Mfg. Co.
A Hanger for any Door that Slides
CHICAGO ST. LOUIS LOS ANGELES PHILADELPHIA — AURORA, ILLINOIS, U.S.A. — BOSTON NEW YORK MINNEAPOLIS SAN FRANCISCO — LONDON, ONT.

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Fiberlic Wall Board

The *material* from which it is made, the fact that the pulp is *chemically cleansed* and that the *fibre lengths* give the finished product that *natural reinforcement* that is lacking in ground wood boards, is in itself a guarantee of the superiority of Fiberlic for *strong, permanent, economical* and *sanitary construction.*

MacAndrews & Forbes Company
200 Fifth Avenue, New York City
Factory: Camden, N. J.

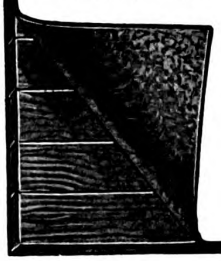
Extreme Uses

such as for wall linings of ocean going steamships where it stands the supreme test of vibration, moisture and strain, proves conclusively the strength and efficiency of

Compo-Board

Its center core of kiln-dried wood slats—the only wall board thus made—is the secret of its strength, durability, cold, heat and moisture-resisting qualities and its adaptability to a wide variety of decorative methods.

Compo-Board is the modern wall lining. It will not buckle, warp, or shrink. So tough that it can't chip, crack or mar, and is not injured by ordinary knocks.



Sample sent free; also interesting booklet. Write for them.

The Compo-Board Co.
5778 Lyndale Avenue, North,
Minneapolis, Minn.



Winter!

And a coal shortage. And prices going up. What's the answer? Conserve the coal supply. Reduce fuel expense 25% by using weatherstrip. Almost every home in your locality is a prospect. Our weatherstrip is scientifically designed, of good material and easy to install. We help you to make sales. Ask for detailed information.



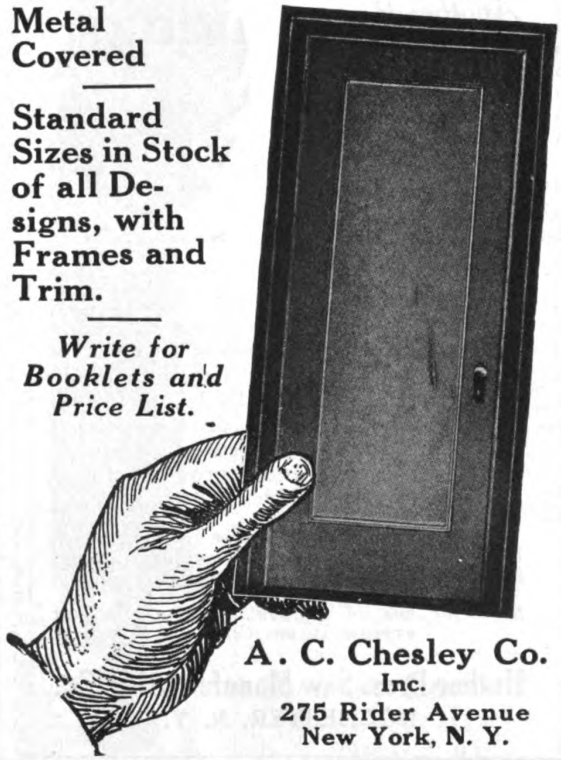
Allmetal Weatherstrip Co.
122 Kinzie Street
CHICAGO

STOCK FIRE PROOF DOORS

Metal Covered

Standard Sizes in Stock of all Designs, with Frames and Trim.

Write for Booklets and Price List.



A. C. Chesley Co.
Inc.
275 Rider Avenue
New York, N. Y.

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"YANKEE"

RATCHET DRIVER
No. 10
SAVES TIME AT EVERY TURN

Here you have— an easy working ratchet, right hand, left hand (and rigid), a comfortable handle and withal a strong and serviceable driver.



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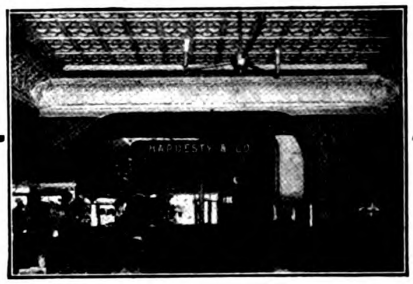

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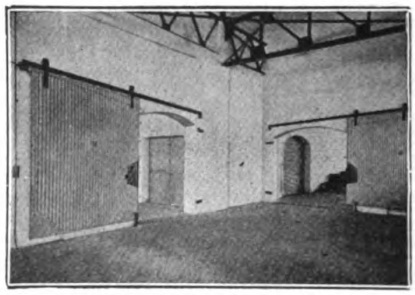

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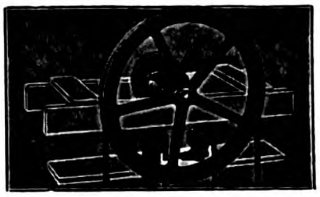

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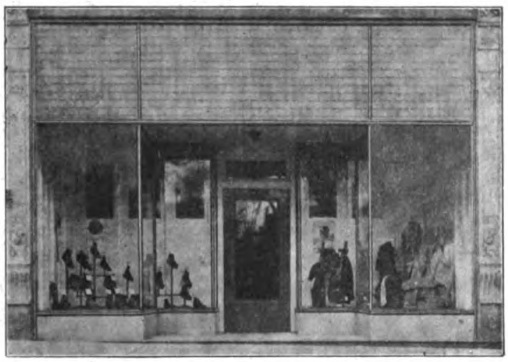

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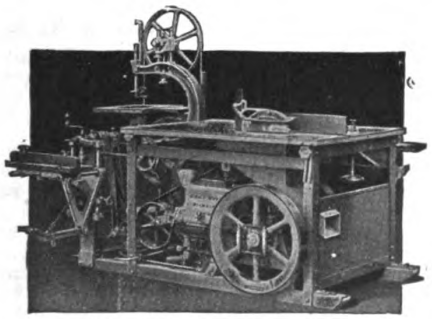

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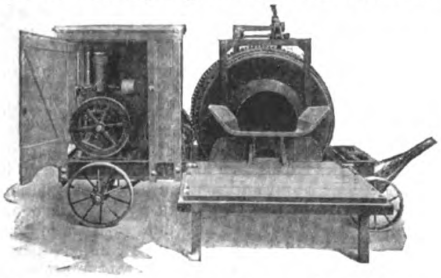

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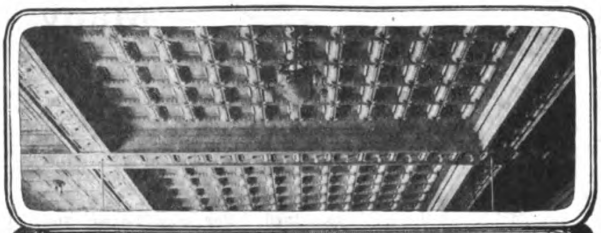

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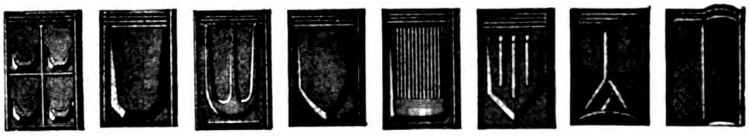

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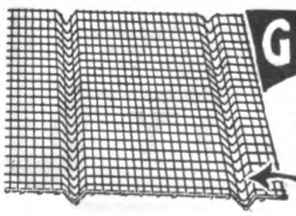

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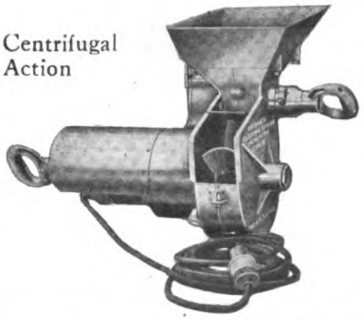

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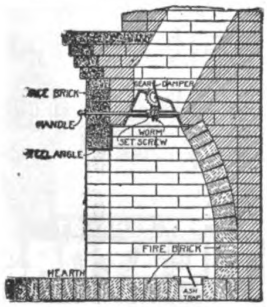

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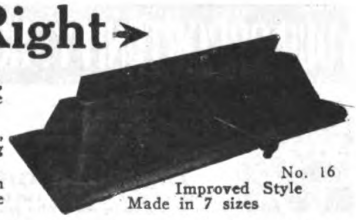

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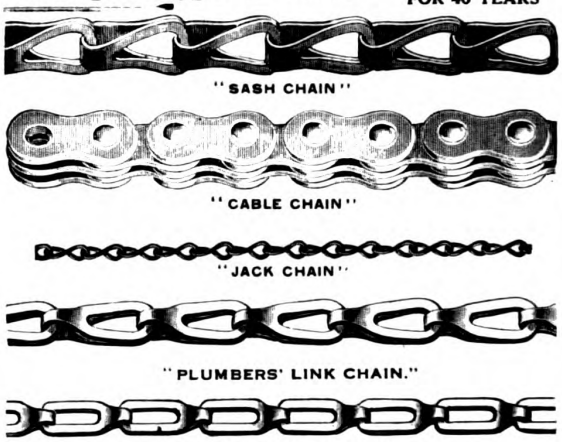

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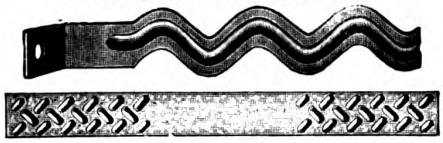

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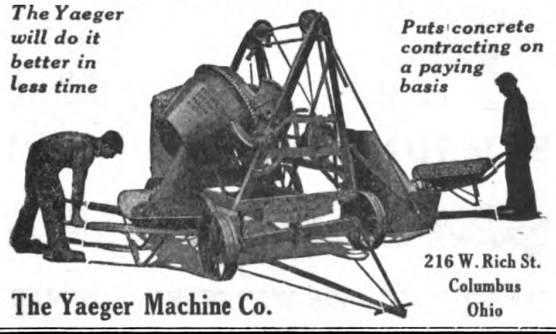

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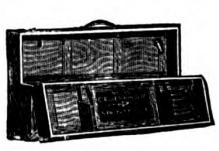



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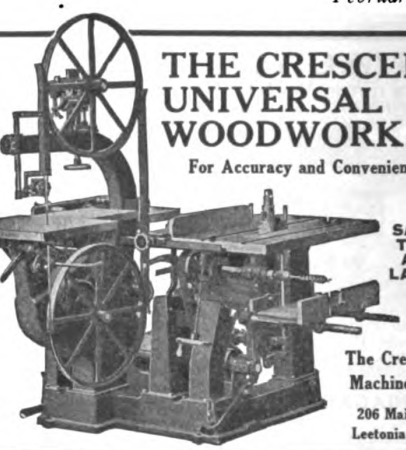

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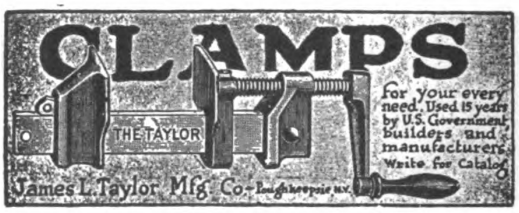

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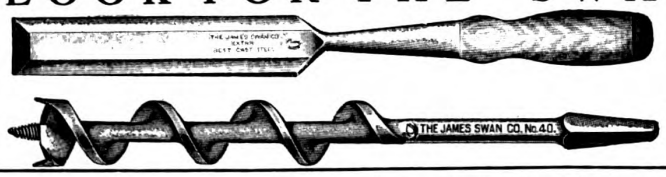

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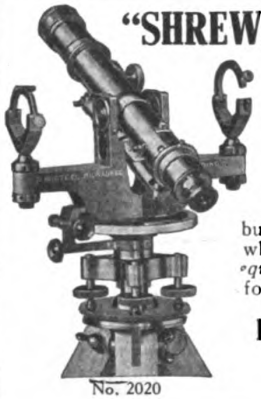

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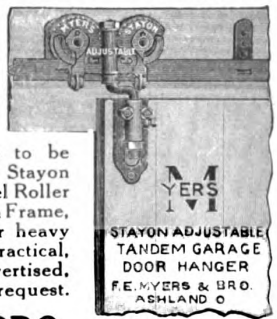

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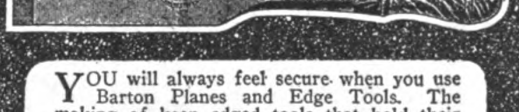

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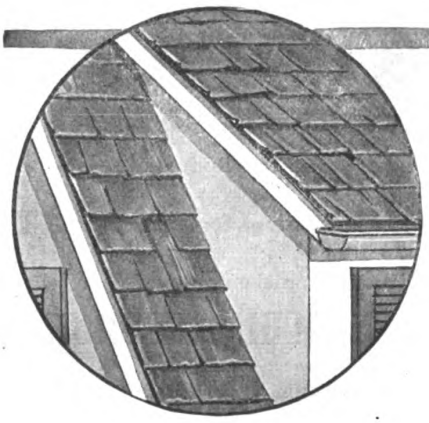

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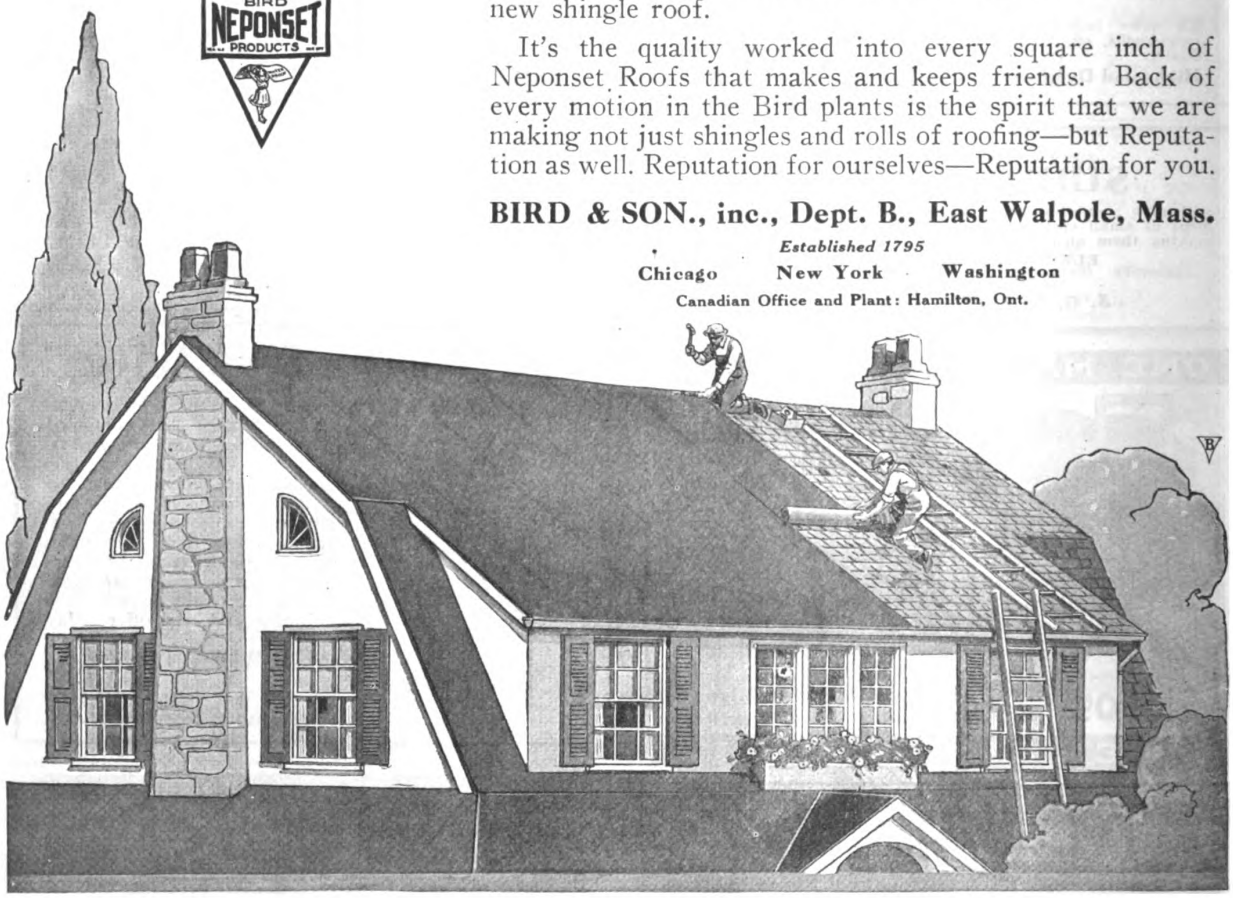

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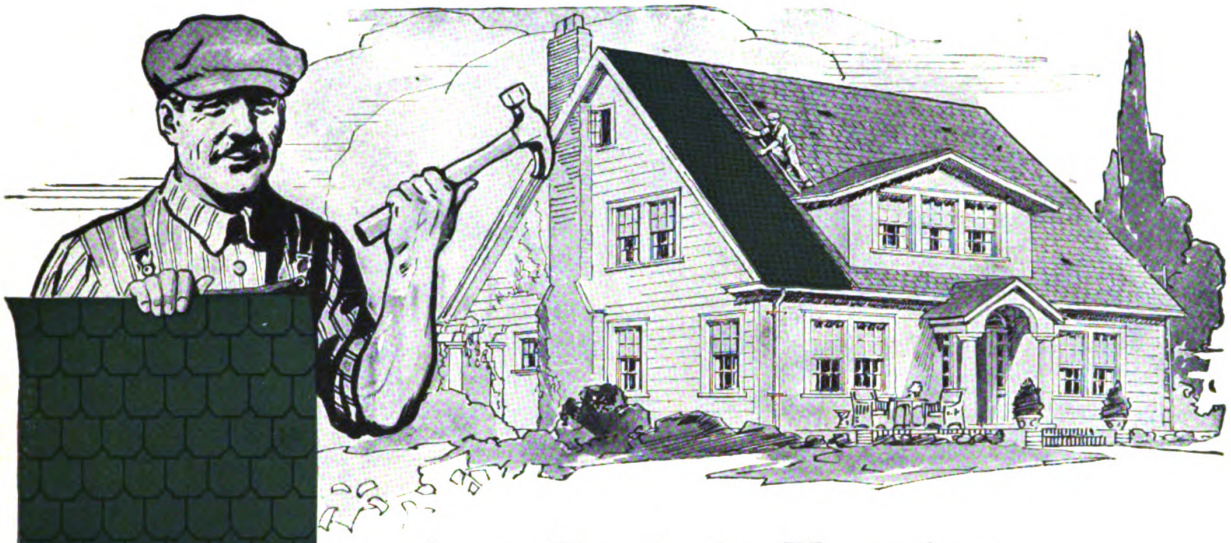

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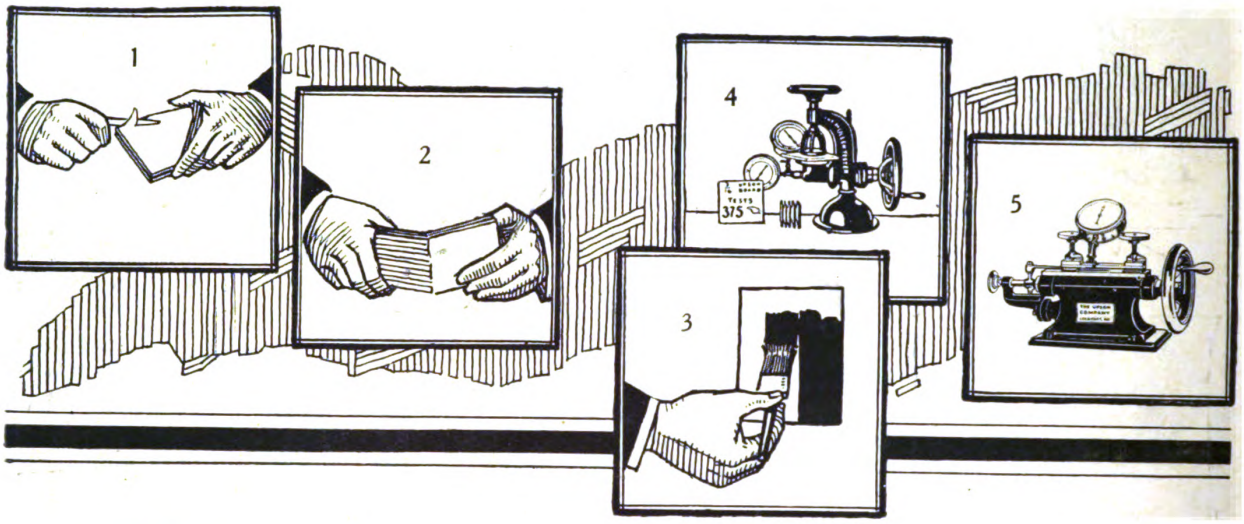

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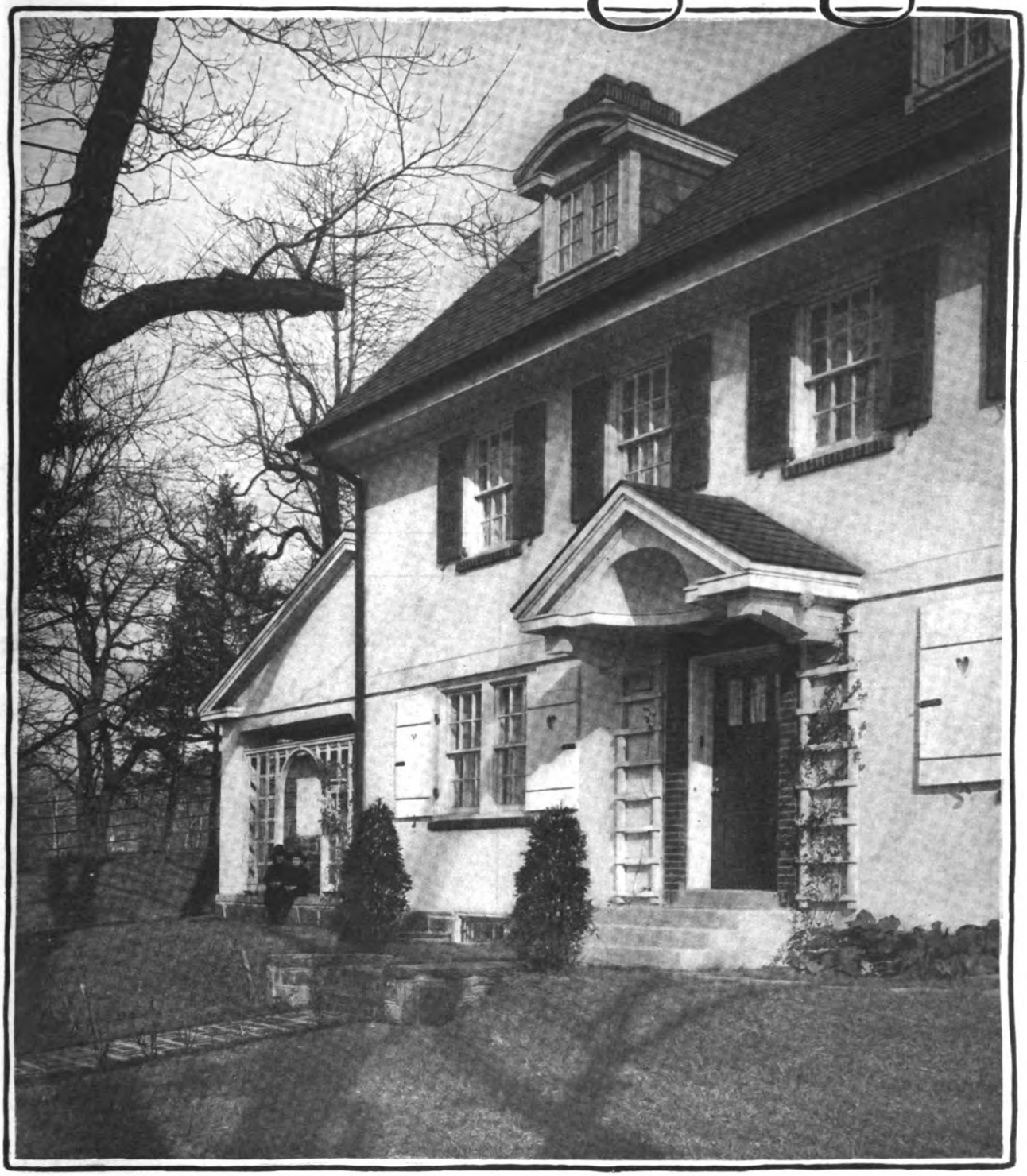

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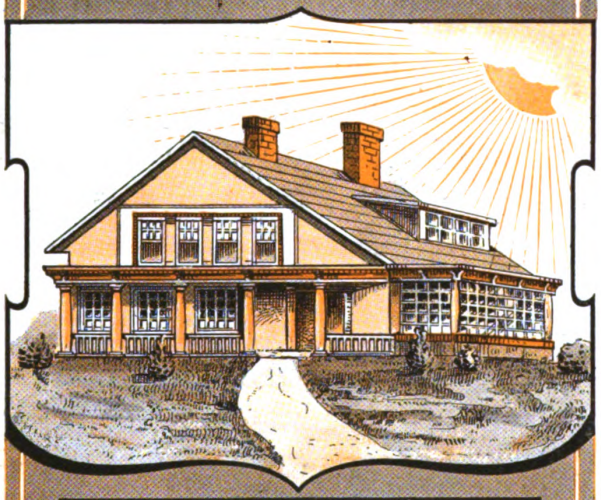

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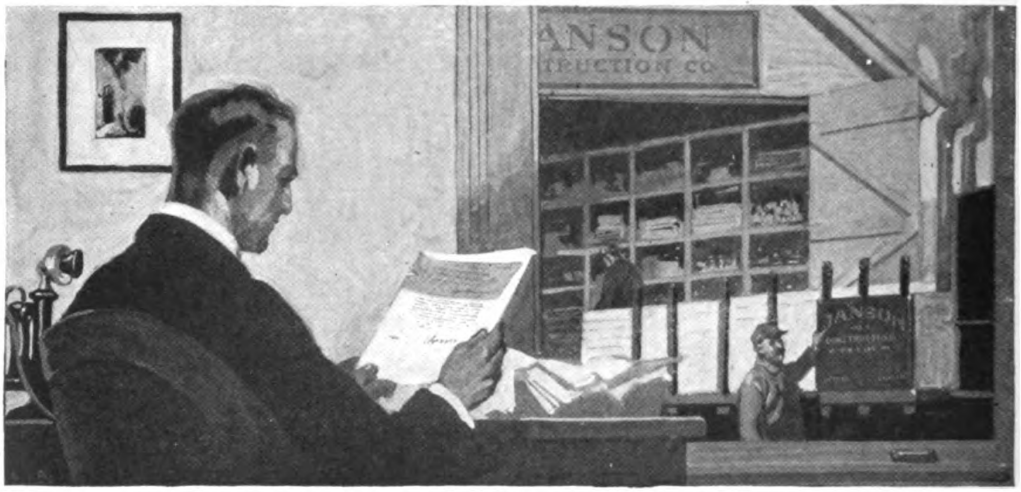

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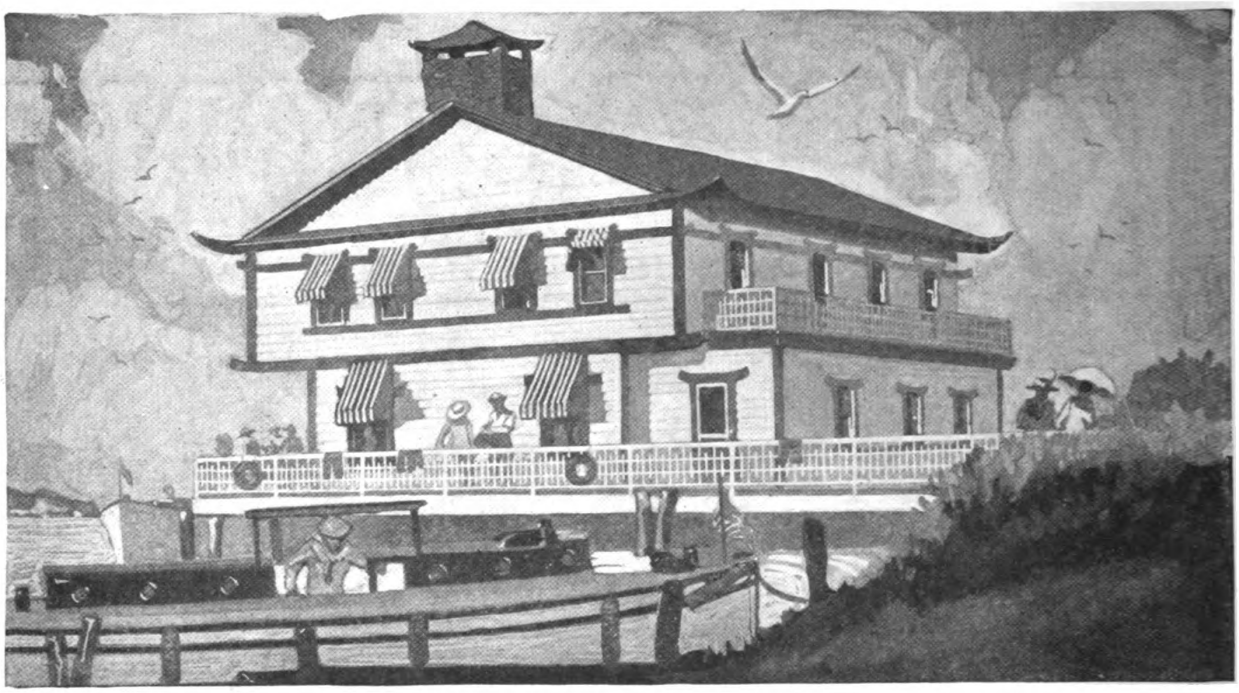

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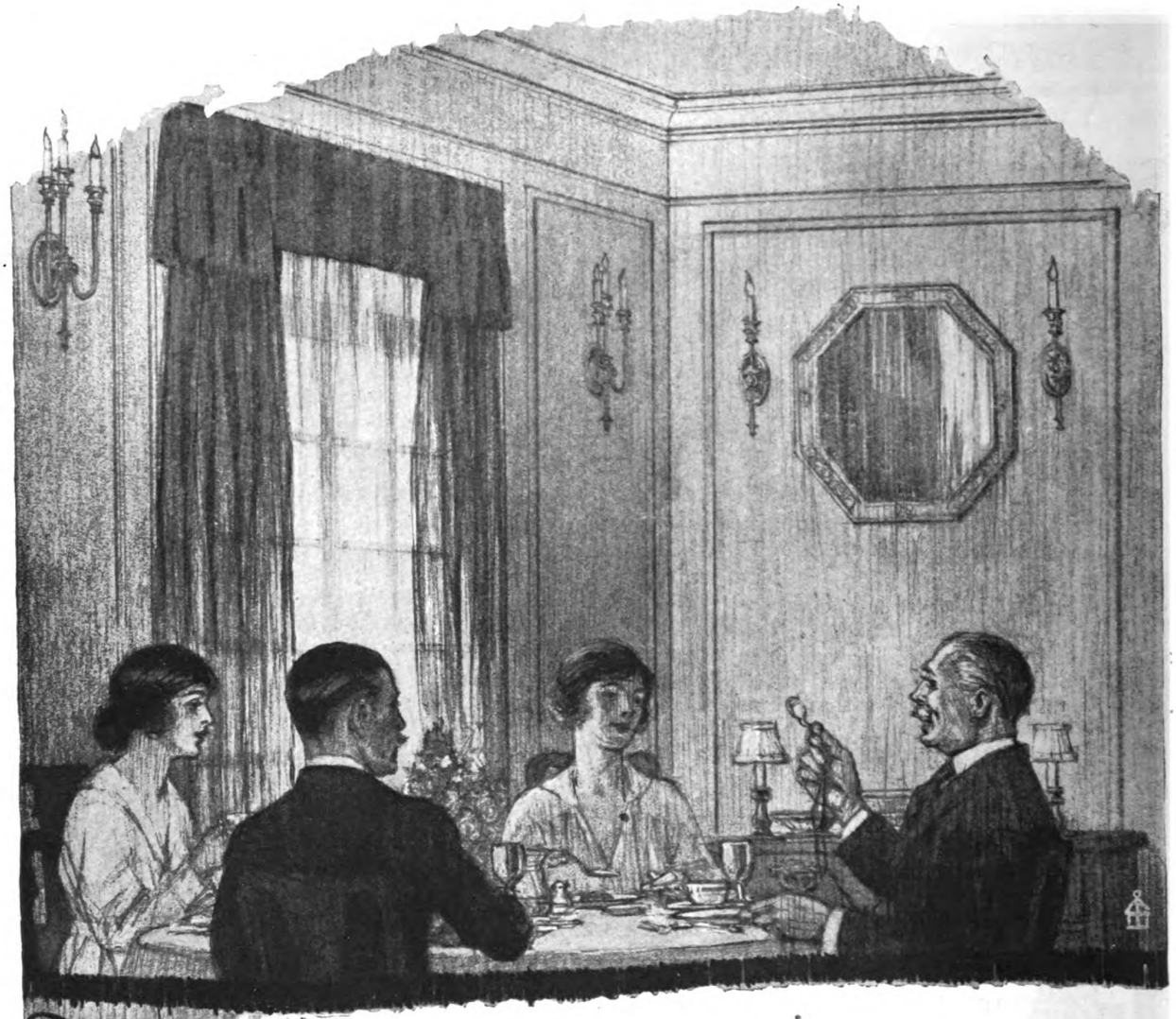

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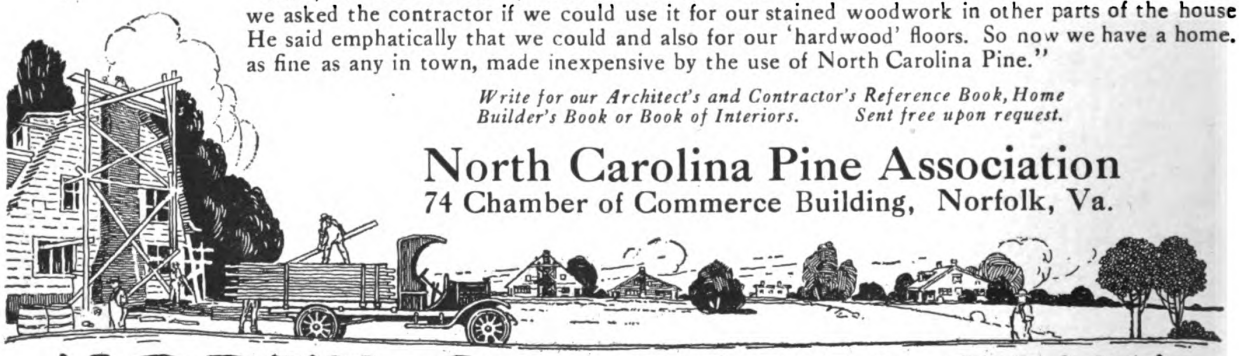

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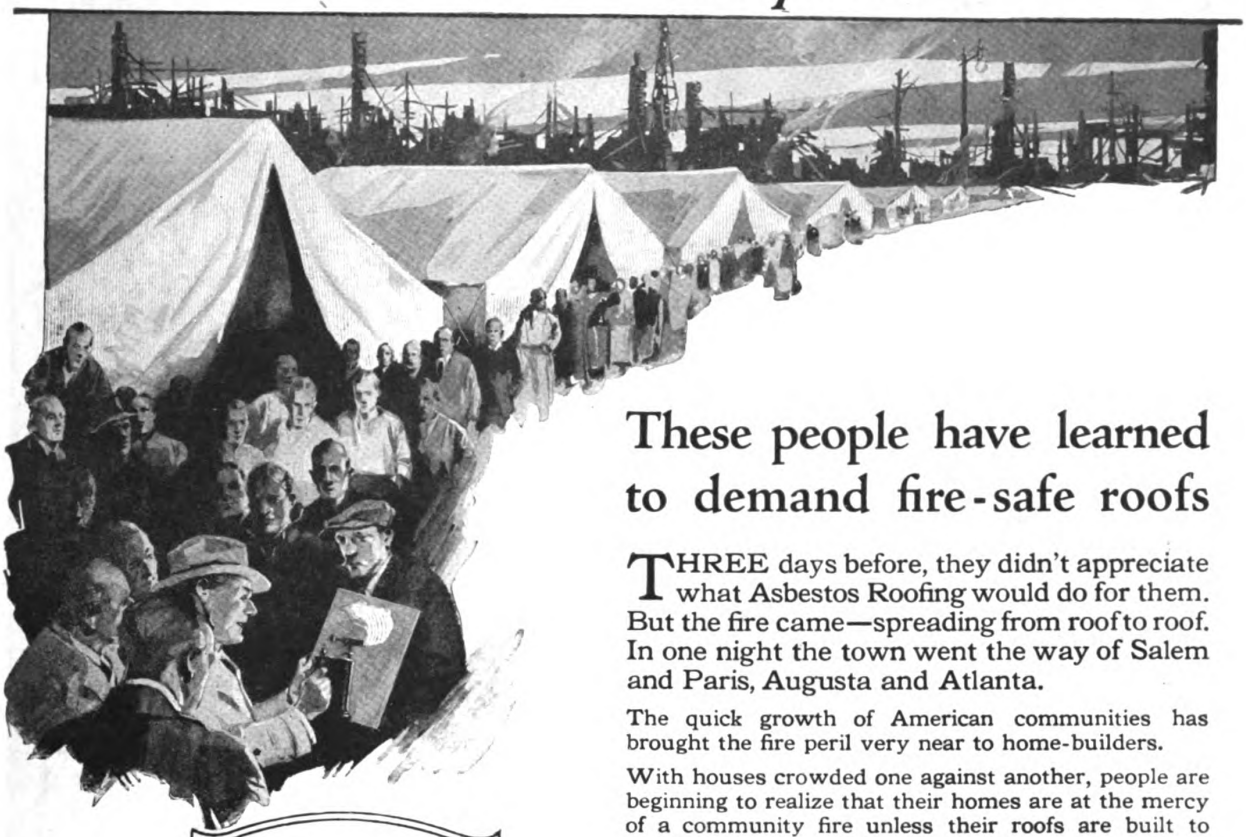

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BUILDING AGE

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The Modern Bungalow Court

A Well Balanced and Attractively Designed Group of Bungalows in Southern California That Possesses Many Features to Attract the Home-maker

By ALBERT MARPLE

IT is probable that no home-building idea has experienced such a remarkable growth along the Pacific Coast during the past few years as has the Bungalow Court. This is especially true with regard to Southern California, for, although this type of home construction is comparatively young, that section is literally alive with novel and attractive courts, built along many different lines. In fact, there is hardly a city or town in that sunny section which does not have within its borders one or more home places of this particular type.

It was in Southern California that the Bungalow Court idea had its inception; this occurring, possibly, about six years ago. Then, as to-day, builders and home-building companies were bending every effort to present new home-building ideas. When it seemed as though the supply of available suggestions and ideas had been about exhausted, along came an architect with this "group of homes on a single lot" idea. At first it was considered impracticable by leaders in the building world, but after carefully thinking the matter over and considering all the points of advantage of the bungalow court, the home-renter voted in favor of the court. It seemed to him to be an ideal home situation and a satisfactory solution of the "tenement" problem.

There are almost as many types of bungalow courts as there are courts themselves. Some courts are made up of homes built all on the same lines or of the one type of architecture, in some instances a single floor plan being used in the building of all of the homes on the one lot, while in the construction of others the architectural treatment of no two homes was alike, and for each home a different floor plan was designed. While "bungalow court" is the name used in the connection with these groups of homes

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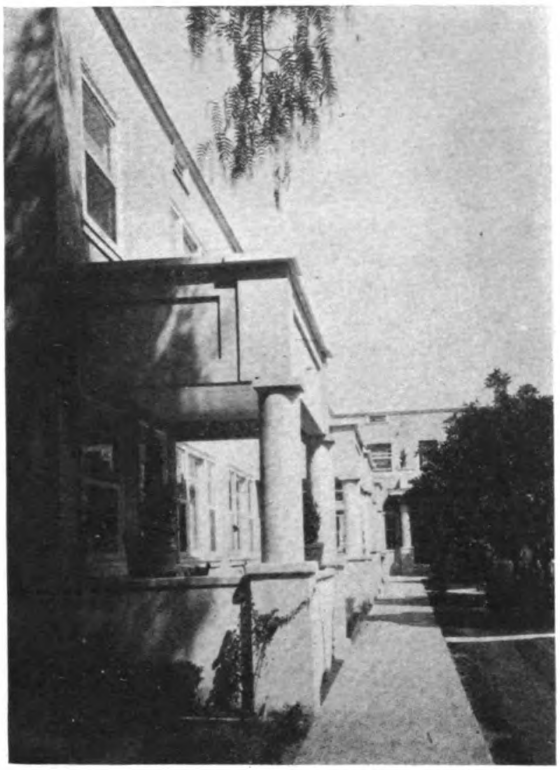
as a rule, in Southern California, they are sometimes called "community parks," or "community courts."

These courts are meant, of course, for use in suburban districts and strictly residential communities. The old-style apartment house will probably



VIEW SHOWING ONE SIDE OF A TWO-STORY CONCRETE COURT.

never be supplanted in the extremely congested sections of large cities, but it is probable that the bungalow court will continue to grow in favor for use in connection with outlying districts in all parts of this country.

WHILE these are "apartment courts" in the truest sense of the word, each little bungalow is a complete, individual dwelling in itself. As a rule, these homes are grouped artistically around a common court or parkway. The principal idea in the construction of one of these courts is, naturally, to get as many homes as possible on the single lot or upon two lots located side by side, thereby permitting the owner to secure the greatest possible financial return from the given piece of real estate. In this way the landowner, instead of putting two homes on the two lots, each bringing him probably fifty dollars a month rental, places, without apparent "squeezing," eight and possibly ten tiny homes on the pair of lots, the rental of each of these being twenty dollars or more per month, thus increasing the financial return three or four fold. To the landlord the attractive features of this type of home building will at once be apparent. The strip of ground used for this bungalow court purpose may be as little as 60 feet in width and it may be three or four times that in depth. The deeper the lot the more homes, of course, may be constructed upon it.

The general plan is to build the homes from the front down either side of the lot to the rear, with possibly a double house extending all the way across the rear end of the property. These homes are so arranged that all of them face the improved and attractive court which takes up the center of the lot. In some instances, where the courts are



THE PERGOLA SEPARATING THE GARAGES FROM THE HOUSES.

being constructed along more elaborate lines, there will be an automobile driveway along the center of the parkways between the homes, or running

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along the rear of the homes at the extreme sides of the lots. Where the drives are run along the center of the lots, walks are invariably built on either side of the driveways, while in practically every other instance the practice is to run a single or double cement walk between the homes for the entire length of the court. In many instances a walk is run along the rear of the plot to provide access to the rear of the homes.

In practically every instance where these bungalow courts are built, the homes within them are modern in every way, the idea being to make each dwelling complete in itself and entirely independent of the others. The parking space between the rows of homes is for use of all of the residents of the court. Often the bungalows in a court are of different sizes, the purpose of this being that different sized families may be accommodated. The rental price of the homes, of course, varies with the number of rooms and different general accommodations. The aim of the majority of court builders and owners is to have most of the homes in their courts furnished and ready for the prospective occupant to "move right in," their own personal effects being all that is necessary for them to go to housekeeping. Two or three dwellings, however, are usually left unfurnished, so that families owning their own furniture may also be accommodated. As the dwellings are all equipped with many built-in features, a comparatively small amount of furniture is actually needed. The difference in the rental between the furnished and the unfurnished homes generally makes it profitable for the owner to equip his bungalows. Then again, where the house is furnished by the builder, the furniture, being especially selected, naturally harmonizes more effectively with the interior trimmings and finish, thus making the home more cozy and inviting.

SO SIMILAR are the interiors of the homes of all of the bungalow courts in Southern California that one may give a general idea of the built-in features and furnishings of the home in the modern bungalow court. As a general thing these homes consist of from three to five rooms, with bath and porches. There is always an attractive front porch, and the customary screen porch at the rear of the house. The three-room house generally has the living and dining rooms combined, while the other two rooms consist of bedroom and kitchen. The four-room home has two bedrooms, combined living and dining room and cabinet kitchen, while the five-room dwelling, as a rule, has two bedrooms, living room, dining room and kitchen. Each house has bathroom, closets, etc.



A BUNGALOW COURT, PASADENA, CAL., SHOWING SIX SINGLE HOUSES AND ONE DOUBLE HOUSE.

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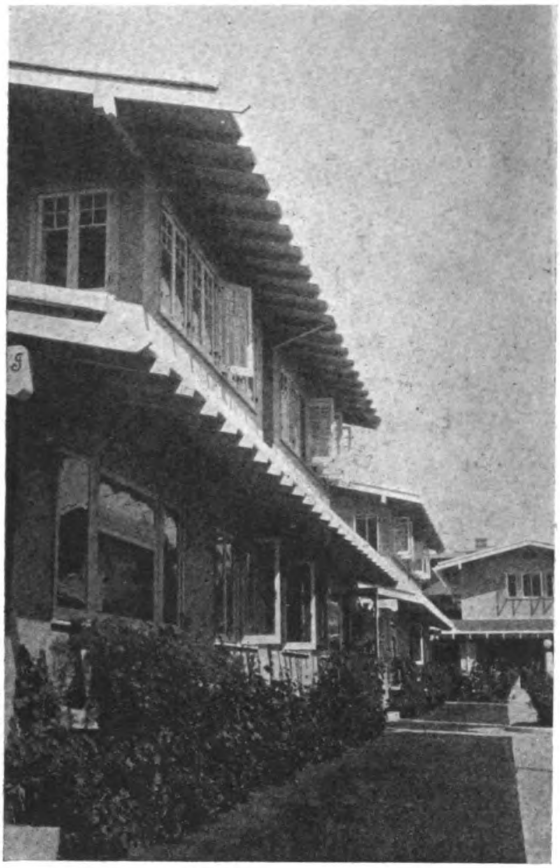
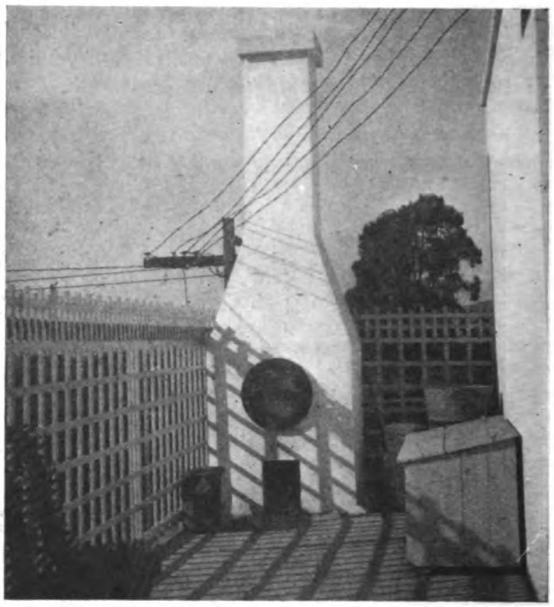
In all of these homes the living room invariably contains a practical, attractively designed fireplace and hearth; the dining room has its buffet, above which is a china closet, and below drawers, cupboards, etc., for linen, silver and the like. Each bedroom has at least one closet, while in the kitchen are to be found the water heater, range and an abundance of built-in cupboards and drawers. These are generally called "cabinet kitchens." The customary stationary wash trays, broom closets, etc., are to be found on the rear screened porch. Many of the bedrooms have disappearing beds. At appropriate places about the home are found built-



A SWISS TYPE OF ARCHITECTURE INTRODUCED INTO THE BUNGALOW COURT WITH PLEASING EFFECT.

in window seats, book cases, writing desks, etc. The decorations of the different rooms invariably make them cozy and attractive. Hardwood flooring is always used in the living and dining rooms, while the others also occasionally have them. The bathrooms are all finished in white, while the kitchens are enameled either in white or drab.

These homes are always equipped with gas, water, electricity, etc. As a rule, the water and electricity are included in the rental price of the bungalows, while each family pays for the gas it uses, each home being equipped with an individual meter. A more or less elaborate garden scheme is maintained in connection with each court, this containing trees, shrubs, flowers, well-kept lawns, etc. Outdoor garden seats, pergolas, fountains and other features are sometimes provided, and in connection with the



INCINERATOR AT REAR OF COURT. A NEW AND IMPORTANT FEATURE.

more recently constructed courts series of garages have been erected. The court space and grounds in general are kept in condition and order by the owner's attendant, this fact insuring any part of the court from taking on that neglected appearance so often seen about the rented place.

FROM the viewpoint of the renter these bungalow courts have much to recommend them, particularly their privacy. As has been stated, each home is separate. There is no such thing as hearing through the walls any more than this is possible with regard to the average city home, and the next door neighbor may come home in the "small, wee hours" without awakening everyone in the court. These courts also provide more freedom for the tenant than does the regular apartment house, and they enable the renter to spend more time outdoors. It has advantages, also, over the average single residence. In the first place, the tired business man living in a court does not have

(Concluded on page 40)

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Lattice—Part II

Some Notes on the Origin and General Adaptation of Lattice as a Decorative Form as Part of the Structural Detail of the House, Both Exterior and Interior, and as to Its Adaptability for the Ornamental Treatment of the Garden and the Grounds About the House.

CONTINUING the discussion of lattice, its construction and design, referred to in a former issue, it becomes necessary in referring to the materials used in construction to emphasize the fact that because of the exposed condition of exterior lattice work and the excessive dampness which necessarily exists for a greater part of the time, ordinary wire nails should never be used in any point in construction. The only safe and, therefore, the best means of putting lattice together is by the use of copper screws. While this process is necessarily expensive and slower, as each hole must be drilled

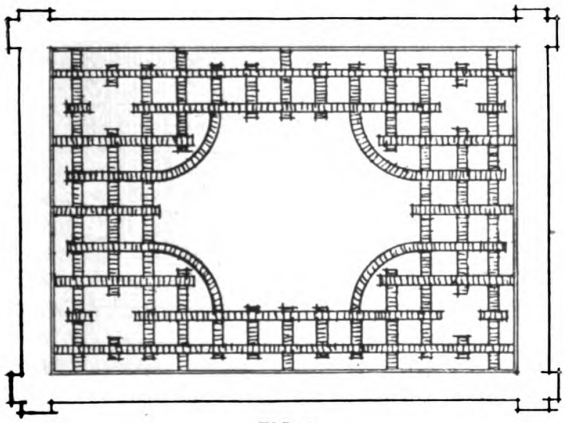

FIG. 6.

before the screws are inserted in order to prevent splitting, it is the only means whereby safety and permanence can be secured. If for any reason copper screws cannot be used, copper nails can be employed, and in the case of cheaper work, when the strips are simply wired together, the wire should also be of copper.

In putting the lattice together special attention must be given to those parts which will in any way serve to retain water or will not readily shed melting snow and ice. By proper attention to these details and the careful setting of mitred, coped and rebated members, which can all be thoroughly filled with paint, a most economical measure can be served and one that will prevent constant and expensive repairs. While the general shrinking of lattice will, if it is properly constructed, cause little harm if it is in a position thoroughly to dry in good weather, the slightest amount of standing water in crevices or on projections will very soon start decay.

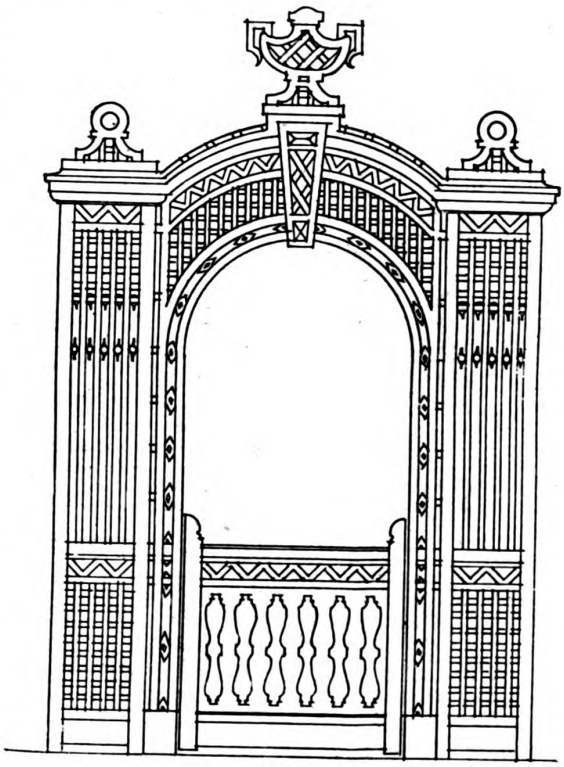

FIG. 5

In building up a design of lattice the builder should endeavor to insert heavy members wherever it is possible to do so. In order to depend as much as possible on the use of metals and railings to attach the lattice to its support the strips forming the field should be inserted at the

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time the work is assembled. It is the natural tendency of all wood to warp more or less and it will therefore be seen that the most difficulty and the greatest tendency to warp will occur at the point where the strips cross one another, as small pockets will always form between the two surfaces of the wood. Because of this fact it is very desirable to notch the strip at these points as is shown in Fig. 3. Painting will later fill up any looseness and a perfect joint will therefore result. If the strips are notched it becomes necessary of course to use a heavy material, and just how heavy this may be will naturally rest on the judgment of the builder. The constructed parts of all lattice should also be framed, one into another, and it should not be necessary to state that in

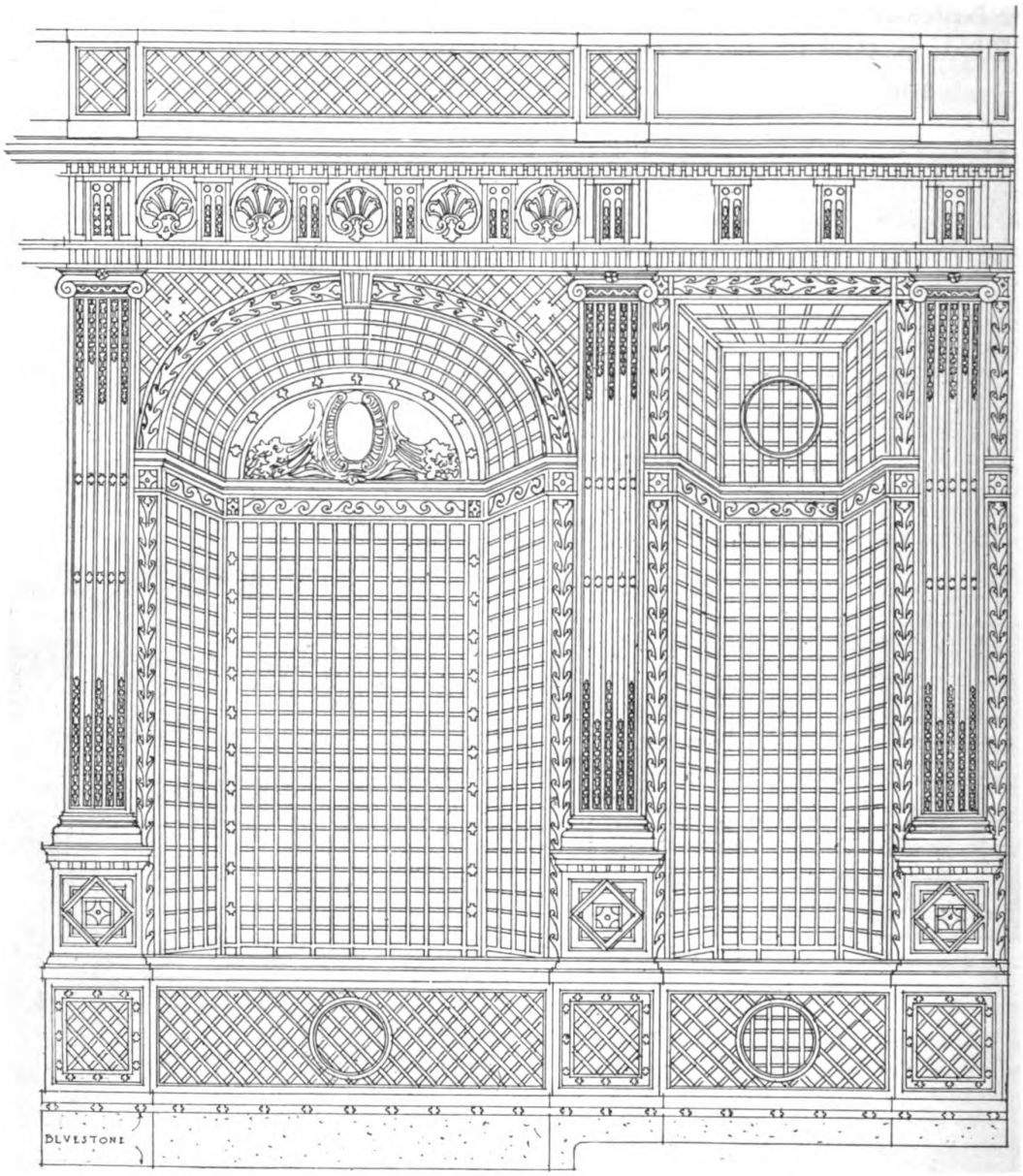

FIG. 1.—LATTICE DESIGNED ALONG CLASSICAL LINES.

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any outside work there should never be any glued joints or any joints left so open that they do not become closed when the paint is applied. Another feature, especially of heavier lattice work, is that where the members are lined horizontally it is well that they should be cut with a wash to prevent standing water. Horizontal strips should in no case be placed across at the lower portion where they will form a sill on which a pocket will exist for dirt to collect and dampness to destroy this most important feature of support.

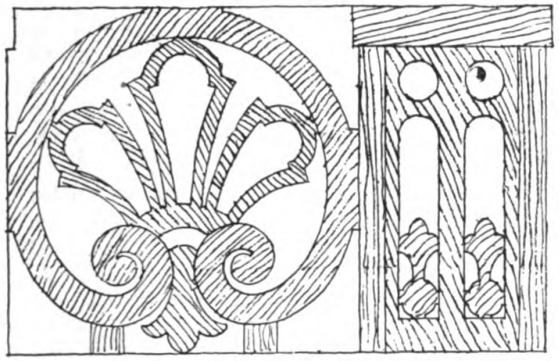

FIG. 2.—DETAIL OF JIG-SAW WORK IN FRIEZE OF FIG. 1.

WHERE lattice is applied against a wall great care should be taken to protect it from water running down from the wall surface. It is for this reason that the free-standing use of lattice for this purpose is urged. In placing lattice against a wall two methods are employed in fastening or anchorage. The first by the use of vertical strips previously applied to the wall and the use of metal anchors by which the entire structure is suspended in such a manner that there is a sufficient space between it and the wall to allow the water coming down the wall above or between the strips to flow freely over the entire surface back of the lattice. While wooden strips provide a good material for making a solid structure, they are of course not so permanent as the metal anchors. When these wooden grounds are used care should be taken to insure that they are attached only to the vertical members composing the frame work of the structure. They should never be laid horizontally. Where metal anchors are used they should be always of copper.

Naturally the proper choice of material used in its construction will determine the life of the lattice. It is by the free use of paint in crevices, cracks and joints as well as on the border surfaces that lattice will be protected from the water and decay avoided. Each piece of the lattice should be thoroughly painted before they are assembled or put together. After the separate pieces are assembled into sections, a first coat of paint should be applied, taking care that all joints are well filled with paint and even the smallest openings thoroughly closed. When the job is finally completed the work should then receive a last coat of paint, using the same care as in every detail of the painting process.

As to the color of the trellis this matter will rest entirely with the choice of the builder. Trellis used in gardens is as a rule painted a shade of green, known as Mitas green. This green is largely used because of its pleasing color and the fact that it approaches in shade more nearly to the surrounding foliage. Where lattice is used for gateways, for interior porches or trellis against the building, the general color of the building or its surroundings will of course dominate the color of the lattice. Where lattice is

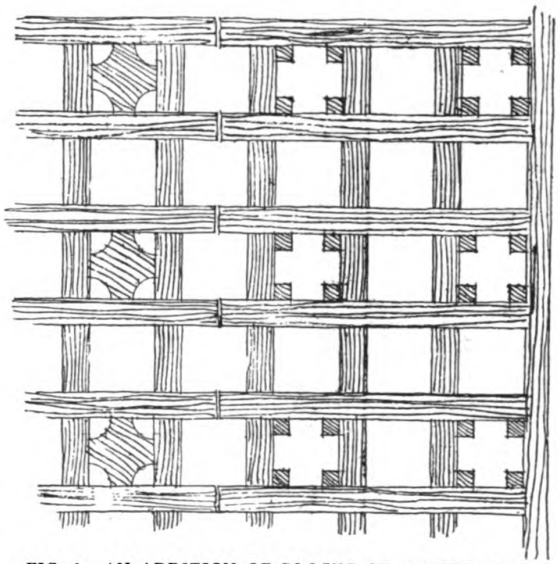

FIG. 3.—AN ADDITION OF BLOCKS OR "BUTTONS" TO OUTLINE THE DESIGN.

used structurally it will of course be necessary to give it the substantial character of the structure itself and it will be necessary to give it the same care in overhauling and repair as the building itself.

In the designing of gates and arbors and those little shelters that the French call bosquets, there is a wide range for good effort and an excellent opportunity for the builder to display his appreciation of the picturesque. A gate may be built entirely for service, and thus as a lattice feature, very simple, or it may take on in harmony with the fence of which it is a part, a more elaborate and heavier structural aspect. In this connection

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it may be said that there could be introduced into the design of gates, grilles and screens of lattice certain features of spindle work or jig-saw work, but it is believed to be hardly worth

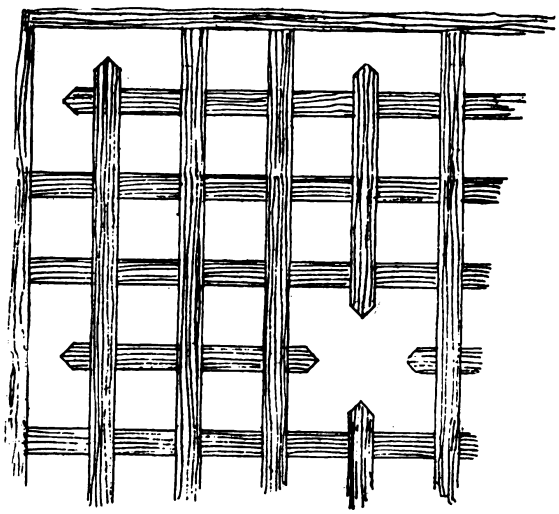

FIG. 4.—OPENINGS IN THE LATTICE PRODUCE A SIMILAR EFFECT TO THE METHOD USED IN FIG. 3.

while to combine these features with the ordinary design as used about the house or gardens of moderate cost.

WE have already referred to the use of lattice to screen unsightly spots or places where the domestic program of the house is carried out. Lattice lends itself particularly well to such locations and especially when it takes the form of a trellis or arbor, over which grape vines or hardy climbing vines may be successfully trailed. The most artistic effects can be secured at a minimum of cost, but it is well to bear in mind, as already urged, that it will not be true economy to build the lattice as a make-shift or of a temporary flimsy material, but that it will be much better to give full consideration to its main members.

When the design for any work of lattice has been decided the question as to the wood to be used will become one of importance. Actual experience and inquiry among a number of architects and builders who are most successful in their designing and executing of lattice work elicit the information that either white wood or white pine will prove the most satisfactory material of construction. Actual demonstrations have shown that these two woods will hold their shape better, that they will not warp like the harder woods, and, above all, will not crack at the time of erection. A very serious difficulty in the erection of lattice is this same tendency to splitting or cracking of the wood when driving home the nails or screws that hold it together. To obtain the best results the wood should be put together with screws, and because of this likelihood of splitting, the strips should be drilled to receive them. It is strongly advised that the builder should never attempt to drive the screws without this preliminary preparation by drilling, for cracks are certain to occur, and cracks, no matter how small, always permit the collection and retention of moisture, and decay when once begun cannot be arrested. Particularly, if it is proposed to introduce jig-saw or scroll work patterns on any places where close cutting is necessary, should soft wood be used, since the points and projections left are less likely to break and chip than if hard wood were used.

The illustrations accompanying these articles have been selected as showing the wide range and the different treatments that can be secured by a minimum of labor and material. BUILDING AGE believes that it is by such means that the best presentation of the builder's work can be accented and that builders can, by a judicious introduction of these different features, command the same respect for their work as does the architect for his often considered more important achievements.

Builders' Second Show Is Planned

Detroit's second annual builders' show will be held by the Detroit Builders' Exhibition, Inc., February 28 to March 7, inclusive.

The first exposition of this sort ever held in the city, conducted in the Wayne Gardens last spring, proved a notable success, helping materially to stimulate the building activity now under way after the lethargic period during the war. This year space in the Ford Sales Building, Woodward and Grand boulevard, has been procured, and the exposition will be held there directly following the annual automobile show in the same structure. It will be a builders' products exposition.

The Detroit Builders' Exposition, Inc., is the successor to the Detroit Builders' Show Association, organized hastily a year ago to conduct the initial show. Its officers are men well known in the business life of the city. J. H. Culver, of the White Star Refining Company, is president, and Frank B. Griffin, who was connected with the old organization as treasurer, is exposition manager and assistant treasurer. Headquarters has been established in Room 924, Chamber of Commerce Building.

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Decorating and Furnishing the Low-Cost House

II.—THE DINING ROOM—PART I



THIS ROOM WITH WINDOWS AT BOTH SIDES HAS SUNLIGHT ALL DAY. THE DARK TONES OF THE WOODWORK THEREFORE ARE A GOOD FEATURE. THE BUILT-IN CLOSET AND THE SIDE-BOARD IN THE ALCOVE UNDER THE RIGHT-HAND WINDOW PROVIDE AMPLE SPACE AND ARE OF ARCHITECTURAL INTEREST. THE LIGHTING ARRANGEMENTS ON ALL THE WALLS ARE GOOD

FOR the success of any room the proper choice of location is of utmost importance. The relationship of the dining room to those adjoining is of peculiar significance. A close proximity of the dining room to the kitchen is indispensable, and a ready accessibility from the living room is hardly less to be desired, that the formal guest may have no need of trespassing through the more intimate portions of the house.

When the living room and dining room communicate, with either no doors at all or with sliding or glass doors, the character of the wall paper and woodwork in both might advantageously be very similar. In the low cost house, such treatment will serve to increase the apparent size of each room and give a better unity to the vista. If these rooms are not so considered with relation to each other, the harmony of the house as a whole will be destroyed, and a number of small, disjointed, chopped off rooms will take the place of what should properly be interdependent and well balanced elements. It is better to avoid a sudden change without due transition in rooms visible one from the other.

Where space permits, the best practice dictates that the dining room be separated from the kitchen by something more than a single door. A small passageway, or better, a pantry, will serve to minimize the sounds and odors coming from the kitchen, and lessen the insistent impressions of culinary mechanics which inevitably accompany a meal. In a sense, then, the dining room acts as a fulcrum upon which the kitchen and living room swing. Its location must therefore be particularly considered.

The direction from which the daylight enters will largely affect the mode of decorating the dining room. If the windows have a western exposure, the prevailing tones should be light, to compensate for the absence of the morning sun. If the outlook is eastern, the colors should be sufficiently darker to absorb the glare. The dining room in the small house is not as a rule enough lived in to justify the much wanted southern exposure. It is better to re-

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THE RUG HERE IS TOO EMPHATIC IN PATTERN AND TOO LIGHT IN TONE. THE FURNITURE IS CONSISTENT THROUGHOUT. THE APPOINTMENTS ON THE CENTER AND SERVING TABLES AND ON THE MANTELPIECE ARE IN GOOD TASTE. NOTE THE SIGNAL TO THE KITCHEN IN THE TABLE. THE CHAIRS HAVE RUSH BOTTOM SEATS, EASY TO CLEAN, AND ARE NOT WIDE FROM BACK TO FRONT, PERMITTING COMFORT WITHOUT LOUNGING.

serve this location where possible for living room, nursery or bed chamber. The direct eastern or direct western outlook is apt to be annoying because meal times are usually synchronous with the height of the sunrise or the sunset. It is not possible to move out of the way of the direct light when sitting at table, nor is it desirable to lower the window shades and exclude the out-of-doors. These, however, are more matters of planning than of furnishing and should be considered before the house is ever built.

In decorating any room the purposes for which it exists should dominate. A dining room is a place where one may eat in peace and comfort. Anything which detracts the attention from that object is worse than superfluous; it prevents the performance of the rightful function of the room. Entering a dining room, one justly expects to see a table and chairs and accessories of such size and scale as will not only satisfy a need for beauty, but will also stimulate a desire to be seated and eat in comfort. If, however, the object most prominent on entering the room is the stuffed head of a deer, or a collection of stuffed birds or other objects properly belonging to a museum of natural history, that purpose is defeated. There is nothing in these to bid one eat or to permit one to do so in peace, although they may gratify the wish to exploit prowess as a hunter. If these things are desired, the place for them is the entrance hall.

The furniture in the dining room should be suited to the needs of the room. While in a small house, lack of space may seem to dictate certain intrusions, too often it is sheer indifference that accounts for the presence in the dining room of a sewing machine or a baby carriage. Both of these items are emblems of thrift and right ideals of life, but every effort should be made to have more suitable provision for them. The essential pieces of furniture for the dining room are the table, chairs, sideboard and serving table. A tea-wagon is also properly found in this room. Nothing else is necessary and nothing else is desirable. The time-honored wooden china closet with its bent glass front and sides may be very well dispensed with and in substitution therefor a well designed built-in china closet or cabinet which becomes structurally a part of the house logically provides a place to keep the china and will not suggest a museum exhibition case as these things so often do. While undoubtedly the housewifely instinct will have pride in the possession of good china and well-selected cut glass, it is not always good taste to flaunt these possessions be-



THE BUILT-IN CLOSET HERE IS A GOOD ARCHITECTURAL FEATURE. THE SIMPLE MAHOGANY FURNITURE PROPERLY COMPLEMENTS THE WHITE PANELLING. THE SIDE LIGHTING IS GOOD, AND THE TABLE DECORATION TASTEFUL.

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fore the casual visitor to the extent of displaying every available piece in the house. The guest will naturally assume that the family has sufficient equipment for its needs. Very often there have been accumulated in the shape of heirlooms or by long possession, certain pieces of china which are more to be honored for their associations than for their artistic excellence and these may very well be kept in some less conspicuous place.

Nor should the sideboard be made to serve as a carry-all for quantities of silver or the larger cut glass, if for no other reason than that the exposed position is apt to cause them to become unclean and necessitate their being taken to the kitchen and well washed every time they are required for use. The top of the sideboard is really the working shelf during the serving of the meal. It is therefore well to keep this space clear for small silver and dishes to be used during its progress, leaving the serving table for the cooked food to rest on its way from the kitchen to the dining table.

The dining room furniture should be as far as possible all of one style and should not represent every period from the early Colonial to the mid-Victorian or the present wretchedly designed department store types. The wood should be of the same species and the period represented should be in harmony with the style of the house itself. Nothing can be more inharmonious than a Georgian interior, well designed by the architect and builder, that is decorated with a lot of furniture that has no relation in its design to the period of the room. The furniture in its choice of wood will naturally take its keynote from that of the mantelpiece in the room. In an English Colonial or Georgian house, the dining room will frequently have white paneled walls. These logically demand mahogany furniture, simple in line, such as the Sheraton or Hepplewhite styles. Chairs should have rather tall backs and should not be wide from back to front. This permits of comfort without lounging. The seats should be high enough to reach the table properly. Cane seated, rush-bottom or leather chairs are more serviceable and comfortable than anything upholstered, and are further to be preferred for ease in cleaning. Round tables have almost entirely superseded square ones, and a basis of equality among the guests has taken the place of graded sequence.

The rug should be the darkest part of the room. As foundation of all that goes above it, it must give an impression of solidarity. If the upper part of the room is darker, a feeling of top-heaviness results. The pattern should be quiet and too great

(Concluded on page 40)



THERE IS PLEASING SYMMETRY IN THIS DINING ROOM. THE DOORS ON EITHER SIDE OF THE MANTELPIECE BALANCE EACH OTHER. THE BUILT-IN CLOSET BALANCES THE WINDOW. THE DARK, UNOBTRUSIVE RUG LENDS A SUBTLE WARMTH. THE ROOM IS LARGE ENOUGH TO PERMIT OF THE BEAMED CEILING.

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The Designing of Hot Water Heating Systems, Part II

By WILLIAM EHRLICH

Practical Methods for Proportioning the Radiators and Sizing the Mains and Branches to Insure Successful Installation

PROPORTIONING THE PIPING LAYOUT

THE most intricate part of the hot-water heating system is the pipe layout. On its arrangement and the apportioning of the sizes depends the successful operation of the installation. The theory of the system is not simple to grasp unless mathematics and the laws of hydraulics are understood. The writer has developed a graphic method, which is here presented with the hope of simplifying the work.

While the pipe sizes used for steam heating are practically standardized, the sizes of pipe for hot-water heating employed by the trade are far apart. This accounts for the difficulties in making hot-water heating installations work successfully. Contractors and engineers who employ some "practical" method of proportioning pipe sizes, which is really a system of "hit or miss," have found that the heating installation works better in one case than in another, even though the pipe sizes are about the same. With years of experience in this work, one learns to size up with a certain accuracy a system that will work fairly well.

What is the newcomer in the field to do? He does not understand where a little juggling may be necessary even though the figures employed in the office are explained. He lacks the experience the "boss" has gained through years of practice. To be guided by the tabulated figures published in different hand-books is not so simple as may be believed. Various authorities have reduced the pipe sizing end of the heating system to a simple set of figures, but such figures vary widely. The tabulation herewith is a summary of such pipe sizes according to five authorities. The figures give the riser sizes necessary for direct hot-water heating systems. Which is the column to use for good working results is a difficult thing for the inexperienced to decide on.

According to the figures in Table 1, a comparison of the pipe sizes is possible and will show that for surface of 200 sq. ft. to the first floor, Nason gives 1½ in., Hubbard 2 in., and the others 2½ in. for a varying amount of surface. Again, the lowest figure for a 1-in. riser for third floor supply is 48 sq. ft. radiation, while the highest figure is 95 sq. ft., which is almost twice the amount of direct heating surface for the same size pipe and floor levels. This wide discrepancy is due to the assumption of a height for the third floor. In residences the height may be 20 ft. and in commercial buildings as high as 35 ft., which would, of course, show a difference.

With trade conditions as they exist, time is not available to compute pipe sizes according to hydraulic formulas. While this is highly desirable for accurate results, the method is not practical for monetary reasons. A study of all the surrounding conditions, and of the theory and the practice of heating by hot water has uncovered a method which is easily understood, and when the points are clear the method of close proportioning an installation is both simple and rapid. The result is the chart, Fig. 2, which gives sizes of mains, risers and branches for gravity hot-water heating under any condition of height up to and including 40 ft. elevation.

Size and Floor		Bixley	Kinealy	Hubbard	Snow	Nason
¾"	First	—	27	—	—	50
	Second	—	35	—	—	52
	Third	—	35	—	—	53
1"	First	39	48	30	33	89
	Second	45	62	55	46	92
	Third	48	62	65	57	95
1¼"	First	64	75	60	71	140
	Second	73	97	90	104	144
	Third	79	97	110	124	149
1½"	First	95	108	100	100	202
	Second	110	140	140	140	209
	Third	118	140	165	175	214
2"	First	156	191	200	187	359
	Second	179	250	275	262	370
	Third	194	250	375	325	380
2½"	First	256	300	350	292	561
	Second	294	390	475	410	577
	Third	318	390	—	492	595
3"	First	381	430	550	500	807
	Second	438	—	—	755	835
	Third	473	—	—	875	856

TABLE 1—GIVING SIZE OF RISERS AND RADIATOR CAPACITY TO CARRY DIRECT RADIATION, BY SEVERAL AUTHORITIES.

It is only necessary to know the amount of radiation and the elevation at which it is located to find the pipe size. In a store building with the first

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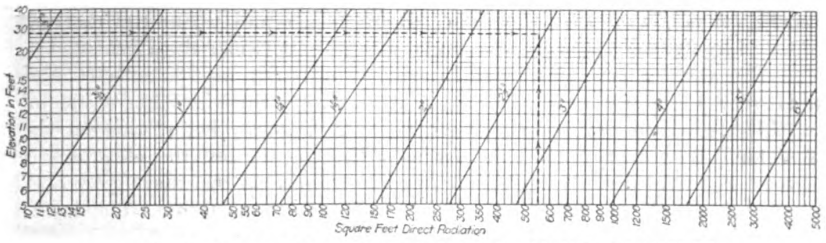

FIG. 2—CHART FOR GETTING SIZE OF MAINS, BRANCHES AND RISERS FOR HOT-WATER HEATING

floor ceiling 20 ft. above the ground and a basement 10 ft. below, the elevation for the second floor radiators would be about 28 ft., measuring from the center of the boiler to the center of the radiator. The heating surface in this space is, say 550 sq. ft. The problem is to find the pipe size adequate to supply this radiation. Find the 28-ft. elevation on the left scale of the chart, Fig. 2, and read across to the line of radiation which has been traced upward from the bottom scale, as shown by the arrows. The meeting point of these two lines lies between the diagonal lines of 2-in. and 2½-in. pipe and 2½-in. is the size that could be selected.

Now, if this same condition were met in another type of building with lower ceilings, the elevation for second floor radiators might be 15 ft., as is common. Then it would be necessary to use a 3-in. pipe as found in the same way on Fig. 2 for 550 sq. ft. of radiation at an elevation of 15 ft. For an average length of horizontal run from the boiler to the rising point, the elevation is the factor which decides the pipe size required. The number of floor, such as first or second, is a totally inaccurate value. The elevation in feet must be known for close figuring and satisfactory operation. It is in this case the height that gives the natural working head.

In gravity hot-water heating, the water in the system is set in motion when heat is applied as by starting the fire in the boiler. It is the difference in the weight, according to temperature between the incoming and outgoing water that maintains the circulation. When the temperature of the water in the flow and return pipes is the same, there can be no natural water movement due to gravity. The water in the system is at rest. Without circulation, therefore, heat cannot be carried from the boiler to the radiators.

The hot water in passing through the radiators is cooled by giving up part of its heat to warm the space. The colder return water is heavier and falls, traveling to the boiler, where it is reheated and the warm water rises, this movement maintaining a circulation in the pipes.

The loss in temperature or the difference between the temperature of the flow and return waters is called the temperature drop. On this depends the quantity of water that must be in circulation and pass through the radiators to supply the required heat. With a high temperature drop, a small quantity of water is required; a low temperature difference means more water in the system. In proven practice the drop is figured as 20 deg. between the flow and return, giving a water requirement of 1 gal. per square foot of direct radiation per hour.

The temperature drop also affects the difference in weight between the ascending and descending water in the pipes and this is the force that produces the flow. With a low temperature drop the velocity of flow is relatively high, and so is the friction. As the force which produces the circulation is actually very small, the velocities must be very low. Otherwise the available pressure would be unable to overcome the friction of the system.

With the ascending water at 180 deg. and the return at 160 deg. there is a temperature drop of 20 deg. and an average temperature of 170 deg. in the radiator. The weight of a cubic foot of water at 160 deg. is 0.0353027 lb. and at 180 deg. it weighs 0.035059 lb., giving a difference in weight of 0.0002432 lb., which is equal to a pressure of 0.003 lb. per square inch for every foot in height. This small pressure is the power producing the flow in a hot-water system and is commonly referred to as the available pressure head. It varies directly with the height of the pipes for a given condition, so that for 100-ft. elevation the pressure would be 100 x 0.003 = 0.3 lb. per square inch, the available head.

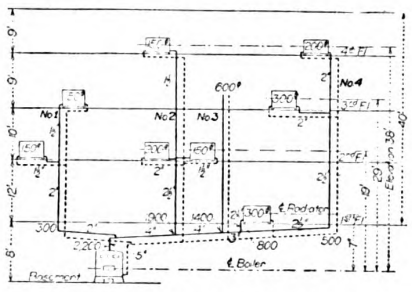

FIG. 3—DIAGRAM SHOWING METHOD OF DETERMINING SIZE OF PIPES FOR HOT WATER HEATING SYSTEMS

This force, the available pressure head, must overcome all the friction losses in the system which tend to retard the flow. The loss due to friction is a component of the length of pipe, diameter, change in direction, fittings in the circuit, etc. When the available pressure head just balances the total friction there will be circulation, but should the friction loss be greater the system will not work.

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The velocity under working conditions is, therefore, low and pipe sizes are relatively large to keep the friction as low as possible. The theoretical velocity for the same condition is very high, but it has no bearing on the practical velocity which is only a fraction of the theoretical value. It will be seen, therefore, that pipe sizes must be carefully proportioned so that the difference in weight of the water in the flow and return pipes will overcome the friction, to insure positive circulation.

All these variable items have been taken into account in the preparation of the chart, Fig. 2. Through laborious processes the factors have been so included and transposed that they appear apparently eliminated, but actually this is not the case. All values are given in working terms, such as pipe sizes in inches, elevation in feet and radiation in square feet. The studious readers who would delve into the mysteries of this diagram will find that the hydraulic values of friction and capacity can be traced back and found to approximately correspond to C = 71 in the HazenWilliams formula, which reads:

$$V = 1.32\ Cr^{0.63}\ S^{0.54}0.001,^{04}$$

in which V = the velocity in feet per second; C = co-efficient; r = hydraulic radius in feet and S = hydraulic slope. The modification in transposing to practical working values as given is the embodiment of an average horizontal run of main.

PRACTICAL APPLICATION OF PIPE CHART

To show the actual use of the chart giving pipe sizes, the illustration, Fig. 3, of a direct gravity hot-water heating system will serve as an example. The building is four stories in height with boiler in the basement. A two-pipe up-feed system of piping is employed. From the floor heights the different radiator elevations are determined. This elevation represents the height from the center line of the boiler to the center line of radiators. Thus the first floor radiators in this instance are at a 7-ft. elevation and at 19, 29 and 38 ft. for the second, third and fourth floors, respectively. In figuring up the size of main, half the height of the building, counting from the first floor level to the top floor level to the top floor ceiling, is taken as the average elevation for the entire system. Thus one-half of 40 ft. is 20 ft., the elevation of basement flow and return mains for this installation. The elevation for risers with radiators taken off at more than one floor level is determined separately for each floor as explained below.

Take Riser No. 1 in the illustration, Fig. 3. The topmost radiator is 150 sq. ft. on the third floor, which is equal to an elevation of 29 ft. Referring to the diagram, Fig. 2, find 150 on the bottom scale of radiation. Then find 29 ft. on the side scale of elevation. Read across and up at the meeting point the finger tip falls between the lines of 1¼ and 1½-in. pipes. The larger pipe is selected and this portion of Riser No. 1 therefore has a 1½-in. flow and return. The radiator below this on the same riser is also 150 sq. ft., but the elevation is 9 ft. Reading these values on the chart gives 1½ in. as the size of branch connections. The lower section of a riser has to supply not only this radiator, but also the third floor unit or 150 + 150 = 300 sq. ft. The elevation is taken as lying midway between the two floors, which means one-half of 19 + 29 = 48 ÷ 2 = 24 ft. Then, reading in the chart in the same way as before, the meeting point is between 1½ and 2 in.; therefore, a 2-in. riser is selected.

All the other risers and branches were similarly selected in this simple manner. Take Riser No. 2 in the center of the illustration, Fig. 3. The topmost radiator is at an elevation of 38 ft. The size being 150 sq. ft., 1½-in. pipe is required, according to the pipe size chart. On the second floor this same riser, No. 2, must supply one 200-sq. ft. and one 150-sq. ft. radiator. The branches for these are 2 in. and 1½ in., respectively, for an elevation of 19 ft. The total tax on the main part of this riser is 150 + 200 + 150 = 500 sq. ft. direct radiation. The average elevation that this lower part feeds is clearly at the third floor or 29 ft. Find on the chart 500 on the radiation scale and 29 on the side for elevation; reading to the junction point, the finger tip lies between 2 and 2½-in. pipe. The riser is made 2½ in. Take the radiator on the first floor between Risers Nos. 3 and 4. It is of 300 sq. ft. at an elevation of 7 ft. For this condition the chart, Fig. 2, gives a 2½-in. pipe.

In sizing up the mains, the total tax on the farthest risers is noted at the base, thus No. 1 has 300 and No. 4 has 500 marked at the foot of the riser in a ring. These figures denote the total radiation. The elevation for the mains is half the height of the building above the basement, or 20 ft. in this case. Each section of the mains is sized separately. For Riser No. 4 with 500 sq. ft. a 2½-in. flow and return main is the right size. For No. 1 with 300 sq. ft. a 2-in. pipe will serve. Following along on the basement lines, say to Riser No. 3, it is seen that the main has to supply 500 + 300 = 800 sq. ft., which for a 20-ft. elevation requires a 3-in. pipe. The radiation is summed up in this way for each part of the main where a riser or connection has been taken off. The figures are marked on the drawing for convenience in sizing up. Then the aggregate heating surface at each part is given a pipe size as found on the chart, corresponding to the elevation.

In this way the entire system totals 220 sq. ft.

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As the average elevation is taken at 20 ft. for this installation, the chart shows that a 5-in. connection is required at the boiler.

In this case it is assumed that the pipes in the basement are insulated with some form of pipe covering. When the pipes are exposed bare, due allowance should be made by adding in the radiation losses of the pipe to the actual surface of the radiators.

It should be remembered that all the figures are based on friction and flow of water in pipes which means a complete circuit in each case, from the boiler to the radiator and back to the boiler. Pipe sizes are, therefore, the same for the flow and return, as the loss is equally distributed over every foot of piping, mains, risers and branches. For the same reason, in selecting pipe sizes from the chart, Fig. 2, the nearest size is not to be used when the point falls between two sizes, but always the larger pipe. This is to insure that the available pressure head will surely exceed the friction head and make circulation positive. It may appear at times for some conditions that the pipe is too large for service. That may be so actually because pipes are made in standard sizes and not in fractions to balance the laws of friction. In such instances it may be well to choke the pipe by means of a valve or disc inserted in the line. Using a pipe one size smaller will not accomplish the same thing. It may cause the failure of the entire system.

The method of determining the elevations for figuring pipe sizes, as outlined, has been found satisfactory.

It is not expected that all will follow this system. Some may even disagree on this particular point. However, that would not alter the value of the chart for simplicity in finding pipe sizes for hot-water gravity heating. Determine the radiator heights in any way deemed correct and then find the value on the scale of elevation at the left of the chart and read as previously explained to the pipe size.

The chart holds true within its limits of 5 to 40 ft. elevation and 10 to 5000 sq. ft. of direct radiating surface for hot-water systems.

Wasteful Use of Lumber

The Danger in Depleting Home Supply in View of Present Transportation Difficulties

A warning as to indiscriminate use of lumber has been given out by Edwin E. Hollenbeck, president of the Master Builders' Exchange, as follows:

Time was when a house built of lumber cost less than one constructed of any other material, but that time has passed.

No less than two or three decades back our greatest supply of timber was secured from near points with little handling and a small amount of freight. The forests were stripped ruthlessly without thought or consideration of the future, and, added to it, there was an equal disregard in its use or waste. Lumber of all kinds for many years and almost up to the present day was considered so plentiful and of such little value that no thought of conservation seemed necessary. Thus lacking in thought we have through our wasteful methods so depleted our supply at home, without the slightest endeavor to replenish and conserve, as to make it necessary to bring it from points far removed, where facilities for economical production are so evidently lacking as to make the use of such material at the present time almost prohibitive.

The cost of a good timber house built to-day as they built them twenty or thirty years [illegible] exceed that of most any common [illegible] The cost of lumber has mounted so [illegible] it appear as a luxury rather than a [illegible]

It never seems to occur to the [illegible] land unfit for cultivation should be [illegible] ing trees upon it. Not that they will [illegible] by it, but generations that follow will [illegible] is done we shall be compelled from [illegible] to find some substitute.

To-day we are facing such a [illegible] uch it impossible to proceed with [illegible] s the serious hindrance. Through [illegible] 50 per slow transportation and the [illegible] m truck sizes, this condition will [illegible] differences the opening of spring [illegible] er is considyears driven the [illegible] uck, for while material more readily [illegible] actical purposes their work.

The Association [illegible] plant and transmis- [illegible] r is limited only by country could [illegible] as are similar to the blessing upon [illegible] of new [illegible] iler operation must always nuded, this [illegible] tions existing in the locality in just what [illegible] e carried out and no truck user have [illegible] d how such figures differ. The [illegible] wever, is a matter of proportion, and, [illegible] t his truck operation costs, the pros- [illegible] ler user can make a close estimate of

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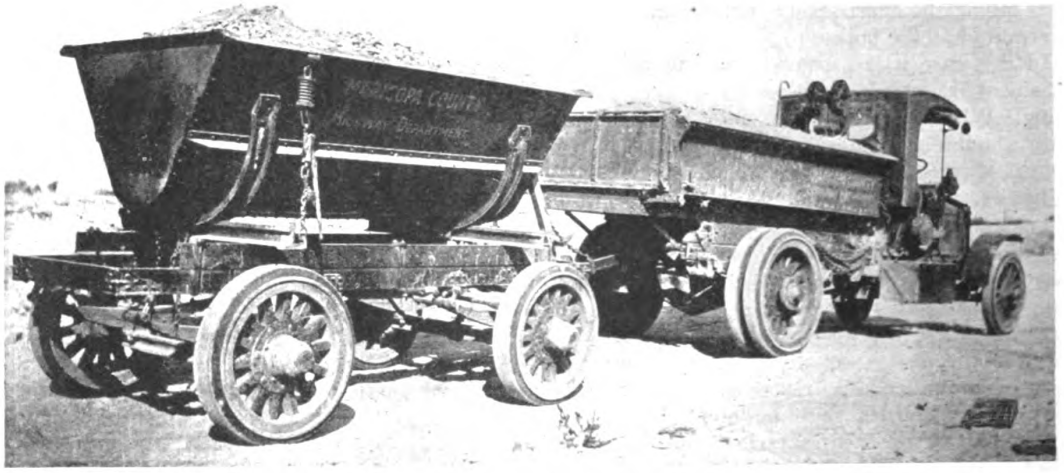

TRUCK WITH REVERSIBLE OPERATING TRAILER.

Cost of Trailer Operation and Types of Bodies

By HOWARD GREENE, M. E.

THERE is no difficulty in obtaining accurate estimates on the cost of trailer operation from trailer manufacturers, who have taken a good deal of trouble to post themselves and, in most cases, are safely conservative in their figuring. The prospective trailer user is generally already a truck user and he can get a fair idea of what he can expect with his own equipment and under his own conditions by using the figures already given. It is always interesting and often profitable, however, to know what has been done by others and the following examples are therefore worth citing.

Lumber haulage costs kept for a period of six months by one company showed that a truck alone carried 382,000 feet at a total cost of a little more than $1,000, or about $2.77 per thousand feet. A semi-trailer outfit used for the same period hauled 1,118,000 feet for about $2,000, or $1.79 per thousand—a very considerable saving.

Comparing horse haulage with trailer haulage shows a wide difference in figures. In one case a team hauled brick at the rate of 1,600 a day. Under the same conditions a 3½-ton truck with a 2-ton trailer handled 10,000 brick a day.

A round trip was made by horses, hauling lumber, in 10 hours, the total distance being 16 miles. A three-ton truck hauling a 3-ton trailer made the same trip in five hours and reduced the cost of haulage from $2.32 per thousand to $1.31 per thousand.

Broadly speaking, there are three types of trailers—the semi-trailer, which is a two-wheeler with its front end resting on a turntable or fifth wheel on the truck or tractor by which it is hauled; the ordinary four-wheel trailer, which is coupled to the rear of any truck; and the two-wheel type, used to support the rear end of a long load. When bodies are considered, however, the variety becomes very great. As a matter of fact, bodies are now regularly built for practically every class of service. In addition to the more ordinary platform and side stake bodies, box bodies, and the like, there are special dumping types. Rear dumpers are operated by hoists which in large units are operated by power from the engine and in small units may be worked by hand. There are also bodies that slide back and dump by gravity. Special lumber bodies have lever-operated rollers for discharging the loads, which work is greatly facilitated by the ease with which the truck is started forward, allowing the load to roll off and dump compactly. For bulky loads of light material, bodies can be made of any desired length so that excessive width and height are avoided. Pole trailers or dol-

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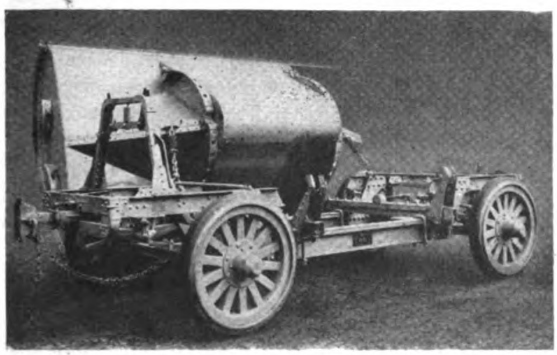
lies permit the supporting of long material so that any desired proportion is carried on the trailer.

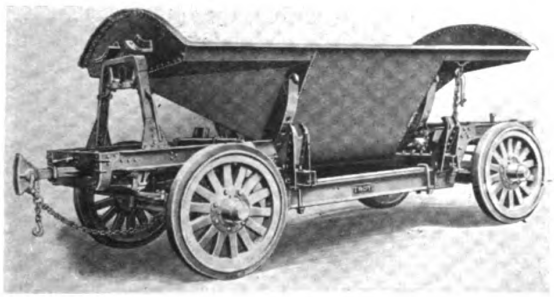
For hauling sand, ashes, garbage or any material that must be side-dumped there are several types of bodies. In one type there are side-dumping pivoted buckets, two or three on each trailer, and these may be made so they can be lifted off by a crane, dumped, and returned empty. In another variation the buckets are on small wheels and roll off the rear of



A THREE-TON DROP-FRAME TRAILER.

the truck on tracks, to be unloaded and returned empty or else replaced by empties, so that the trailer outfit is not delayed. Such bodies are largely used in contracting and municipal work.

For road building steel bodies are built with bottom dump, and these are so arranged that the load can be dumped in one spot or spread any depth over any desired distance. State Highway Departments are using dumping trailers quite extensively in road building.



A DROP-FRAME TRAILER WITH A CAPACITY OF THREE TONS.

Where roads are level, road material is often hauled by powerful tractors running at slow speed and handling a considerable number of trailers in a train. In such cases the cost of haulage is not infrequently as low as 7 cents per ton mile. From six to eight trailers are coupled up in a train and so good are the steering arrangements that all the trailers track perfectly with the tractor, all tendency to cut in on corners being eliminated. For such work special slow-speed trailers are built, and in many cases they have wheels with wide steel tires—which of course helps keep down the cost of operation.

Semi-trailers that are frequently detached from their tractors are provided with quick-acting jacks which support the front end while the tractor is driven out. Improvements in the coupling arrangements have been such that it is not necessary to place the tractor with mathematical exactness for coupling up, and this saves much time and trouble.

The trailer is a vehicle of simple construction. Its parts are substantial and, so far as the standard makes at least are concerned, they are of very good materials. There is little wear and tear. Even the rubber tires usually fitted have long life, for they simply carry weight; they have no propulsive effort to transmit as have the rear tires of the motor truck or tractor. It is therefore with reason that the tires



A LIGHT-DUTY TRACTOR WITH HAND-OPERATING SEMI-TRAILER.

on a trailer are expected to run, and do run, much longer than the tires on the truck that supplies the power. It is not an uncommon thing to get 50 per cent longer wear from trailer tires than from truck tires and in some cases much greater differences have been obtained. The life of a trailer is considerably longer than that of a motor truck, for while the life of the truck is to all practical purposes limited by the life of its power plant and transmission system, that of the trailer is limited only by the durability of such parts as are similar to the longest-lived truck parts.

The exact cost of trailer operation must always depend upon the conditions existing in the locality in which operations are carried out and no truck user need be reminded how such figures differ. The whole thing, however, is a matter of proportion, and, knowing what his truck operation costs, the prospective trailer user can make a close estimate of

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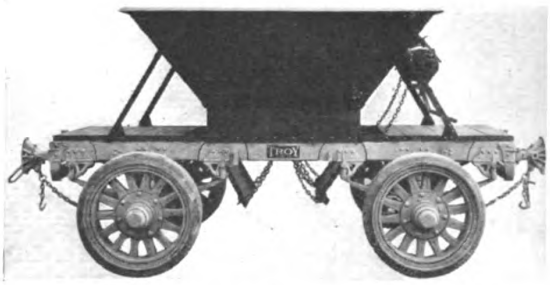
what it will cost to increase the hauling capacity by using trailers. As has been stated, it usually is fair to figure that doubling the total load will increase the hauling cost not more than 25 per cent and a more common figure is 20 per cent.

It may be said in conclusion that a good deal of faith may be placed in the manufacturers of trailers



A DUMP TRAILER WITH A CAPACITY OF THREE CUBIC YARDS.

when they are given an opportunity to acquaint themselves with conditions. Co-operation between truck and trailer makers has led to an understanding and appreciation of conditions, and over-optimistic figuring is the exception rather than the rule, as far as can be gathered from inquiries on the subject.

Fuel Value of Wood

IN heating value, one pound of good coal may be taken as the equivalent of two pounds of seasoned wood, says the Bureau of Standards, Department of Commerce. Allowing eighty solid cubic feet of wood to an average cord and assuming the sticks to be well seasoned, a cord of hickory or other heavy wood is equivalent in heat value to one ton of coal. For lighter wood, as cedar, poplar, spruce and white pine, two cords are equivalent to one ton of coal.

Equal weights of dry, non-resinous wood give off practically the same amount of heat in burning; that is, a ton of dry cottonwood will give off as much heat on burning as a ton of white oak. Highly resinous woods, like some of the pines and firs, have an appreciably greater heating value per ton, because a pound of resin gives off twice as much heat during combustion as a pound of wood.

When buying wood by the cord, it must be remembered that different species vary greatly in weight per cubic foot, so that a cord of hickory has considerably more fuel value than a cord of soft maple. A cord of seasoned wood contains more wood than a cord of green wood, because of the shrinkage which takes place in seasoning.

The amount of moisture in firewood influences not only the vigor with which it burns, but the amount of heat actually given off. Therefore, to obtain a standard cord of wood of the greatest fuel value, thoroughly dry wood of the heaviest kind, straight in growth, cut into short lengths and with the largest diameters, should be selected. As a rule, the softwoods burn more readily than the hardwoods and the lighter woods burn more readily than the heavier ones.

IT is often possible to use the smaller sizes of anthracite coal, which are cheaper than nut or stove, and thereby effect a financial saving. Much of this small coal must necessarily be burned in connection with the larger sizes, and care must be exercised to prevent such coal from falling through the grates.

In the operation of the furnace it should be kept in mind that the heat value of coal is derived from two sources. In the first place, coal contains a large amount of volatile matter. After firing, the boiler becomes initially a gas producing plant. Upon the proper operation of the boiler depends whether this gas shall pass up a chimney unburned or whether the major portion of its heat value shall be retained in the fire box. When a low fire is maintained the temperature in the fire box is insufficient to ignite these gases and they therefore pass up the chimney unconsumed, whereas by maintaining a well-controlled draft and a hot fire bed these gases are immediately ignited and give off their full heat value. After the volatile material has been given up the remainder of the coal, which has really been reduced to coke, will burn with a good heat. If after firing it is noted that considerable smoke goes up the chimney there is no doubt that a large amount of the heat value of the coal is being wasted. Approximately one-half of the energy of the fuel passes into the combustion space in the form of these combustible gases. A combustion temperature of at least 1,000 degrees Fahrenheit is absolutely essential to produce economic combustion.

By maintaining the bed of fire and ash on the grates at all times, say from sixteen to twenty inches deep, the heat loss will be materially reduced. Excess air (from below the grates) produces a chilling and deceiving effect. Too strong a draft is undesirable.

Finally the sifting of ashes, when they contain any fuel value, will prevent the discarding of coal which has gone through the grates. In this connection it is well to emphasize that violent shaking of the grate is never warranted. A moderate shaking twice a day should be ample in most cases, since it is only desirable to shake down the finer and well burned ashes.

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Before and After

A Brief Story of the Remodeling of an Old-Fashioned House, Which Can Be Duplicated in Every Community

By CHARLES S. KEEFE

THERE was a time—not so far distant either—when it was fashionable to tear down the house built a few decades ago and replace it with an ultra-modern structure. In many instances such a procedure was to a large extent pure waste, but the owner's money was plentiful, and labor and material were available and not very costly.

To-day conditions have greatly changed and as a result a note of conservation has been struck. The tendency is to use existing structures with alterations, wherever this is possible. With what surprisingly good results such alterations can be made is strikingly illustrated in this article.



DETAIL OF ENTRANCE AFTER ALTERATIONS.

One of the illustrations (page 44) shows the house, located at Saratoga Springs, N. Y., as it existed when the present owner, Charles C. Van Deusen, took title to the property. It had been built about 1880, and was of the usual Queen Ann type of brick house, with bands and mouldings, round porches and an odd-shaped and inartistic tower.



THE LAWN FRONT AFTER ALTERATIONS

Comparing the "before and after" photographs, it is interesting to note how simple were the actual structural alterations.

All the excrescences were removed and a two-story porch was built on the side. The entire front was rebuilt inasmuch as it was so broken up that it was impossible to do anything else with it. It originally consisted of a bay and two or three other projections.

New dormers were cut in the roof in place of the old ones, a new cornice was put on and the building, which was of red brick, was painted white.

Several brick bands on the sides were not removed, inasmuch as this was too expensive. The chimneys also were left as they had been.

On the interior comparatively few changes were made. New bathrooms were installed, a heating system put in as well as electric lights. On the first

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floor two small rooms were thrown into one to make the living room and this together with the dining room and hall were decorated by having wood strips nailed on the wall and these were painted. In addition to these mouldings, new trim was installed in the living and dining rooms.

On the second floor new bathrooms were arranged and two small rooms thrown into one. The walls of the three bedrooms on the second floor were paneled by nailing strips on the wall, after which the walls, ceilings and woodwork were painted.

New floors were laid throughout the first story, except in the servants' portion, but on the second and third stories the floors were left as they were originally.

In the attic the rooms were left practically as they were with the exception of the installation of a new bathroom.

There were practically no structural changes on the inside of the house with the exception of the removal of the two partitions necessary to enlarge the rooms on the first and second stories.

It is possible to alter a great many buildings of this character with practically no changes in the interior. There are many houses which, while comfortable for living, leave much to be desired as far as the exterior appearance is concerned. The house here illustrated gives a suggestion as to what is possible under even the most adverse circumstances, and this house certainly had a very bad exterior.

Every town has some buildings in it that could be altered with much less change than was necessary on the Van Deusen building.

In the instance cited, the owner was provided with a home of undeniable excellence, both as regards interior and exterior, in quicker time and at far less expense than would have been possible had he decided to demolish the old building and erect a new structure.

The architects for the alteration were Hopkins and Keefe.

Building Operations in January

CONTRACTS let in January, 1920, amounted to approximately $236,000,000. The average per month during 1919 was about $13,000,000 less, being around $213,000,000. The January figures on analysis show that $92,000,000 or about 40 percent was for industrial buildings, $48,000,000 or 20 percent for houses, $38,000,000 or about 15 percent for public works and utilities, and about 15 percent or $35,000,000 for business structures.

It will be learned from a careful study of these figures and comparison with those for January, 1920, that the demand all over the country for structures of all types is constantly increasing. Normally, January is not a month of building activity. If the month of January, 1920, may be regarded as an indicator of the building activity for 1920, it may with confidence be stated that the figures for this year will largely excel all previous years.

Building contracts in the Middle West for January, while not equalling the monthly average for 1919, were nevertheless larger than any previous January of record. Those in a position to judge conditions in this section predict the largest volume of building during 1920 that has ever been recorded.

In the Pittsburgh district there was naturally a large proportion of industrial plants projected, or more than half of the total of the building contracts. The figures for January is slightly in excess of the monthly average for 1919.

An unprecedented figure for building contracts was established in January in New York State and Northern New Jersey. Here again does the industrial building show the greater volume. It is reported that the contemplated work in this district amounts to upward of $112,000,000, as compared with $76,000,000 reported in January, 1919.

These high figures of contracts placed are despite the fact that there are, in certain quarters, evidences of hesitation in carrying forward building projects because of an expectation of lower prices and cheaper building costs. For, on the other hand, there is a generous amount of vitally necessary work projected that will go ahead regardless of cost. There is also current a strong body of opinion which does not look upon present conditions as inevitably resulting in a panic of business depression, to be followed by reduced prices of building materials and labor. They hold a contrary view that a world wide inflation has decreased the value of currency everywhere, that wages and prices merely seem high and that a man who hesitates about carrying on needed work is making a great mistake.

RECAPITULATION

	Contracts let January, 1920	Average for 1919	Projected work reported in Jan., 1920
Minnesota, North Dakota, South Dakota	$7,200,000	.....	$12,600,000
Michigan, Wisconsin, Illinois, Iowa, Indiana	61,423,000	74,000,000	137,000,000
Ohio, West Virginia, Western Pennsylvania	43,600.000	35,000,000	37,775,000
Eastern Pennsylvania, Southern New Jersey, District of Columbia, Delaware, Maryland	26,188,000	32,500,000	98,458,000
Northern New Jersey, New York	79.570,000	46,000,000	112,000,000
New England States.	17,950,000	19,675,000	71,771,000

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Editorial

The Economics of Building

IT BECOMES to-day, to a greater extent than ever before, the duty of everyone engaged in this country in the building industry to give careful consideration to the economic problems that affect the business of construction. Further, it is the duty of any journal that works in the construction field to place before its readers the latest phases of economic problems and to endeavor to point out just what bearing these conditions exert on every undertaking of building operations from the smallest to the largest. This BUILDING AGE from month to month will strive to do.

Labor and the availability of materials are to-day the major problems. With a wage scale agreed on for 1920, approximately 30 per cent in excess of the already abnormally high scale as enforced during last year, there is small hope of any substantial reduction of labor costs. But many and sensible men who have contemplated building operations this Spring have shrewdly figured that with the possibility of increased rental returns there was wisdom in building now. This wise decision has, however, in most localities been futile, as owing to a most serious car shortage and a very considerable congestion at terminal points, there is no certainty as to deliveries.

Fortunately we have the widest resources and great adaptability. Where one material may not be available there will undoubtedly be stocks of others procurable. The lessons of wise and practical substitution learned during the war have taught that there is often a wiser choice than the first one and that this alternative may be availed of to even better satisfaction. So, then, there is no need for hesitation. The prudent man will build now, the over-cautious will only lose by procrastination.

It is absolutely necessary, if a builder hopes to be even moderately successful, that knowledge of all these various things be part of his mental equipment. He can only secure this valuable aid by closely following the economic factors that affect his business. BUILDING AGE will strive to help him keep posted on every essential thing that he needs to know.

ECONOMIC writers in this country predict that the present low rate of foreign exchange will in the end largely affect the high cost of living and that we may confidently expect, if this low exchange rate continues, a very material reduction of prices on such commodities as are now being held for export. It is contended that these conditions will retard the European buyer in his purchasing and that large stocks in this country, being manufactured for a foreign demand, will have to seek a market for their distribution in the United States. Such a condition would, of course, have a tendency toward a decrease in prices in this country, as manufacturers would need to find quick markets here for their stocks in order to convert the merchandise into cash.

It is further pointed out that conditions in Europe, particularly in England, all indicate a curtailment of buying in this market, as England is suffering from a shortage of ships. This shortage prevents the even normal shipment to English colonies of all sorts of structural material. A recent despatch from England states that there is at present tied up, through lack of ships, no less than 80.000 tons of structural steel.

It is these items to which the casual reader gives but a passing thought that are the straws which indicate the direction of the economic wind. If the builder gives them the proper consideration he will avoid many errors of judgment.

ANOTHER factor that looms large in our economic problems is that of Americanization. This movement is daily gaining impetus and its large importance as affecting our national growth is becoming insistently apparent. We shall need to devise some more speedy and surer processes of Americanization than those that have been tried in the past. It will be necessary to get the newly arrived citizens away from our large cities and distribute them more evenly throughout the country. Further, it will be necessary to see to it that these foreign people learn our language, our customs and those traditions that make for citizenship. An important matter now going forward takes the name of the Own Your Home Movement. The idea of this organization of people who are working for this country's interest is to teach the people how they may own their home and thus assume as a landowner one of the chief attributes of good citizenship.

An exposition to be held in New York early in May, 1920, the purpose of which was fully set forth in January BUILDING AGE, has been especially planned to provide a solution of the present acute housing shortage. The great value of home ownership should be taught all over the country and it is expected to make this exposition a thorough pres-

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a list of chores to do every evening after he reaches home. The grounds are always in order and are entation of the merits in owning your home that it will have a wide educational value.

To further this movement and to give the essential features of this exposition the widest publicity, it has been decided to make the May issue of BUILDING AGE a special Own Your Home issue. The subject will be very thoroughly presented and it is believed that much good will result in making these valuable matters known to builders everywhere.

The builder as a "business getter" often finds that in his arguments with a prospective customer he could give added emphasis to his statement of fact if he could but have some impartial authority further to explain the necessity for building and the best and most efficient way to finance the proposition and erect the building.

The May issue of BUILDING AGE will supply just that authoritative confirmation of the builder's arguments. Equipped with a copy of this issue, he will have a valuable, efficient and economical addition to his selling force.

The Modern Bungalow Courts

(Concluded from page 22)

kept so by the court attendant. Again, the houses are off the heavily traveled streets, making the location much safer for children and freer from dust and dirt.

Bungalow courts of Southern California are of many sizes, consisting all the way from two to fourteen homes. These homes range in value from $600 to $5,000, bringing the price of the completed court from $5,000 to $100,000. These bungalows are made to suit the pocketbooks of all kinds of renters, the monthly rate being from $15 to $65, depending upon the size, location, etc. The several accompanying illustrations will give some idea of the types and character of homes erected in these courts as well as of the general arrangement of these homes in the various groups.

Decorating and Furnishing the Low Cost House

(Concluded from page 29)

contrast of color avoided. Flower designs in regularly spaced bunches are to be deplored in floor and wall coverings. They create a desire on the part of the onlooker to count the number, in all the straight and diagonal lines that the design follows, and this is a restless and useless performance. The rug should be large to accommodate the table and chairs when pushed back, and should be neither too heavy to prevent free moving, nor so small that it catches into the chairs. It is best to have the walls of one color, a neutral one, and never a striped red which is suggestive of the poor wayside inn or the cheap river boat. The dining room walls may be painted with any one of the many flat wall paints that are provided for this purpose, if paper is not desired. The ceiling in this room in the small house is best when presenting a perfectly plain surface. Simulation of beams is only permissible in a room that approaches the Jacobean or early formal type and this is scarcely ever attempted in the low cost house.

(The Dining Room, Part II, will appear in the April Issue of BUILDING AGE.)

Announcement

Mr. Richard Van Gaasbeek, Head of Department of Woodworking, School of Science and Technology, Pratt Institute, Brooklyn, New York, has prepared for BUILDING AGE a series of articles, extensively illustrated by drawings, dealing with stairway construction. The first of these will appear in BUILDING AGE for April; the complete series will run in from six to nine successive issues.

Pittsburgh has Housing Program

A home building program involving the expenditure of $15,000,000 over a stretch of five years, is to improve Pittsburgh's industrial position and to relieve social unrest.

The proposal calls for building 1,000 homes each year near employment centers. It is believed that the plan, together with independent building, will assure needed housing facilities.

The shortage of approximately 8,000 homes here, it is said, was a cause of much unrest among the employed and was causing the cost of living to soar.

Building Trades Form Council

A state building trades council of more than 100,000 skilled mechanics belonging to local councils of building trades' employes in Massachusetts was formed at a meeting at 386 Harrison avenue, Boston, by union representatives of the men, including many international officers.

This State council is formed to bring about better co-operation among the men employed in the industry, to stabilize wages and working hours with a view to establishing a universal wage schedule and to combat the open shop.

W. A. Rossley, general agent of the Worcester Building Trades' Council, was elected temporary chairman, and John C. Macdonald, Boston Building Trades' Council, temporary secretary.

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Financial Encouragement to Promote Building Is Increased

Mortgage Tax Exemption as an Aid to the Complex Housing Problem—McLaughlin Bill Now Before Congress, If Enacted, Will Exempt From Income Tax Mortgages of Not More Than $40,000 Owned by Individuals

DIFFICULTY experienced in obtaining the necessary financial assistance for the more rapid construction of homes, while greatly lessened since the arrival of the new year, is still demanding the keen attention of the building industry. While action by the Government in enacting legislation materially to relieve the situation will undoubtedly be supported in any reasonable measures, it will be considerable time before existing conditions can be fully met.

There are two bills at present awaiting enactment by the Senate which are the only practical ones so far advanced to secure financial encouragement that will cause great building activity in spite of the prevailing high labor wage and material prices. One is the McLaughlin bill, which, if enacted, will exempt from the income tax mortgages owned by a single individual amounting, as to the principal thereof, in the aggregate to not more than $40,000. The exemption is to be applied, not as is popularly supposed, to mortgages for amounts less than $40,000, no matter what number, but to individuals owning investments in mortgages up to $40,000 in the aggregate.

The only objection to the bill is coming from the savings banks, which, under the existing laws, have the monopoly of investing their funds in tax-exempt mortgages. It matters little in the present exigency who or what institutions may be benefited by the exemption so long as the public needs are satisfied. Present conditions show conclusively that savings banks have been either unwilling or unable to supply the demand for building loans. It is not to the public's best interest in the fight to avert the disastrous consequence of a continuation in an aggravated form of the existing housing shortage to preserve a monopoly for the banks. It therefore is decidedly to the interest and advantage of owners, mortgagees and tenants to give their support to the McLaughlin bill.

The other plan to aid the home builder is the home loan bank bill. It is proposed that the Government license these building associations to form into group organizations or local home banks, with which they may deposit their mortgages and receive long term loans upon them, the funds becoming available through the issuance by the district home loan bank of salable bonds against mortgages deposited.

Licensing of the Federal Government would function to standardize these bonds and make them more attractive to the investor. At the same time it would have all the security of the well-placed first mortgage, and, in addition, the security of a collection of such mortgages backed by a reserve fund against possible loss. It is to be hoped that these securities may be sold on such favorable terms as to permit a minimum charge of interest to the home builder and save him the annoyance and hardship of commissions and bonuses so frequently suffered.

It is certain that the United States can do little to relieve the necessities of the country in securing additional housing facilities except by encouraging a proper financing of housing undertakings. The creation of a Federal home loan banking system through the medium of the building and loan associations of the United States will enable the people of the country to obtain money on reasonable terms for the building of homes.

The lack of mortgage money to finance building operations can be attributed directly to the income tax on mortgages. This was a vital blow to the speculative builder, whose business calls for building according to the demand. The income from mortgages, the interest paid on loans, is taxed in the hands of the mortgagee just as other income from business stocks or other sources is taxed. Money, like other commodities, seeks such avenues of investment which yield the

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highest return commensurate with safety and convertibility into cash when necessary.

The substance of the entire situation has been very ably summed up by Adolph Bloch, of the Real Estate Owners' Protective Association, who says: "In these days of high rates for money on call and 6 per cent. gold bonds issued by public utility corporations of unquestioned financial stability and soundness, who would be tempted to invest surplus funds in real estate mortgages at the face rate of 5 or 5½ or even 6 per cent., as limited by law, and then suffer that income to be materially diminished by an income tax normal at 4 per cent. or at a surtax in some cases running as high as 73 per cent.

"On the other hand, what investor would not gladly prefer to make his investment in bonds secured by first mortgages for a conservative amount upon well-located improved real estate—securities that suffer no fluctuation and, if well-selected, furnish absolute security—if mortgages were exempted from Federal or State taxation?"

Nothing will so surely increase the construction of houses as an abundant supply of mortgage money at reasonable rates. Nothing will furnish the supply of money for that purpose in larger volume, almost instantly, than the removal of the imposition of both Federal and State taxes upon the income of mortgages. Only with the influx of more money can building be further stimulated. Public sentiment must be aroused to demand the enactment of the two bills now before the Senate for its consideration.

Competition for Development of a Small Country Property

Held by the "OWN YOUR HOME" Exposition, under the auspices of the New York Chapter of the American Society of Landscape Architects

THE object of the competition is to secure the best design for a plot located at the intersection of an avenue and a street; 144 feet on the avenue and 270 feet on the street. One side of the lot faces a sandy beach. The street runs at right angles to the beach and ends at the high-water line.

The first prize design will be executed in miniature, one-sixth full size, at the OWN YOUR HOME Exposition at the Grand Central Palace during the week of May 1, 1920. The residence, greenhouse and garage at the same scale are now being built. These three buildings are to be located on the plan, and there must be a flower garden and a vegetable garden. Any other features are left to the discretion and judgment of the competitor.

Anyone who signifies his intention to compete may ask questions of Mr. Geiffert in regard to the work, and the answers to any such questions will be sent to all competitors. No questions will be answered after March 6.

The first prize will be $125; second, $75; third, $50.

Three drawings are to be submitted: A general plan on mounted paper, rendered; a planting plan drawn in ink on tracing paper; a drawing on mounted paper showing such details as the designer wishes, to explain his work.

The scale of all drawings is to be that of the topographic map. The size of the drawings is to be 26" x 38". The general plan should show grades by figures, no contours. No fences are permitted on the boundary lines. Any medium may be used in rendering the drawings; however, much more importance will be given to the logical and artistic planning of the plot and the selection of materials in regard to their fitness to local conditions and their effect on composition than to the presentation, which shall not go beyond what is strictly necessary to make the plans intelligent.

Each set of drawings will be signed by a *nom de plume* or device and accompanying the same shall be a sealed envelope with the *nom de plume* or the device on the exterior. The name and address of the contestant is to be inside. No contestant shall be permitted to submit more than one design alone or in association with other men.

The drawings are to be delivered at the office of the OWN YOUR HOME Exposition at Grand Central Palace, Lexington Avenue and 46th Street, New York, not later than March 27.

The jury appointed by the Chapter to judge these designs consists of Charles Downing Lay, Gilmore D. Clarke and Noel Chamberlin.

The decision of the jury will be final. The jury will send a copy of its report to each competitor, and will reach its decision not later than April 3. All designs will be exhibited at the OWN YOUR HOME Exposition, at the conclusion of which all except those receiving prizes will be returned to their authors.

The competition is open to all members of the New York Chapter of the American Society of Landscape Architects, all draughtsmen and junior draughtsmen employed in offices of practicing members of the Chapter and students of landscape architecture at Cornell University.

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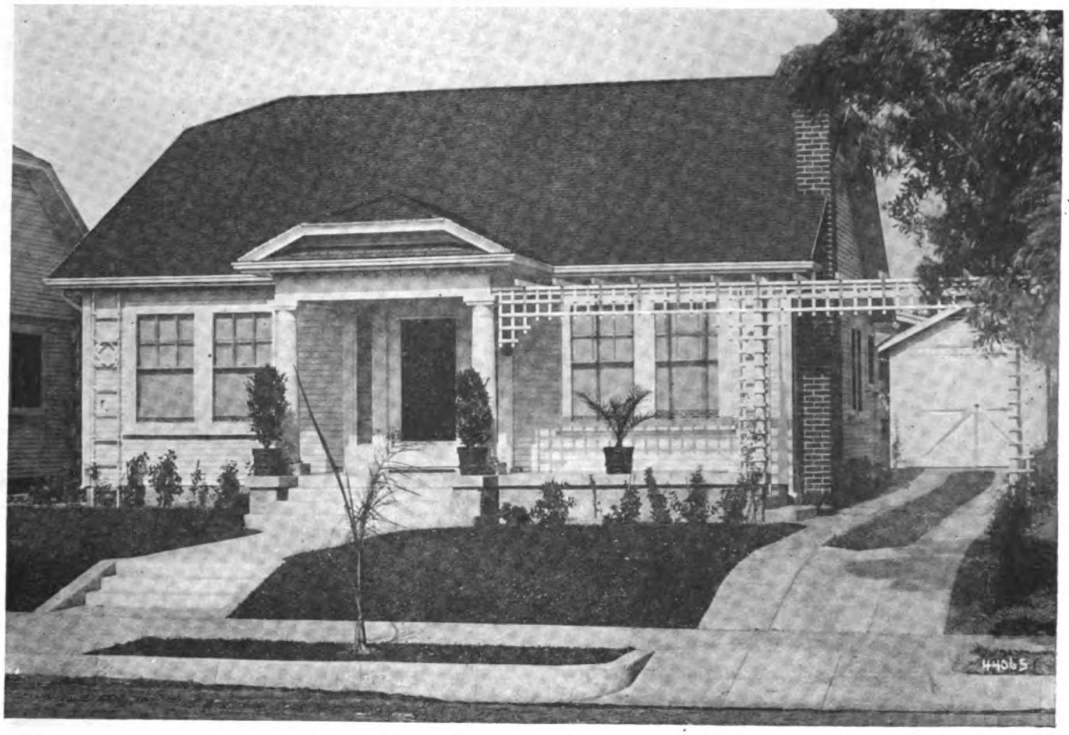

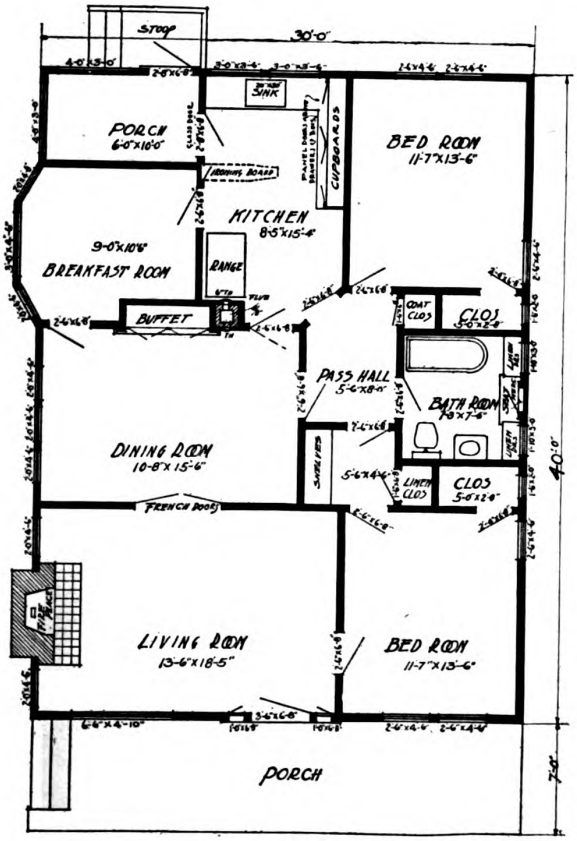

Typical Bungalow Erected at Los Angeles, Cal.

This interesting house indicates skillful adaptation of the materials used. The plan is particularly good, with ample closet space, a built-in sideboard and a spacious breakfast room which in emergencies could be used as an extra bed room.

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ALTERATIONS TO THE HOUSE OF CHARLES C. VAN DEUSEN, SARATOGA SPRINGS, N. Y.
ALFRED HOPKINS AND CHARLES S. KEEFE, *ARCHITECTS.*
(See text for article descriptive of alterations. The insert is a photograph of the house before alteration.)

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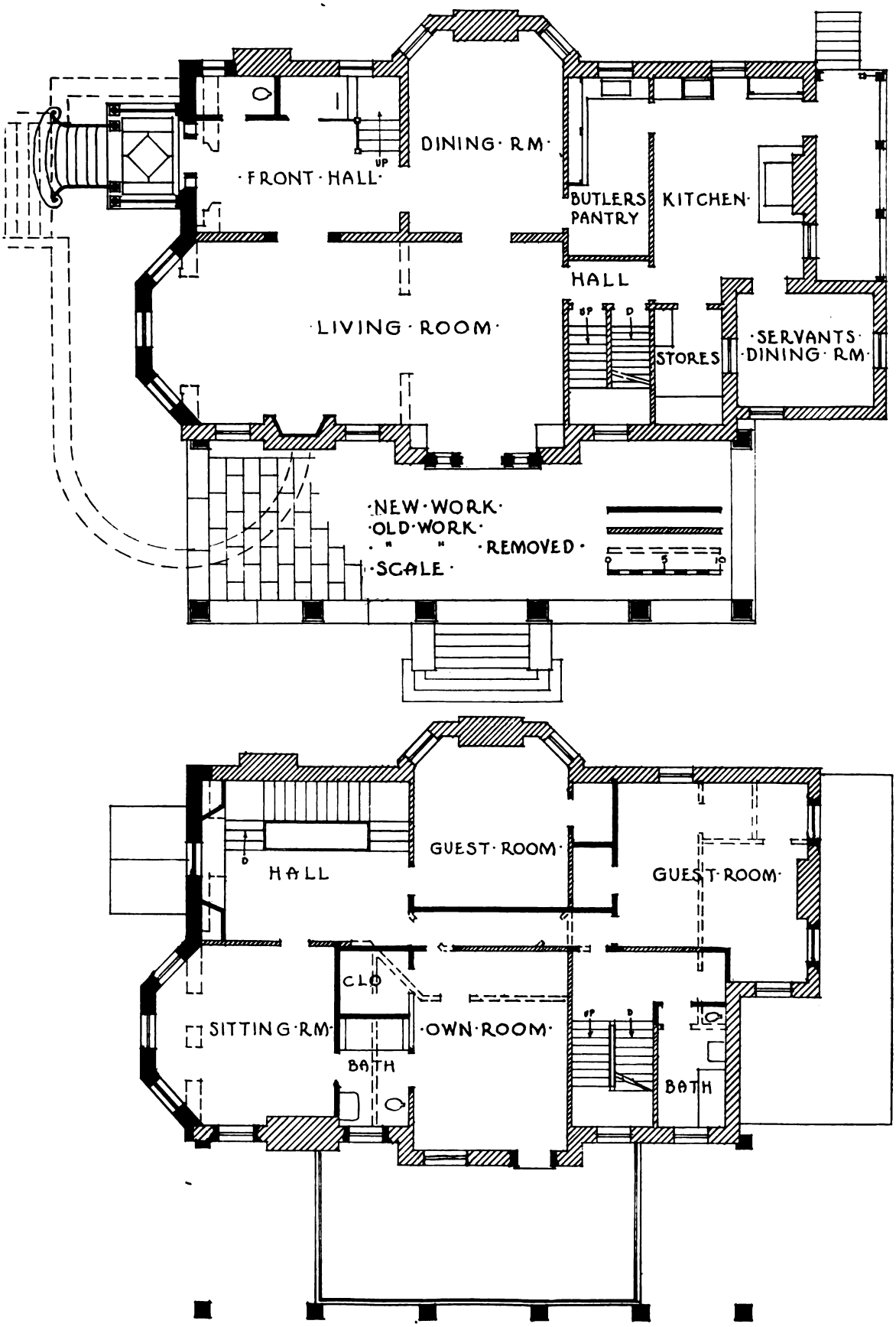

FLOOR PLANS SHOWING ALTERATIONS TO THE HOUSE OF CHARLES C. VAN DEUSEN, SARATOGA SPRINGS, N. Y.

ALFRED HOPKINS AND CHARLES S. KEEFE, *ARCHITECTS.*

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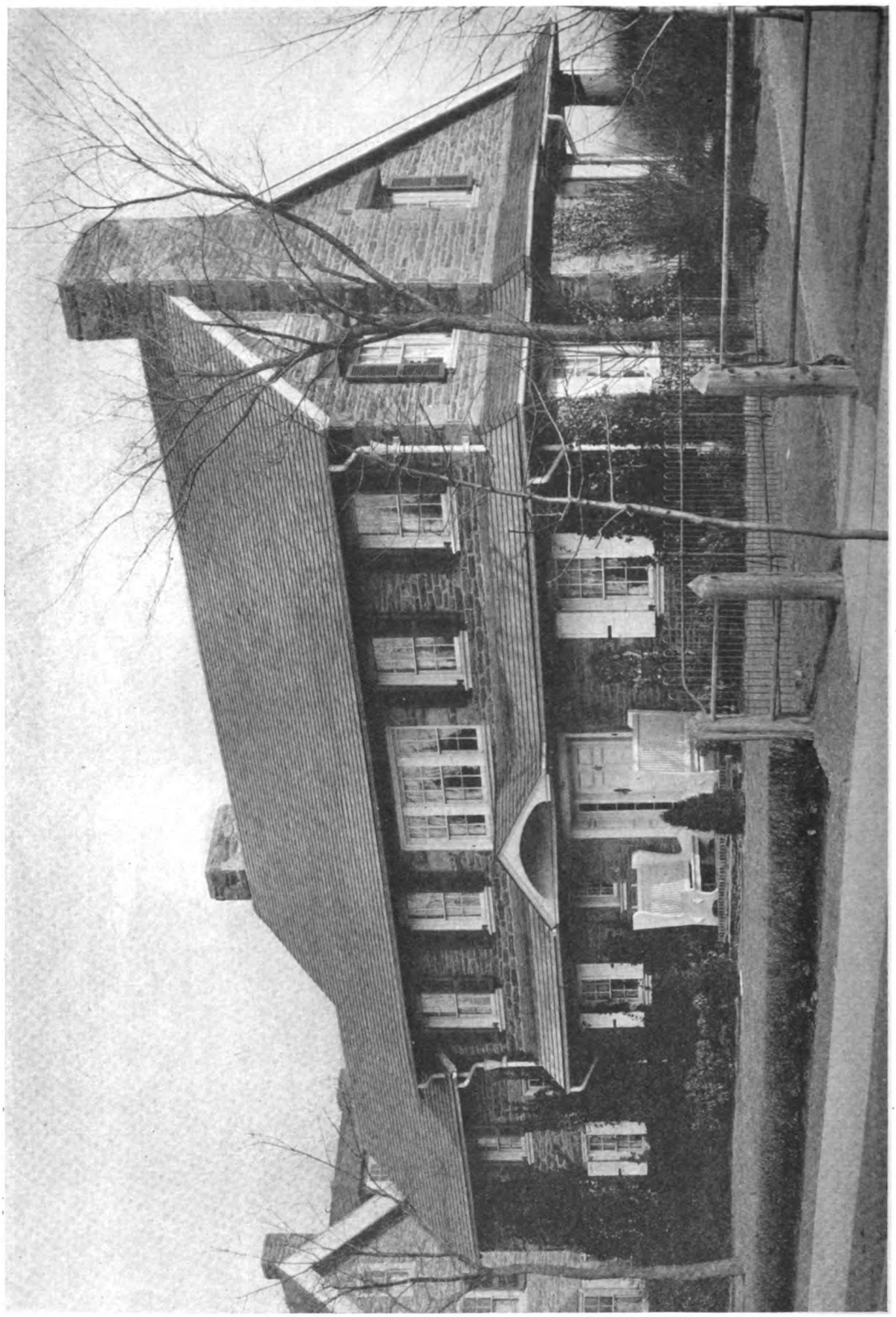

A HOUSE ON WESTVIEW AVENUE, PHILADELPHIA, PA.
C. A. ZIEGLER, *ARCHITECT.*

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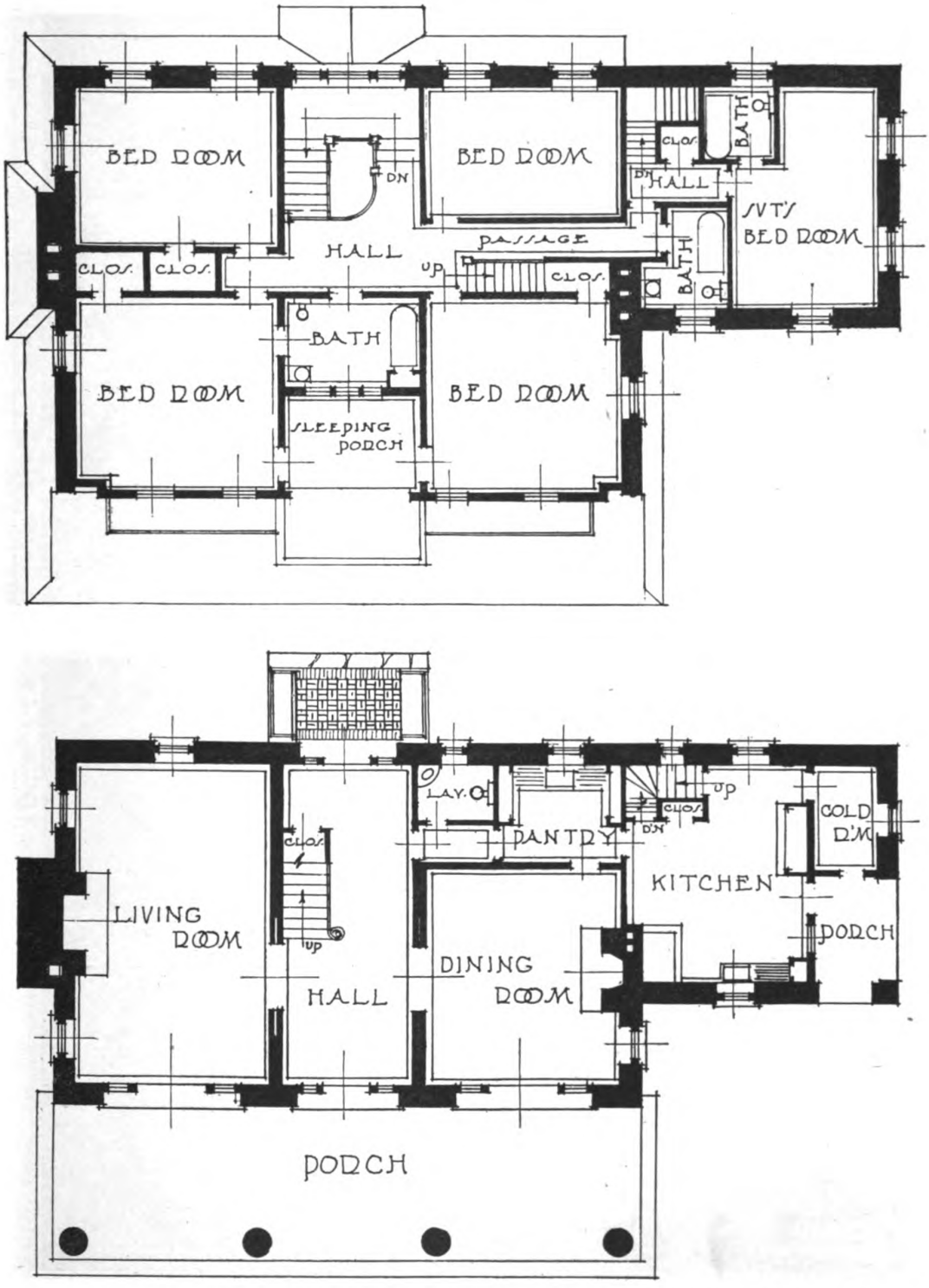

FIRST AND SECOND FLOOR PLANS OF A HOUSE ON WESTVIEW AVENUE, PHILADELPHIA, PA.
C. A. ZIEGLER, *ARCHITECT.*

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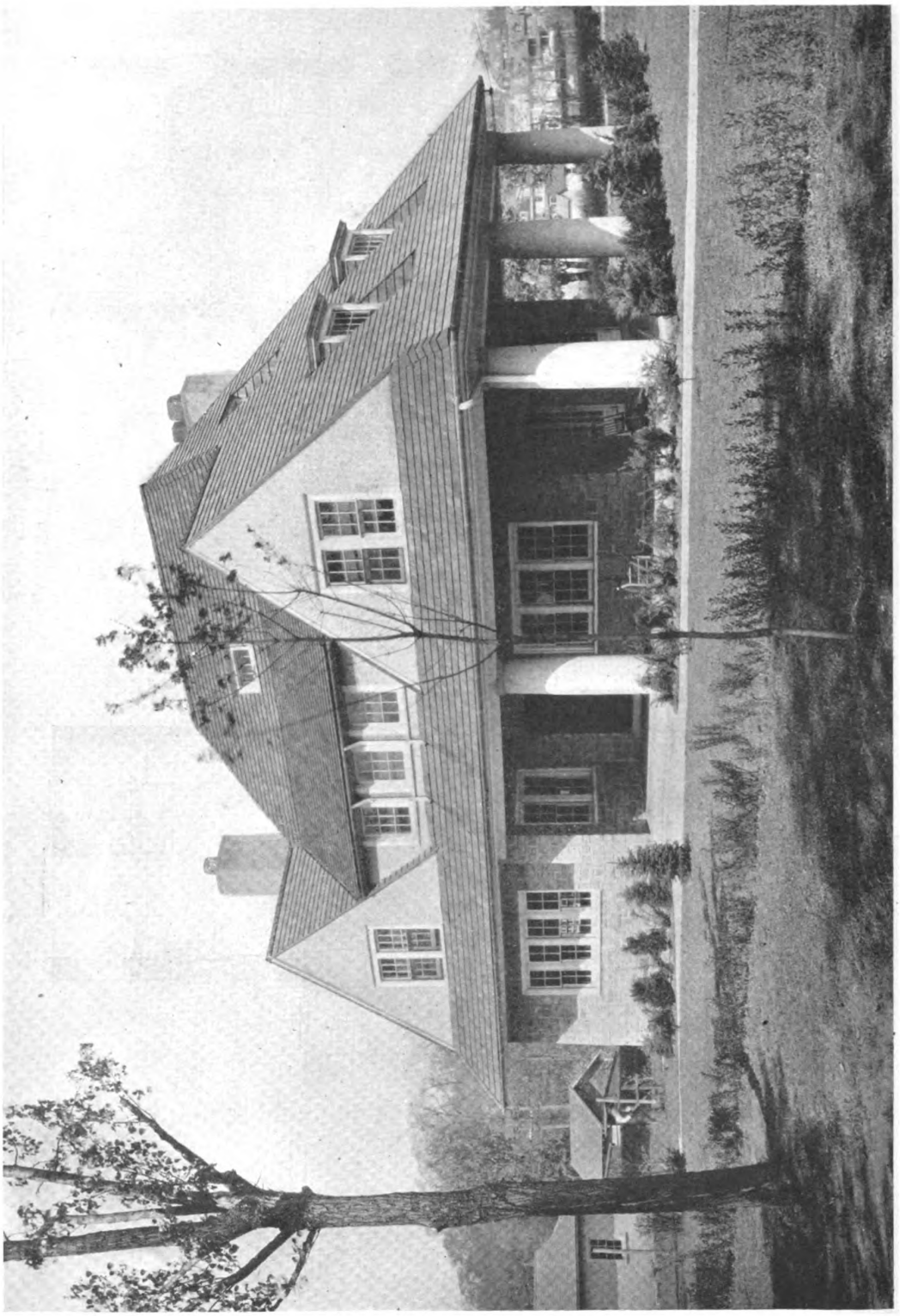

A HOUSE AT LANSDOWNE, PA.
HEACOCK & HOKANSON, ARCHITECTS

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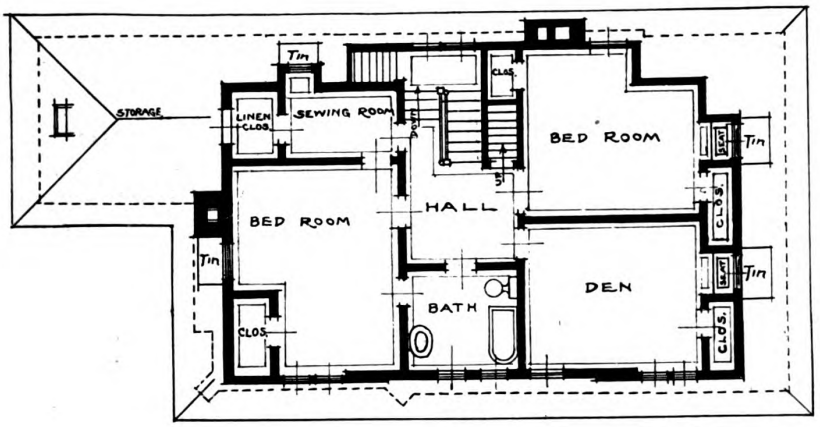
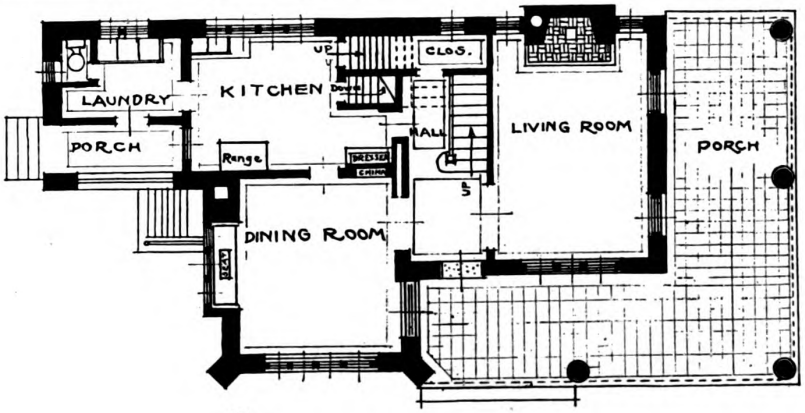


House at Lansdowne, Pa.



Heacock & Hokanson *Architects*

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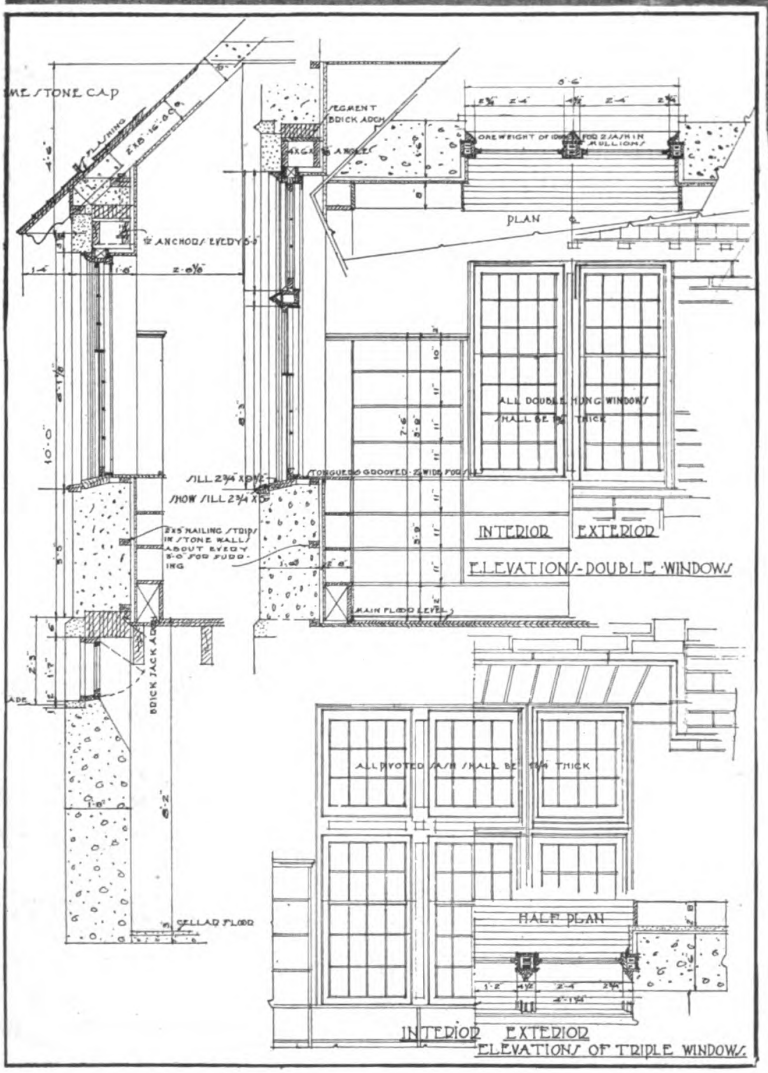

Helen Kate Furness Free Library

Wallingford, Pa.

Robert G. Holland
Architect

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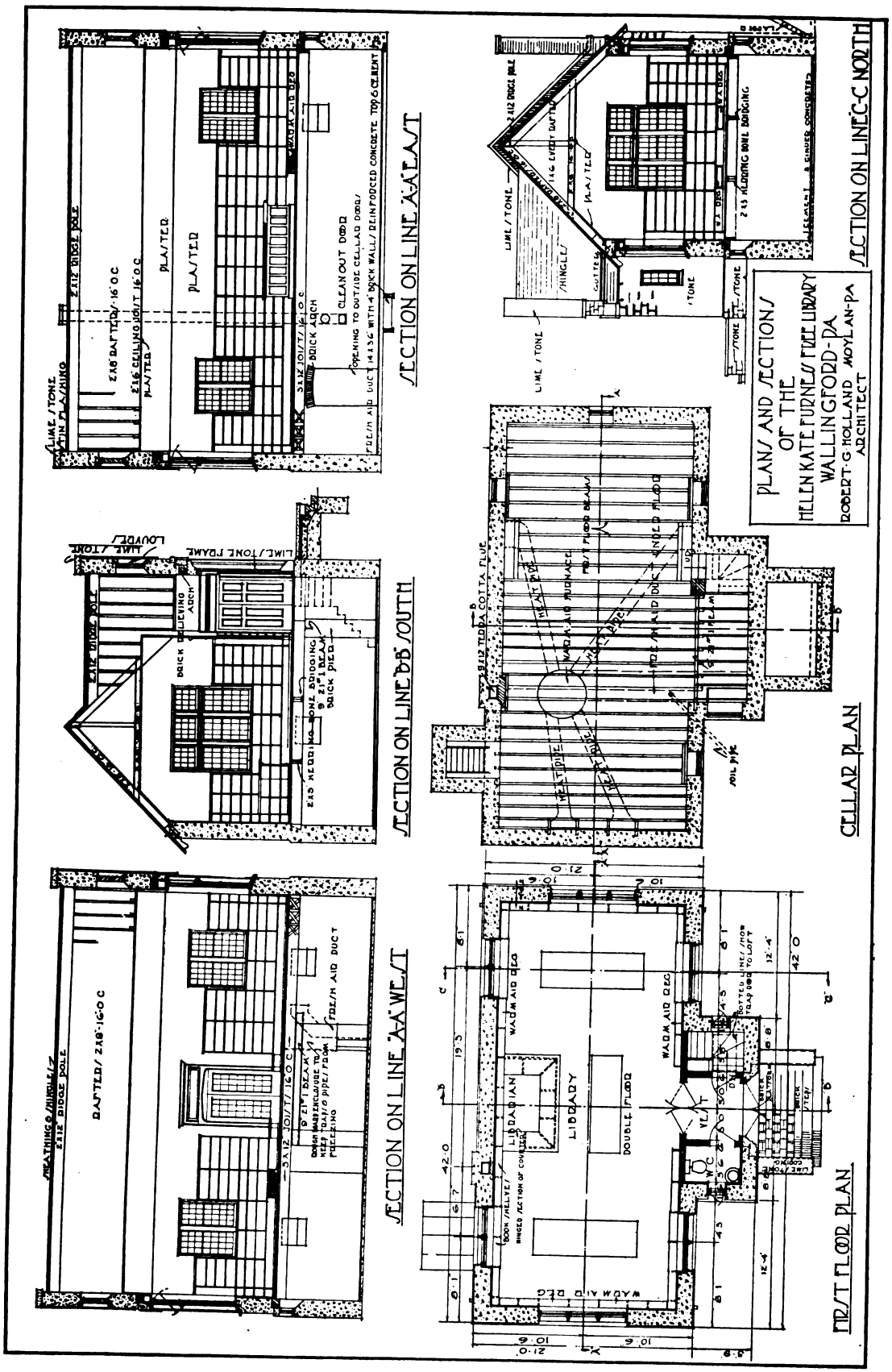

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Raising the Roof of a Building

By HENRY SIMON

A New and Economical Method That Transformed a One-Story Garage Into a Two-Story Building

WHEN the owner of the building with which this article is concerned consulted me as to the possibility of raising the roof a story, the question was not if it were possible to perform a stunt, but whether or not an economy could be effected.

And since, if the answer had been No, there would never have been anything to describe, I deem it appropriate to preface my description of the raising by the statement that it cost less than thirty dollars to lift the roof eight feet and a



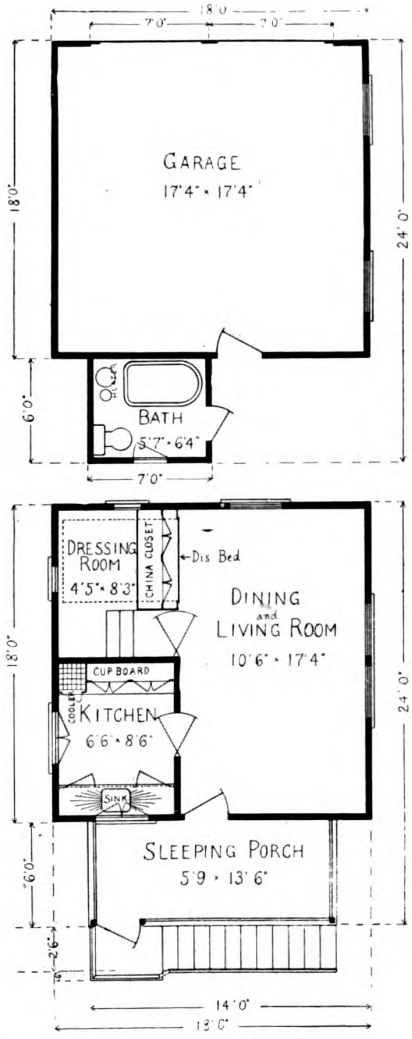
FIG. 1.—ROOF RAISED 8 FT. 7 IN. TO NEW POSITION

half, preparatory to setting up another story on top of the original one.

This meant not only a material saving over the alternative method of tearing down the roof and re-building it, which would have cost over twice as much, but several days' time was saved and the roof, for once, was ready and in place before the walls of the new story were ever started, which was particularly desirable in view of the threatening rainy season.

The original building was a one-room garage, 18 by 18 ft. The owner wished this to be converted into a two-story house, with a complete little apartment in the second story. The old building was substantially constructed, though showing the rough framing inside. Eacn pair of rafters was already provided with a tie which afterwards served as ceiling joists in the second story, running from plate to plate.

The first step, after removing the top course of siding, was to s.ver the roof from the walls. This was done at the meeting point of studs and plate, the plate thus remaining connected with the roof. This was accomplished by prying up the plate over each stud by means of a lever and a scantling enough to permit the spikes fastening studs and plate together to be cut.



THE FLOOR PLANS

Next, two of the three 2 x 12 x 18s, which were afterwards used as girders under the main floor, were taken and hung, one on each side of the building under the roof ties and at right angles to them. They were placed within a foot of the wall and were held in place by hangers nailed to each end tie and consting of two pieces of 1 x 6 straddling the girder and both securely nailed to a 2 x 4 block on which the girder rested.

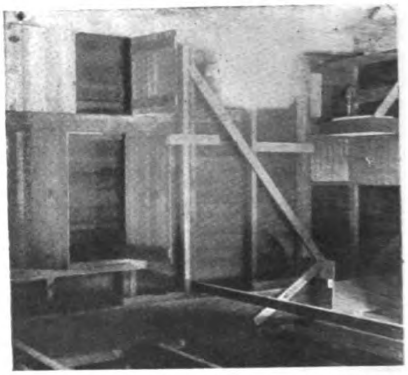


FIG 2.—INTERIOR VIEW OF KITCHEN BEFORE FINISHING

These lifting girders, as I will call them, made it possible to apply pressure to the roof only at the four corners and yet to have that pressure evenly distributed over all ties and rafters, thus equalizing strains and greatly simplifying operations.

I took advantage of the fact of the studding being exposed in raising the roof the first eighteen inches. A movable scantling, equal in dimensions though slightly shorter than the wall studs, was placed against each alternate stud on the two sides parallel to the lifting girders and there solidly secured by means of cleats nailed against the latter at top and bottom, each cleat bearing a block secured to that face of the cleat turned against the wall and set close to the scantling, which, therefore, could only move up or down. Scantlings were

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then tacked to the plate, so that the latter, in rising, would carry them with it. The walls were connected by temporary ties made of 2 x 4s placed six feet apart and just beneath the lifting girders. The jacks were then set up on the floor, sticks cut to reach from the bottom edge of the girder to the top of each jack, then the raising begun.

A number of scrap blocks of ½ x 3, 1 x 3, 2 x 3, 3 x 4, and 4 x 6 had previously been cut to lengths of a foot or so, and as soon as the roof began to go up these blocks were slipped in under the movable scantlings, providing a factor of safety and making it possible to block up and re-set the jacks from time to time.

This method was only employed because it made it easier and more convenient to use the lifting truss by which the main operation of raising was accomplished, and which alone had the stability sufficient to raise the roof to the desired height. It saved building up the blocking under the jacks to too great a height and made it possible to work off the floor from beginning to end without any climbing about, which would have been both risky and would have wasted time.

The lifting truss proper was now put in place. It consisted of two pairs of uprights each connected together by two horizontal cross-bars, the two units in turn being connected at top and bottom and thoroughly braced. Each pair of "legs" was made of two pieces of 2 x 6 x 10 set upright close to the corner of the building and bearing against the inner face of each lifting girder. Each of the cross-bars was a 2 x 6 x 18, the top one being placed directly underneath the girders and projecting a foot or so beyond them on each side. The lower piece, being cut a trifle short of 18 ft., just fitted into the building, almost touching the inner face of the siding on each side. A 2 x 3 was then cut to fit exactly between the two cross-bars and spiked to the upright, to take the strain off the spikes holding the timbers together. The two upright units were then joined by two pieces of 2 x 6 x 16 at the bottom, while at the top both the "legs" and the cross-bars were thoroughly toe-nailed to the girders. When this construction had been complemented by double diagonal bracing made of 1 x 6 stock, a rigid frame of great strength had been obtained, to which the heavy load could be safely trusted.

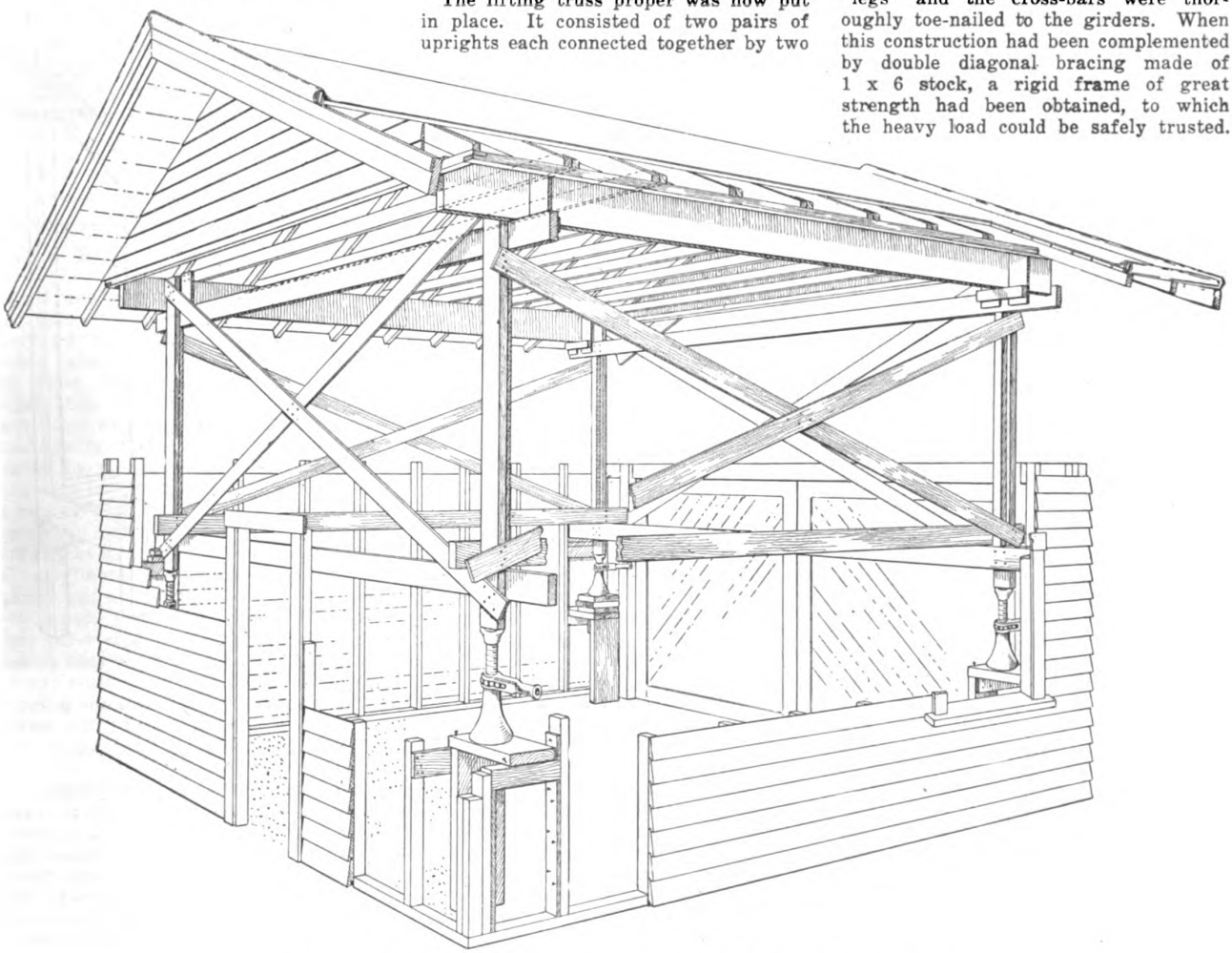

FIG. 5.—ILLUSTRATING METHOD BY WHICH ROOF WAS JACKED UP

It will be noted that this truss left an interior space of about 15 x 15 ft. unobstructed for working, and also left the walls entirely free, making it possible later to frame the second story wall without interference while the truss was still holding the roof in place.

It is also worth noting that in the construction of the entire lifting apparatus there was used nothing but timbers which were later worked up into the

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building, and that in almost every instance these timbers were left the exact length in which they were later used. The 2 x 10s were floor joists for a section of the sleeping porch which called for that length. The 2 x 6 x 18 pieces were joists for main floor, which was eighteen feet square. The 2 x 12 girders, as before mentioned, were supports under the main floor.

The main lifting operation was now begun. As soon as the frame began to rise, blocks were built up under the ends of the bottom members or, as I will call them check-bars, of each upright unit, every half inch being taken up so that, had a jack slipped or turned over, no corner of the frame could have dropped more than half an inch. This was an important measure because it permitted the roof to be raised quickly without the constant fear of what might happen should something suddenly happen to one of the jacks.

As soon as the jacks had been extended to their limit, the frame was eased back a little so as to bring it to rest on the pile of blocking, the jacks removed, re-set, blocked up, and the operation repeated.

When the roof had been raised about a foot in this manner, the piles of blocks under the check-bars, which had by that time grown to be over two feet high, were taken out and replaced by a bridge built right under each end of each check-bar. This was made of a block of 3 x 4 cut to a length to fit exactly between the studs to either side of the bar and supported at each end by a length of 1 x 3 securely tacked to the studs. This released a large number of blocks for renewed use, besides making it much safer than if a tall pile of blocks had been depended upon. The raising was then continued, the old blocks being gradually built up again on the bridge until the roof had been raised another eighteen inches or so. At that point another set of bridges was built under the check-bars. A short 2 x 12 slab was spiked to the first bridge and supported at its other end by one or two legs made of whatever dimension stuff of the right length was at hand. In the drawing, three jacks are shown on tables supported by slabs of 2 x 12, which happened to be on the job. As the illustration shows, they were braced to the nearest stud by pieces of inch stuff tacked on near the top, which thus kept the table from moving sideways, the heavy pressure being sufficient to prevent the bottom from moving. As the raising proceeded and the jacks were set up on the second bridge, however, the legs under the tables were secured both at top and bottom by braces to the walls. In the blocking of the jacks, care was taken to use only wide and heavy pieces of even thickness, and to replace these by still fewer and heavier pieces as the height increased.

In this manner the roof was raised to the required height, 8 ft. 7 in. above its former position. The only side of the building which needed further preparation was that one opposite the garage entrance, where all studs were cut off 2 in. and a plate spiked to them for the ends of the floor joist to rest on. The opposite side already had a 2 x 6 plate above the garage doors, and on the two remaining sides the outside joists were toe-nailed directly to the stud ends.

The corners had previously been nailed together and cut to the proper length. These were now set up in place and braced. The roof, which had been lifted about a quarter of an inch higher than its final position, was eased back, one corner at a time, steered to its proper place, and then let down enough to bind, and securely nailed. So straight had it gone up that it was found that no corner of the plate was over half an inch out of the true perpendicular, and it was an easy matter for one man standing on a ladder to shove the roof to its proper position.

Studs were then placed along the walls every four feet and nailed in place, and when this was done, it was possible to demount the lifting truss and to complete all remaining framing after the floor had been laid. The roof was safe in its new place, raised by two men in a little over three days. The total waste of lumber resulting from cutting off the ends of sticks or cutting braces, etc., amounted to about $2. All the rest went into the construction of the apartment shown in the plan.

One additional difficulty had to be met in framing the wall over the garage doors, which being a pair 14 feet wide, created a fourteen-foot span under the south wall.

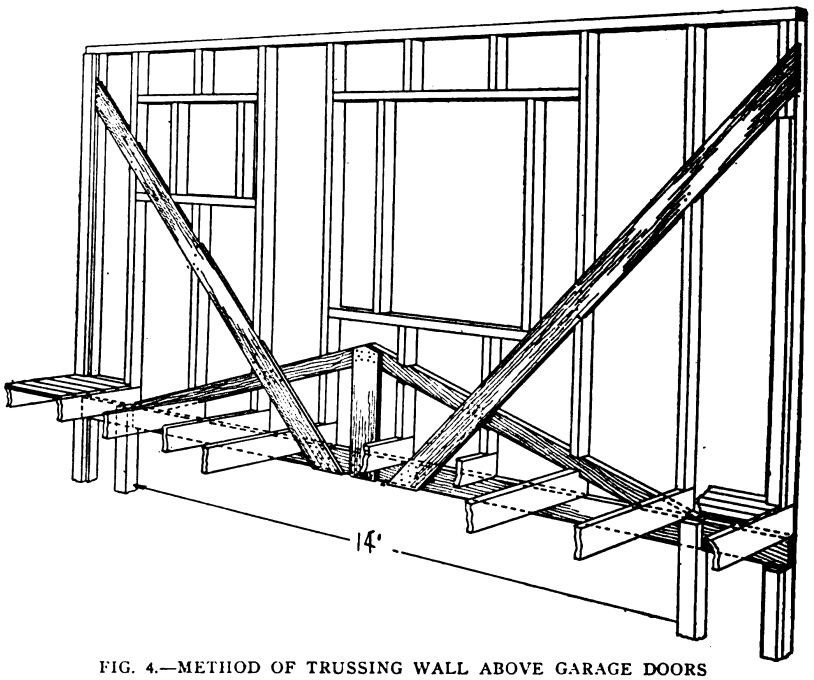

FIG. 4.—METHOD OF TRUSSING WALL ABOVE GARAGE DOORS

To overcome this difficulty I designed the combined hanging and bridge-truss shown in Fig. 4, which besides supporting the wall and floor, also braced the wall most thoroughly at the same time. As the drawing shows, it consists of two pieces of 1 x 6 mortised into the corner studs near the top and nailed at their lower ends to the 2 x 6 plate over the door near its center, and a pair of rafters set up on the plates with their seats directly over the 4 x 4 hanging posts for the garage doors. The 1 x 6 pieces of the hanging truss are also nailed to these rafters, and the meeting point connected with the center of the 2 x 6 plate by means of an inch piece nailed to both. The truss thus produced is one of great strength and rigidity, as is shown by the fact that after having stood nine months it has not even settled a fraction of an inch.

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Legal Department



Is Contractor Entitled to Extra Compensation on Change in Measurements?

From E. E. G., Pennsylvania—After contract for the erection of building was signed, and material ordered for the job, including structural steel, the architect increased the width of building 9 in., which caused one-half the beams to be too short. Before getting out the material, shop drawings of first and second floor steel were submitted by the people who are furnishing the same, and approved by the architect. Not until the basement walls were practically ready to receive steel, and first floor materials were most on the job did he change the measurements. Now the contractor asks to be reimbursed for the extra cost of beams, walls, floors, etc., and the architect insists there can be no allowance since the over-all dimension on basement plan is shown questioned, and note calling for verification of all measurements. Under the circumstances is not the contractor entitled to a reasonable extra?

Answer—I am of the opinion that the contractor is entitled to extra compensation. It seems to be clear that the notations on the basement plan merely required verification of dimensions as provided for under the original plans. So far as the change in measurements, made after the contract was signed and after the contractor had ordered materials conforming to the contract plans, involved necessary additional expense, he is entitled to an allowance as for extras. Any allowance in this respect must, however, be governed by any pertinent provisions in the original contract relating to extra work.

Is this Architect Entitled to Compensation?

From W. C., Colorado—In 1910 the congregation Oheb Zadek was organized and soon thereafter I was commissioned to prepare preliminary plans for the new synagogue. Various projects were considered, but because of financial reasons none was carried out. In January, 1919, the chairman of the building committee called me in conference with him, and, at his request, I furnished plans sufficient to obtain bids. The plans were finished Feb. 28, and were revised early in March as to choir and aisle arrangement, at the chairman's request. The chairman approved the plans before the blueprints were made. The specifications then being prepared, bids amounting to about $36,000 were received. In submitting these bids I told the chairman that I stood ready to assist in saving $1,000 or more on the work. He replied that he would submit to his committee and leave matters to its decision. Afterward I furnished the chairman with additional blueprints and specifications at his request. But, without consulting me, new bids were received and contract was awarded some time between March and June. The cornerstone was laid Aug. 3. I visited the work Aug. 6 and was told by the contractor that the structure was to cost $18,000, including heating and plumbing, and that they were proceeding without an architect to save his cost and builder's profits. Meantime I had visited the implement shed and tool house and found a pencil outline of elevations and a blueprint of floor plans, which were a copy from the original plans I had made. Now the question is: To what extent is the committee or the congregation obligated to me, seeing they have used my plans? We have no contract, but I am of the opinion that the schedule of fees as formulated by the American Institute of Architects is proper, and can and will be sustained by the courts. On what base shall I submit my bill—on the figures obtained, or on the contract price as acknowledged unknowingly by the building contractor?

If you are bothered by any point of building law, write to our Legal Adviser, A. L. H. Street, LL. B., who is retained for the benefit of subscribers to Building Age, and is at your service.

Answer—Your query resolves itself into three important questions: (1) Are you entitled to any compensation at all? (2) If so, against whom? (3) How are your services to be valued?

1, 2. The first and second questions are the most difficult, because your rights must depend upon an agreement, express or implied, to pay you, and you seem to concede that there was no express contract. If the congregation employed you in 1910, or authorized your employment through its building committee, you were entitled to be paid reasonable compensation for the services. The only bar to recovery then was any mutual understanding that you were not to be paid unless the project should be carried out. But I am afraid that your right to recover for that service was outlawed under Colorado's statute of limitations, which fixes six years from the maturity of a debt as the time within which suit must be brought on it.

As to services rendered in 1919 on revival of the project, you do not state enough facts, in my opinion, to entitle you to recover, against any particular party, although there may be undisclosed circumstances which will alter the case.

In the first place, it is likely that you have a valid claim against the congregation as an incorporated or unincorporated body. Neither the building committee nor any of its individual members is liable, unless the person or persons to be held, held themselves out to you as possessing greater authority to contract on behalf of the committee or congregation than he or they actually possessed. Ordinarily an agent (and the commit-

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tee was the congregation's agent) is not liable personally on obligations incurred on the principal's behalf. Unless the chairman or the committee exceeded his or its authority in dealing with you, neither is liable to you; it being understood, I assume, that you understood that the congregation was the principal in the transaction.

Your right to hold the congregation liable depends upon your being able to prove to the satisfaction of a judge or jury that the congregation either authorized the committee or the chairman of the committee to retain an architect to do the work you did, or that the congregation ratified the securing of your services. (Ratification of an agent's unauthorized act is as binding on the principal as if expressed authority had been conferred.) It is not necessary that the congregation have expressly empowered the committee to retain an architect; in a case of this kind, I believe that the conferring on the committee of general powers to proceed with the erection of the building would be held by any court to imply authority to retain an architect to prepare plans and specifications, if not to supervise construction of the structure.

But your dealings with the chairman alone will not sustain recovery against the congregation. You must show that his dealings with you were authorized or ratified by the congregation, or by the committee, acting under authority from the congregation. To establish authority given by the congregation you must resort to the proceedings of that body, and to show authority in the chairman from the committee you must resort to the proceedings of the committee. In the eyes of the law, you were bound to know or ascertain the extent of the chairman's authority to act for the committee, and of the committee's power to act for the congregation.

But, as intimated above, if you can prove that, although your employment was not properly authorized, it was ratified by the congregation, or by the committee acting under power from the congregation, you are entitled to recover against the congregation. Use of your plans knowingly by the committee or the congregation would make out a plain case of ratification.

Should it appear that the congregation never expressly or inferentially authorized use of your work, your only redress must be against the person or persons who did make such use of them, on the theory of a species of fraud practiced against you.

If suit should be brought on this claim, I should be inclined to advise joining the congregation, the committee and the chairman as parties defendant. In this way judgment may be obtained against the congregation on the proof showing an employment authorized or ratified by the congregation, directly or through its committee, or against any person or persons individually who may be shown to have acted unauthorizedly, on the congregation exonerating itself from liability on the ground that it never authorized or ratified use of your work. I do not doubt your right to recover against some one, but against whom depends upon the considerations above stated.

3. On your establishing liability to pay for your services I believe that the measure of your compensation is to be found in the charges usually made by architects in your city for similar services, and not in the schedule of fees fixed by the American Institute of Architects, unless you can show that the party to be held knew of this last mentioned schedule. (Of course, it may well be that the schedule of charges in your city may coincide with the Institute's schedule.) When there is an employment without agreement as to the rate of compensation, the law raises an implied promise to pay what is usually paid for the same kind of services in the same community. Schedules fixed by trade or professional associations are not binding upon persons who do not know of them, and are not in such position that they may be expected to have contracted with reference to them. Architects may be held to know of such schedules as that of the Institute, but laymen are not bound by them unless they contract in special contemplation of them. I am of the opinion that a judge hearing your case would measure your compensation on the basis of what the average architect in your city would charge for the kind of service you rendered.

Since it is only equitable that you should be paid the fair value of your services, I should not hesitate to place my claim in the hands of an attorney for enforcement, if I were in your situation. Almost any judge or jury is apt to resolve all disputed questions of fact —such as those touching the actual powers conferred on the building committee and its chairman—in your favor.

In conclusion, we suggest that the observations of this article point to three precautions architects should take in accepting employment in cases of this kind: (1) See that a definite written contract of employment is entered into. (2) Be sure that persons or committees acting in representative capacity are acting well within the authority conferred upon them. (3) Insist upon an express stipulation as to the rate of compensation to be paid.

When Can Surety Be Sued Directly?

That a material man may bring suit directly against the surety on a contractor's bond when the contract between the owner and the contractor provides that the contractor is to faithfully perform all the conditions of his contract and that he shall pay for all the materials which he will use in the building was the decision in another recent case.

A building contractor entered into a contract to construct a building and gave a bond for the faithful performance of his contract. A material man who had furnished material to the contractor, which was used in constructing the building, brought suit against the surety on the contractor's bond to recover the value of the material furnished. It was decided that the contractor's bond contained an agreement for the benefit of the material man, and under such circumstances the latter could sue the surety direct.

When Mortgagor Is in Possession of Property, Can Lien Be Enforced Lien?

It was recently decided in the Supreme Court of Alabama that when a mortgagor is in possession of property, he is the owner of the premises in such a sense that he can contract for improvements to it. As a result, mechanics or material men may acquire a lien for improvements to the premises, which may be enforced against the interests of both the mortgagor and mortgagee.

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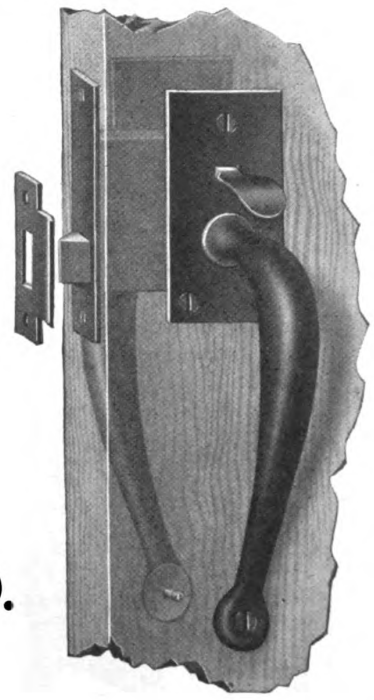



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Improved Contract Forms Needed

Engineers, Architects and Contractors Join in Preparation of Standard Documents

CONTRACT forms generally accepted as standard are greatly needed at the present time in order to stabilize prices in letting and carrying on construction work. Not only must these forms be absolutely fair in fact, but they must be recognized as such, and brought into general use if their full value is to be gained.

For these reasons, engineers and architects as well as contracts are expressing much interest in the work being done by the Committee on Contracts of the A. G. C., which intends later to present definite recommendations to the Association concerning contract forms.

The results of this study would then be placed before the technical societies for suggestions and approval. J. Edwin Hopkins, of the McCormick Co., Inc., architects and engineers, in a letter to the Associated General Contractors of America, states in part:

"This organization has been accustomed to using the uniform contract as originally adopted by the National Association of Builders and the American Institute of Architects, but since the status of this contract has been superseded in may states and cases by the documents of the American Institute of Architects, we have attempted to use these documents.

"Please understand that I consider the documents of the American Institute of Architects an admirable medium governing the procedure of building operations and have used them in a number of cases, but to be frank with you, I find that when these forms are submitted to contractors in the smaller cities and towns throughout the country, they invariably are skeptical and take exception to these documents, preferring to use their own local forms which in instances such as ours can hardly apply intelligently. For this reason, I am exceedingly interested in the consideration that your Committee on Contracts is giving to this matter, for undoubtedly you can strike a happy medium and possibly in a briefer form, which would eliminate any feeling of doubt or suspicion in the preliminary procedure of a building operation.

"I write you at length because of certain unfortunate experiences which have occurred in my activities for this company in the states of Michigan, Georgia, Rhode Island, Kentucky, New York, and Maine where both the owner and contractor have materially been affected by a lack of mutual understanding as to the proper contract to govern their building operations.

"This organization has always adopted the attitude that the owner and contractor stand on the same level and in our handling any work we show absolutely no partiality to either the one or the other, and in cases where we find an attempt on the part of the owner to take advantage of the contractor, we protect the contractor, and vice versa.

"You make mention of cost plus contracts which during the present time seem to be finding favor amongst general contractors. We have been compelled to use such contracts, but in doing so, we prefer to include either a participation clause or profit sharing clause, the idea of which is to offer an incentive to all parties concerned to give closer co-operation on the work.

"In other words, and under present day conditions, we find that if a contract is entered into between owner and contractor on the basis of a conscientious guarantee price, plus the contractor's legitimate percentage of profit, a further beneficial step is to state in the contract that if the total cost of the work exceeds such guarantee price, the contractor is to share the loss or excess with the owner on any basis that is mutually agreed upon, whether it be half and half, one-third and two-thirds, or some other division.

"In like manner any saving that can be effected which would nominally be a profit would be shared between the contractor and the owner on the same basis."

National Federation of Construction Industries

The first annual meeting of the above organization will take place at the Hotel Sherman, Chicago, on March 24-25. Builders, architects, manufacturers of building materials, and all those interested in any aspect of construction are invited to attend. The building industry is composed of a large number of divisions of activity which until recently have been regarded as separate and independent. To secure a better inter-relation is one of the chief purposes of the organization, and a large attendance is desired. Further information may be secured by addressing John C. Frazee, executive secretary, Drexel Building, Philadelphia.

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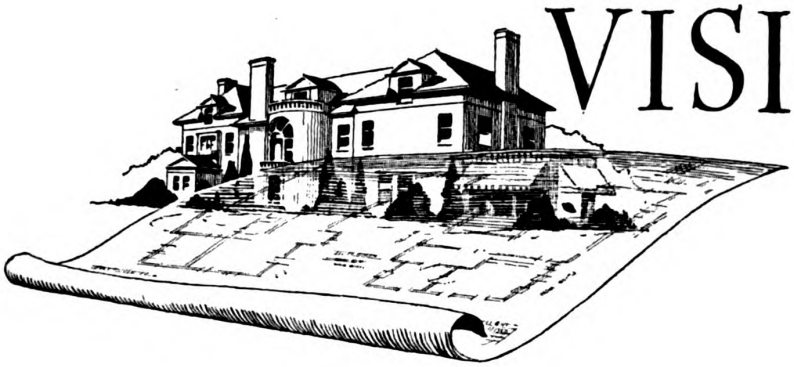
Architectural VISION



THE ability to see beyond the plan and to select those materials which will add both beauty and durability to the finished edifice—that is Architectural Vision.

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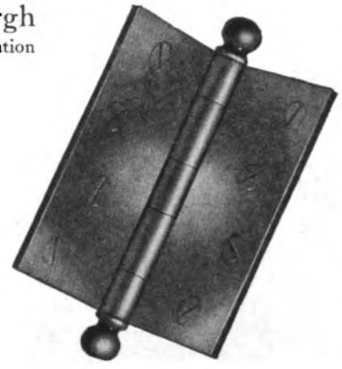

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New Books

Notes of Recently Published Books of Interest to Builders and Those Engaged in Allied Trades

Blueprinting

By JOHN F. FRIESE

Architects or builders located in the smaller towns very often have blueprint facilities that are decidedly not of the best, and either must put up with them or send the work to some nearby city, thus incurring delays that are often vexatious. The only alternative to this condition is to do the blueprinting one's self.

Judging from the many requests coming into the office of BUILDING AGE asking for information on this subject, there is a very real need for a book on the subject of blueprinting. The book under review will be of much assistance to those in need of information, for it covers the subject in a very complete and practical manner.

A chapter is devoted to equipment necessary for blueprinting, and its proper arrangement is outlined. A chapter is also devoted to blueprint papers, telling just how the best results may be obtained, both in purchasing and in making one's own paper. The chapter on the making of blueprints will prove of special interest, for it covers many of the points that are constantly coming up. A separate chapter is devoted to special prints, such as black line prints, vandyke negatives, blue-line prints, etc.

The book contains 56 pages, size 5 x 7¼ inches, is illustrated by drawings showing equipment, fully indexed, and is published by the Manual Arts Press.

The Practical Book of Interior Decoration

By EBERLIN, McCLURE & HOLLOWAY

The moderate cost house of to-day is, as it comes fresh from the hands of the architect and builder, merely an unfurnished product which depends for its final attractiveness on the way in which it is furnished. The owner himself is the one who generally chooses the furniture, hangings, rugs, etc., for the services of a professional decorator are seldom employed in smaller houses. And only too often does the house fail to put its best foot forward, due to a poor choice of the period of furniture, improper mixing of styles, unbalanced placing of furniture, pictures, etc.

And not only in these things is the average small house lacking, but also in the artistic decoration of the bare interior. Good effects may be gained as inexpensively as poor ones, and it is necessary for the owner who often plans most of his house to be able to interpret his desires artistically, if only that he may better respect the advice of his architect.

The book under review gives some very practical and valuable information concerning interior decoration and is of interest not only to professional decorators, but also to home owners and architects or builders who must be prepared to give sound advice when it is requested.

Perhaps the most valuable part of the book is that dealing with the correct assembling of the various types. The authors recognize that styles may be well combined and interest enhanced by a harmonious variety of treatment. How this may be done is clearly explained, the principles elucidated being pictured by 150 illustrations of authentic period furniture and interiors.

One of the most practical features of the book is the constructive nature of many of the criticisms of arrangement of furniture and pictures. One illustration, for instance, will be presented with some fault in it, the fault will be pointed out, and another illustration will show it corrected.

The first part of the book is devoted to historic period decoration in England, Italy, Spain and France. Here the decorations and furniture of various periods are fully illustrated and described.

A section is devoted to practical furnishing of to-day, ample space being given to simple cottages and apartments as well as to more expensive houses. Floors and floor coverings, lighting, window hangings, etc., are all touched on in a way that will clear up the subject for many. Not only will those about to build be interested, but also those who already own a home and desire to make it present a better appearance.

The book is 6½ x 9 inches, contains 451 pages, has 300 illustrations of interiors and furniture, 7 colored plates, and is fully indexed. Published by J. B. Lippincott Co., Philadelphia, Pa.

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New Catalogs of Interest to the Trade

42. Book of Interiors. North Carolina Pine Association, Norfolk, Va.—Gives attractive photographs of interiors where North Carolina pine was used.

43. Bulletins 10 and 77. American Saw Mill Machinery Company, Hackettstown, N. J.—Describe "American" Variety Woodworker furnished with built-in gasoline engine, self-contained electric motor or for belt drive and "American" No. 4 Hoist with self-contained gasoline engine; also furnished with electric motor or for belt drive.

44. Empire Pipeless. Co-Operative Foundry Company, Rochester, N. Y.—Booklet describing this pipeless furnace which burns any fuel.

45. "Swan" Tools. The James Swan Company, Seymour, Conn.—Booklet describing mechanics' tools manufactured by this company.

46. The Taylor Clamps. James L. Taylor Mfg. Company, Poughkeepsie, N. Y.—Catalog describing clamps manufactured by this company.

47. The Most Enduring and Attractive Roof at the Most Reasonable Cost. F. C. Sheldon Slate Company, Granville, N. Y.—Booklet giving interesting facts for the man about to have a new roof put on or an old one repaired.

48. Walter's and Cooper's Metal Shingles. National Sheet Metal Roofing Company, Jersey City, N. J.—Literature describing these shingles, which are made in painted tin or genuine re-dipped galvanized tin. Samples given.

49. Forstner Bits. The Progressive Mfg. Company, Torrington, Conn.—Literature describing tools manufactured by this company.

50. Improved Circular Sawing Machine. R. E. Kidder Co., Worcester, Mass.—Circular describing this machine in detail.

51. Weather Vanes and Flag Pole Balls. E. G. Washburne & Company, New York City.—Catalogue describing different sizes and designs of weather vanes; also describes rotary exhaust ventilators manufactured by this company.

52. Monash No. 6 Four-Way-Drain Automatic Air Valve. Monash-Younker Company, New York City.—Literature describing this valve in detail.

53. Highwood Dumbwaiters. Highwood Dumbwaiter Co., Leonia, N. J.—Catalog describing these dumbwaiters, which come ready to install.

54. Concrete in Architecture and Engineering. Portland Cement Association, 111 West Washington St., Chicago, Ill.—December-January issue contains interesting article on "Strength of Concrete Buildings." Also contains article on an industrial housing project in which concrete is used.

55. Moulding Knives. The Parks Ball Bearing Machine Company, Cincinnati, Ohio.—Describes knives suitable for making various types of mouldings, these mouldings being illustrated, and underneath the kind of knives suitable for them are listed.

56. Troy Slow Speed Trailers for Use with Tractors. Troy Wagon Works Company, Troy, Ohio.—Folder describing wagon bodies used by contractors who possess tractors.

57. Ohio Five Foot Batch Concrete Mixers. The Parks Ball Bearing Machine Company, Cincinnati, Ohio.—Folder illustrating this mixer equipped with loading platform with power side loader or equipped for hand operation.

58. Parks Wood Working Machine. The Parks Ball Bearing Machine Company, Cincinnati, Ohio.—Booklet illustrating and describing various kinds of wood working machines manufactured by this company, such as rip and cross cut saws, mortising and tenoning machines, combination machines of various types, portable saw rigs, etc.

59. Concrete Work in Winter Time. Alpha Portland Cement Company, Easton, Pa.—No. 19 of Alpha Aids gives valuable information on using concrete in the winter time. Contains outline specification and blueprint of concrete flower box and garden seat; article on a home-built concrete forge, concrete flower pots, posts, etc. Also contains an article on accounting that shows costs and profits.

60. The Shinn System of Lightning Prevention. W. C. Shinn Mfg. Company, 53 W. Jackson Blvd., Chicago, Ill.—Catalog illustrating and describing various ways in which houses and commercial buildings may be protected by lightning rods. Weather vanes, etc., are illustrated. Pictures of numerous installations are given.

61. The Carter Times. November issue. Carter White Lead Company, West Pullman St., Chicago, Ill.—House organ giving valuable information concerning methods of mixing paint, the highlight oil-color method of wall decoration, painting plaster walls, the use of thinners, finishing radiators, etc. A number of questions and answers on common problems in the trade are given.

62. Specifications and Directions. How to Use the Murphy Bed. Murphy Door Bed Company, 22 West Monroe St., Chicago, Ill.—Illustrated folder giving typical installations of these built-in beds, with section showing construction. Specification sheets included. Eleven plans of bungalows equipped with Murphy beds are given.

63. Contractor's Atlas. The Atlas Portland Cement Company, New York City.—December issue contains some interesting data on concrete form spacers, foundation costs cut by new concrete piling system, etc.

64. Better Cabinet Work Which Lowers Your Costs. Curtis Service Bureau, Clinton, Iowa.—Folder illustrating and describing cabinet work, which comes all ready for installation.

65. Highway Trailer. Highway Trailer Company, Edgerton, Wis.—Describes the fifth wheel trailer for use by contractors, lumber dealers, etc., with comparative operative cost of a 2-ton truck versus a 6-ton fifth wheel trailer.

66. Appleton Gasoline and Kerosene Engines. Appleton Mfg. Company, Batavia, Ill.—Booklet illustrating and describing these engines for contractors' use.

67. How to Figure What Your Truck Can Do. The Troy Wagon Works Company, Troy, Ohio.—Booklet giving cost data on trucks, trailers, etc., together with weights of various kinds of materials, etc.

68. Scientific Illumination for Schools. Holophane Glass Company, 340 Madison Ave., New York City.—Booklet illustrating the Holophane system of lighting for schools, with plans showing lighting projects where fixtures are used in various ways.

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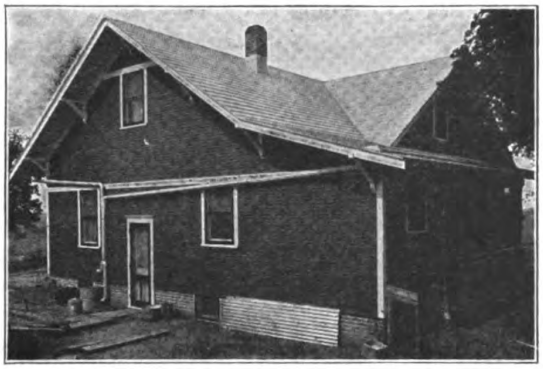

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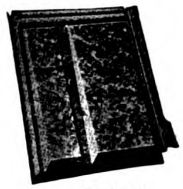

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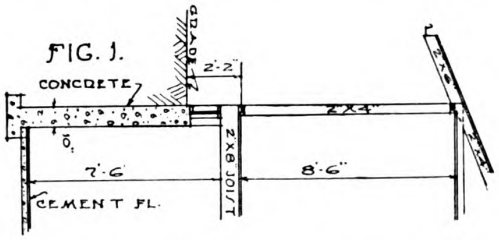
Underpinning Bungalow Walls

From C. C., Penn.—I am about to erect a bungalow in accordance with plans and specifications furnished. The specifications call for 2x4 in. underpinning for outside walls. Is this placed on the foundation walls and the joists placed on it? Section and elevation given in figures 1 and 2 are as shown on plans.

Answer.—A sill piece may be laid directly on



top of the foundation walls and anchored thereto by bolts left in the concrete. The studding can then be started on this. Since the plans show the foundation walls built only to the grade level,

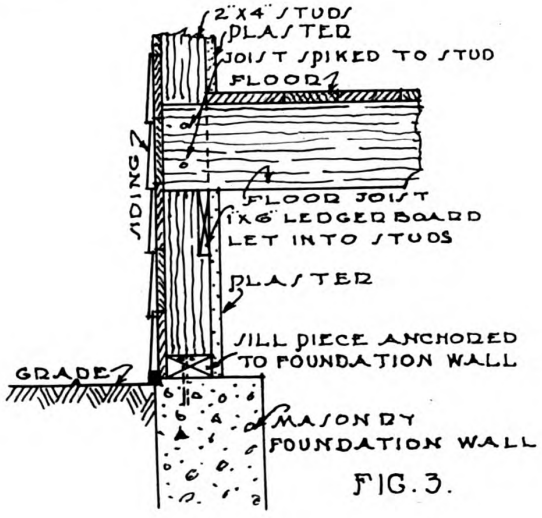


FIG. 3.

and the first floor level is 2 ft. 2 in. above grade, a 1x6 in. ledger board should be let into the inside face of the studs at the proper level and the first floor beams placed on this. They should be well

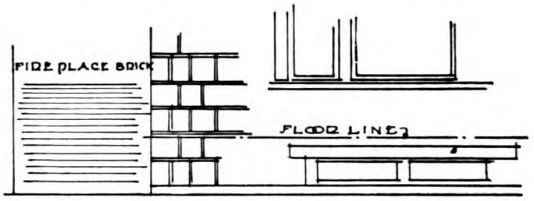


FIG. 2

spiked to the studs as well. This construction is shown in Fig. 3.

It would be more advisable, however, to bring

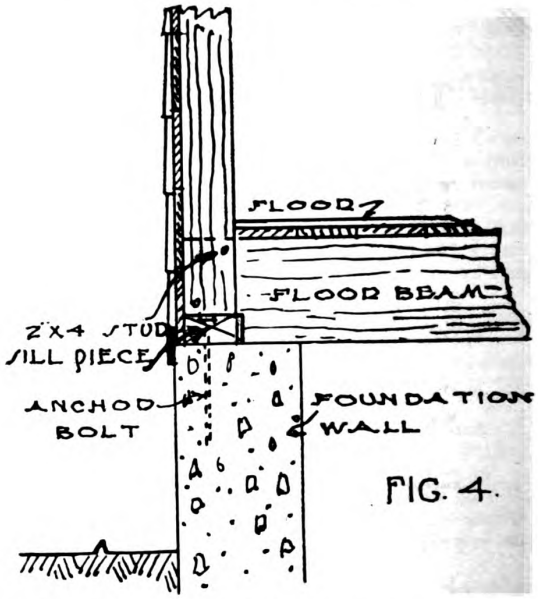


FIG. 4.

the foundation walls higher—at least to the level of the floor joists as shown in Fig. 4.

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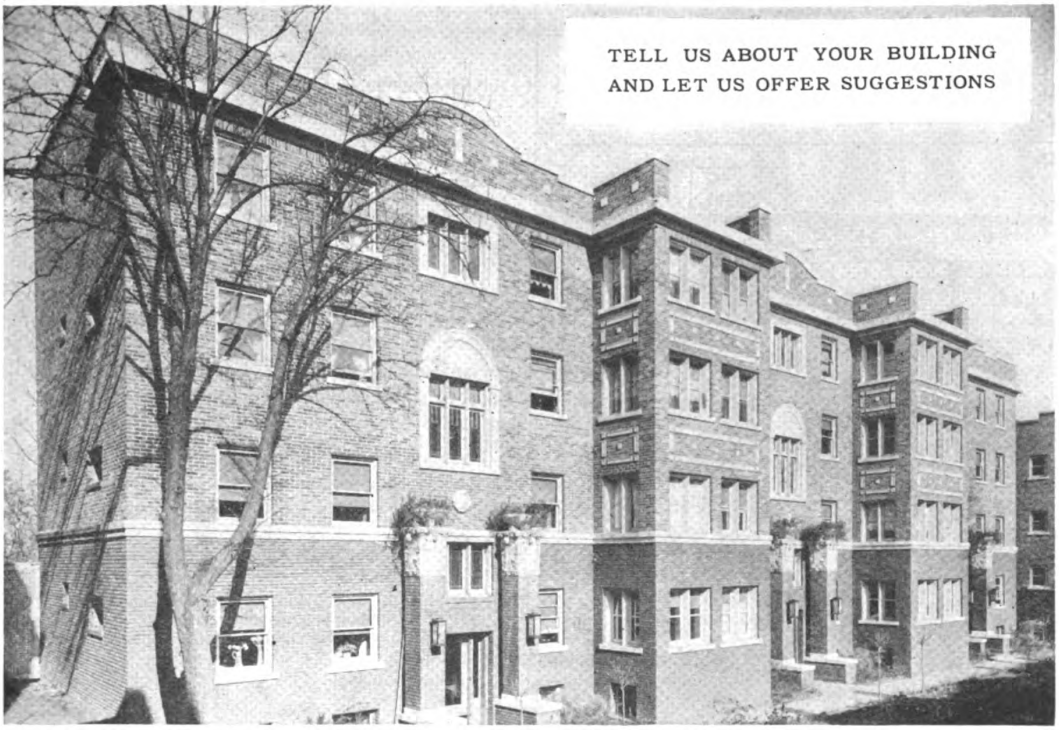
MURPHY IN-A-DOR BEDS



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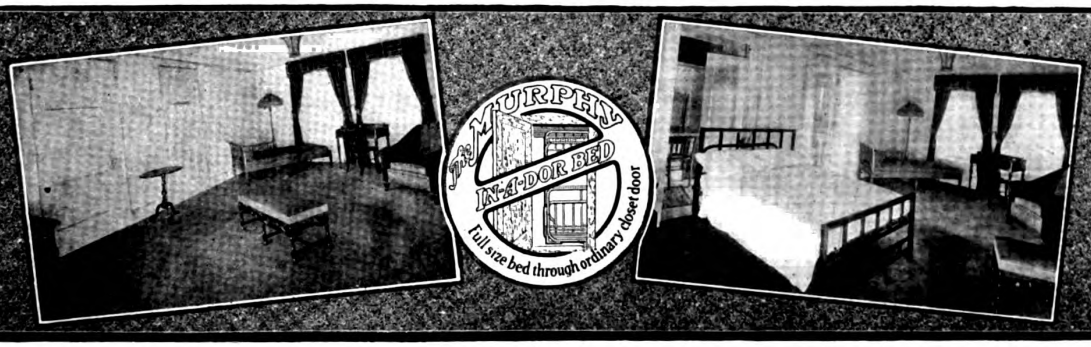

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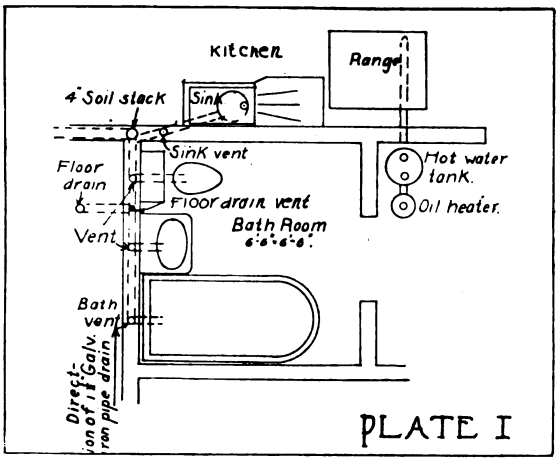
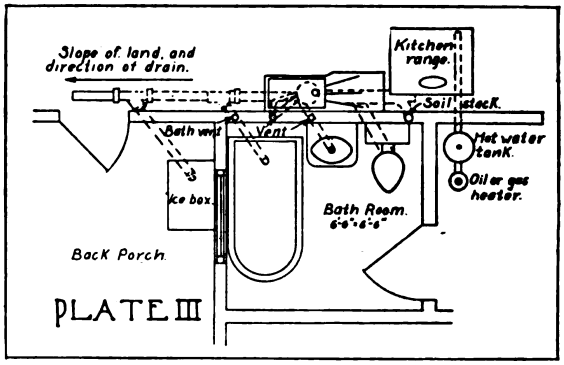
Arrangement of Bath-room Fixtures

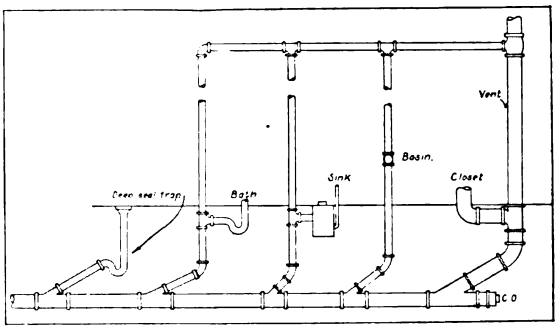
From A. S. R., Neb.—I am enclosing herewith three drawings of my ideas of arranging a bath-room's fixtures coupled up with a kitchen sink and a floor drain. This is for a one-story four-room suburban cottage where no plumbing is to be attached other than that mentioned. The cottage is to be located on a plot of almost level river bottom land where river water rises to



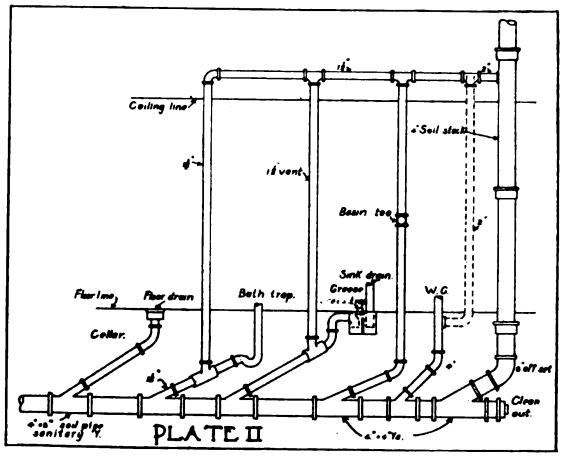
within 3 or 4 ft. from the surface in a sandy subsoil. The drain will, therefore, need to "head" as high beneath the floor as possible. Your September "Economical Designs" (pages 286, 287) seem to illustrate a section of a plumbing system where fixtures are connected both above and below. My illustrations are for a one-story cottage only.



I am seeking advice and good suggestions. The drawings which I submit are of two plumbing designs. In Plate I, I have tried to show work corresponding with your recommended design as given on page 287, September Building Age. With this design I will have to have a right angle bend centering at the soil stack, with the 4 in. main drain and the 1½ in. galvanized



ALTERNATE ARRANGEMENT AS SUGGESTED



iron drain as wings. I am wondering whether that will be all right. I plan also to connect the kitchen sink and a floor drain (for the ice box and floor moppings) to this system, using but the one soil stack and the one 4-inch main drain, all draining through one pipe into one septic tank system.

Plate No. II and Plate No. III are to illustrate one design. These are my studious developments of former ideas. I would like to have you give me some pointers upon them all and so your kind consideration is solicited.

In Plate No. II the vent pipe from the W. C. is only dotted in as I had thought to omit this, inasmuch as there is no other fixture between the W. C. and the main soil stack. Also I thought

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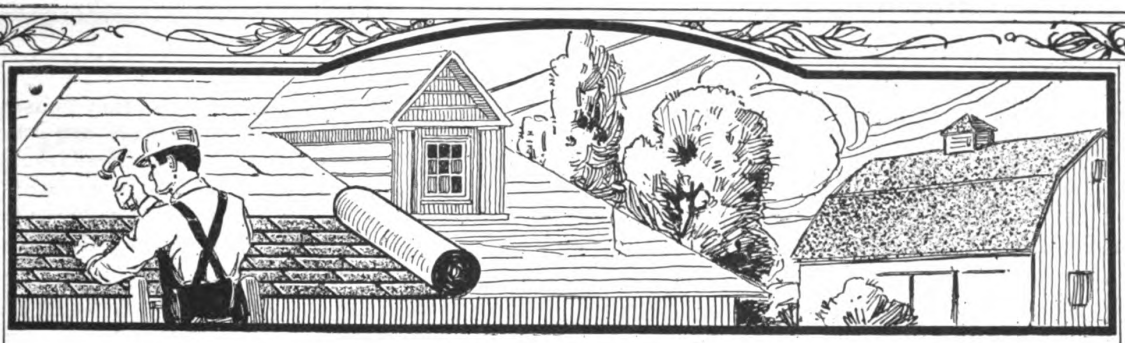

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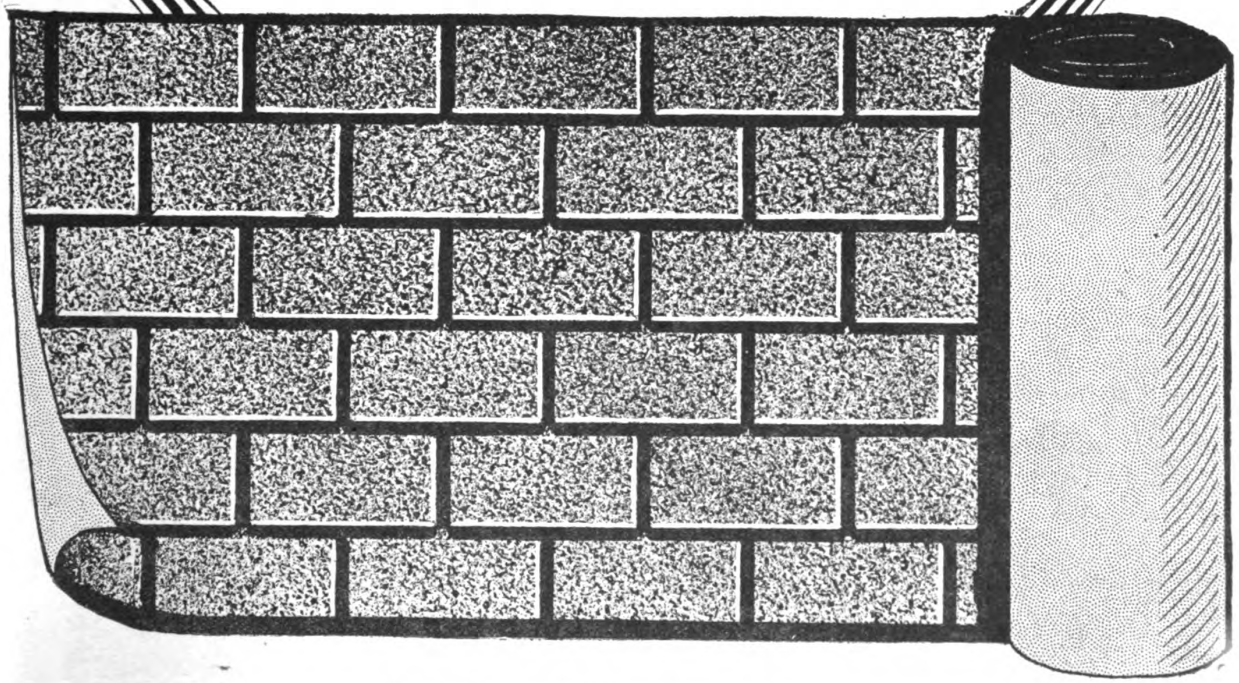

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to omit a floor drain vent pipe as this drain is outdoors on the back porch. However, my ideas are changing daily, and I am indeed glad to secure your article in the September Building Age. It goes into such careful detail that it is a most valuable help. It alone is worth the subscription price.

Answer.—The arrangement of the bathroom shown in Plate I is not so good as that in Plate III, although the connections to the soil pipe are all right. It would be easy enough to connect the water closet into the vertical soil and vent stack and the sink into a Y branch on the horizontal line. The alternative suggested in Plates II and III would require a little more cast iron soil pipe but the job would be better.

An accompanying drawing shows how this plan could be improved. It is well, when using any simple form of venting, to follow the continuous plan as closely as possible and it is better to enter all branches on the vertical rather than on the horizontal lines. There is less opportunity for grease and lint to lodge in the vent pipe if this is done and even when a heavy discharge is made into the waste lines the air will follow the body of water quicker or be relieved more easily in front of the discharge when the branch is made into the vertical line. The suggested improvements on the original plan show the bath and grease traps entering through drainage tee Y's on the vertical waste and vent lines and the closet branch connecting into the main vent stack.

If it is possible to do this with the cellar space available better results will be obtained with very little increase in cost. In regard to the floor drain, a deep seal trap or a properly designed floor drain trap should be used. If a deep seal trap is used there will be very little chance of its being siphoned, entering as it does on a horizontal line and if, as is indicated, there is no main or house trap there should be equally little chance of the seal being forced by air pressure in front of a discharge from the fixtures.

The closet trap is well enough vented either when connected as in Plate II or in the manner shown in the alternative plan submitted. It is common practice to allow the last fixture on a line, where the main stack is carried through the roof, to discharge as indicated without a special back vent pipe and, even if another fixture had entered the line beyond this closet, it is unlikely that the seal of the closet trap ever would be affected either by siphonage or pressure. But if local ordinances call for back vents, they must be installed. In order to protect users against ignorant application of such departures from regular practice, it now and again appears as if venting were carried to foolish extremes, but "when in doubt, vent" is a safe maxim to follow.

A Plaster Specification

From A. E. L., Anacortes, Wash.—I am writing for your approval on a plaster specification I have from an architect. The building to be plastered is a lodge hall. The following is the specification:

Brown coat to be three-eighth inch thick over lath, made of fresh lime, coarse sand, good long hair and water in proportion 14 pounds of hair to each barrel of lime used, all well clinched and floated down to be dry before white coat is put on. Second coat or hard finish to be of the best stucco and lime to secure a first class job, put on smooth and trowelled to a hard finish.

Above is an exact copy of specifications. I would like your opinion on same. Is stucco a certain kind of plaster? I aways called outside plaster of any kind stucco.

Answer.—It is assumed that this is being put on over wood lath, and in this case the work should have three coats to secure proper results.

The thickness of the brown coat specified is O. K., and this should be mixed as follows:—One barrel of lump lime to 5 barrels of sand, with binder in the proportion of 1 pound of hair or fiber to 100 pounds of lump lime; or the following proportions may be easier to follow:—To 500 pounds unslaked lime add 1 cubic yard of screened sharp sand and 3 pounds of hair.

The specification of the finish coat given is rather vague, as there is no brand of plaster by the name of stucco, this latter term simply applying to a mixture of cement and sand applied for exterior work. It may be that the architect intends this term to apply to some form of bagged stucco plaster. The finish coat should be as follows:

(a.) The hard finish coat shall be the best quality of prepared finish or well slaked lime putty gauged with plaster of paris, or plaster of paris with marble dust or white sand in combination.

(b.) The mix shall be proportioned as follows: To one part of plaster add two parts of white mortar.

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Johnson's Perfectone Undercoat works easily under the brush and can be flowed on and brushed out free from brush marks. Dries hard with a smooth, velvety sheen—requires very little sanding.

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Johnson's Perfectone Enamel is made in Satine and High Gloss. We recommend the use of the Satine everywhere except in kitchens and bath rooms where a High Gloss may be desired. Johnson's Perfectone Enamel Satine has just enough gloss and not a bit too much. It gives a beautiful, artistic, hand-rubbed effect without the expense of rubbing, but it may be rubbed if desired. Johnson's Perfectone Enamel is elastic and durable. It stands repeated washing with soap and water.

We are glad to furnish painters and contractors with beautifully finished wood panels. Do not besitate to bring your wood finishing problems to us.

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Late Quotations in Building Material Markets

Price quotations now current on building materials and supplies as quoted by dealers and jobbers for delivery in New York City, Chicago, San Francisco, Seattle and Birmingham follow. The quotations set forth are placed before readers of BUILDING AGE *to afford an accurate review of market conditions, rather than for use as a basis for actual purchase. They will not only provide knowledge of the exact state of the market as to items quoted but will also present a basis to judge conditions as affecting correlating materials.)*

	New York	Chicago	San Francisco	Seattle	Birmingham
BRICK					
Common	$30.45	$14.00	$15.00	$18.00	$28.00
Face brick	55.00 to 60.00	30.00 to 40.00	46.50	23.00	45.00
BURNED CLAY (Delivered on Job)					
Block partition:					
3 in., per sq. ft.	0.13	0.10	.....	0.10½	.....
4 in., per sq. ft.	0.15	0.11	.....	0.10	.....
Wall coping (single slant):					
8 in., per lin. ft.	0.16	0.18	.....	.....	0.14
12 in., per ft.	0.26½	0.27	.....	.....	0.19
18 in., per ft.	0.54	0.54	.....	.....	0.31
(Corners and angles four times the price of one foot of coping the same size.)					
CEMENT					
Per bbl. in 15-cent bags (rebate 60 cents per bbl. for bags)	3.40	3.25	3.63	$4.25	4.50
FINISHED IRON AND STEEL (Mill Shipments)					
Bar iron, refined grade	.....	.....	.....	.....	.....
Bar iron, double refined	.....	.....	.....	.....	.....
Soft Steel bars	2.62 to 4.27	.....	.....	.....	3.50
Shapes	2.72 to 2.82	.....	.....	.....	.....
GLASS (Discounts from Manufacturer's Price Lists)					
Single strength, A quality, first three brackets	75%	77%	.....	.....	.....
Single strength, B quality	75%	77%	.....	83%	.....
Double strength, A quality	77%	79%	.....	83%	4.09
Double strength, B quality	79%	79%	.....	.....	.....
GYPSUM					
Plaster Board:					
27x28x1	.....	.....	.....	0.36	.....
27x48x ½	0.45	.....	.....	.....	.....
32x36x ¼	0.28	0.24	.....	.....	.....
32x36x ⅜	0.29	0.26	.....	0.36	.....
32x36x ½	0.35	.....	.....	.....	.....
Plaster blocks:					
2 in. solid, 12x30, per sq. ft.	0.13	0.12	.....	.....	.....
3 in. hollow, 12x30, per sq. ft.	0.13	0.12	.....	.....	.....
4 in. hollow, 12x30, per sq. ft.	0.14	0.13½	.....	.....	.....
6 in. hollow, 12x30, per sq. ft.	0.21¼	0.20	.....	.....	.....
HOLLOW TILE					
2x 8x12 partitions, per 1,000 sq. ft.	$98.80-$111.10	.....	75.00	.....	.....
3x12x12 partitions, per 1,000 sq. ft.	148.20-165.10	110.00	105.00	105.00	112.00
4x12x12 partitions, per 1,000 sq. ft.	166.70-185.70	118.00	113.00	120.00	126.00
6x12x12 partitions, per 1,000 sq. ft.	222.30-247.60	162.20	142.00	170.00	168.00
8x12x12 partitions, per 1,000 sq. ft.	.....	221.10	208.00	230.00	224.00
10x12x12 partitions, per 1,000 sq. ft.	.....	272.70	258.00	.....	.....
12x12x12 partitions, per 1,000 sq. ft.	.....	316.90	.....	.....	.....
2x12x12 split furring, per 1,000 sq. ft.	92.60-103.20	73.80	105.00	.....	.....
LATH					
Eastern spruce, per thousand	20.00	16.00 to 18.00	18.00	14.50	.....
No. 1 white pine, per thousand	18.00	16.00 to 18.00	20.00	.....	.....
No. 1 hemlock, per thousand	18.00	.....	18.00	.....	.....
No. 1 yellow pine, per thousand	18.00	16.00 to 18.00	18.00	.....	20.00
LIME					
Common, 200 lb. bbls., per bbl.	3.80	1.75	.....	2.85	2.50
Finishing, 300 lb. bbls., per bbl.	19.50	20.00	.....	3.25	2.50
Hydrated, in paper bags, per ton	4.00	.....	.....	25.00	2.50
LUMBER (Retail Prices per Thousand Delivered)					
Yellow pine, No. 1 boards, 1x6	80.00	95.00	.....	.....	120.00
Yellow pine, B, and better flooring (plain)	130.00	135.00	.....	.....	125.00
Douglas fir, 6x6 to 12x12	80.00	77.00	56.00 to 60.00	36.00	.....
Oak, quartered, 1 in., F. A. S.	325.00	370.00	430.00 to 530.00	.....	.....
Oak, plain, 1 in., F. A. S.	225.00	260.00	290.00 to 340.00	.....	.....
Oak flooring, ⅜ quartered, white	220.00	370.00	470.00	.....	.....
Maple, 1 in., F. A. S.	180.00	185.00	220.00 to 280.00	.....	.....
Maple flooring, ⅜ clear	175.00	370.00	225.00	.....	.....
Mahogany, 1 in., F. A. S.	.....	225.00	400.00 to 440.00	.....	.....
Spruce, 10 in.	85.00	80.00 to 140.00	96.00	.....	.....
Cypress, 1 in., F. A. S.	150.00	150.00	.....	.....	.....
METAL LATH					
Under 100 sq. yd., per sq. yd.	0.40	.....	.....	0.40	0.42

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The Hess Welded Steel Furnace

(PIPE OR PIPELESS)

A Good Income for the Contractor
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This is a direct-from-factory proposition with a liberal resale discount to the contractor.

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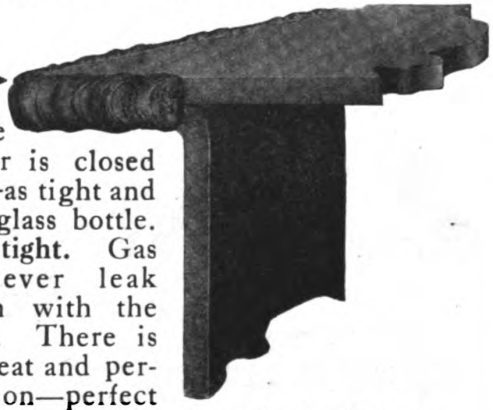
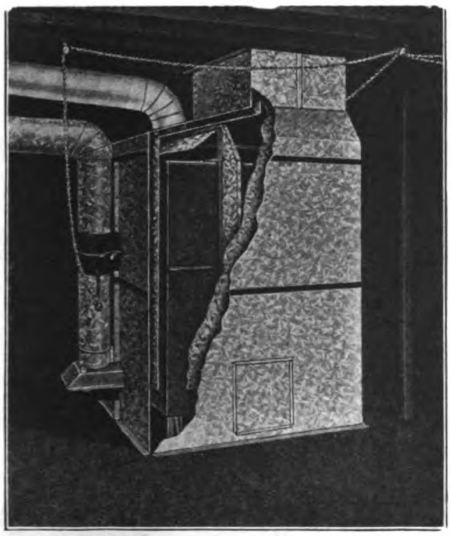
See That Welded Seam?→



That's the reason. Every seam in the whole radiator is closed just like that—as tight and smooth as a glass bottle. **Everlastingly tight.** Gas and dust never leak through, even with the cheapest fuel. There is always clean heat and perfect combustion—perfect because the large grate surfaces let in plenty of air and the heavy brick slabs superheat and burn the gases and smoke.

Installing is easy and our positive guarantee assures success. Write us to-day and get our free booklet on furnace heating, and send us your next plan for estimate.



The Hess Welded Steel Pipeless Furnace with robber pipe for detached room

Hess Warming & Ventilating Co.
1201 C Tacoma Bldg. CHICAGO, ILL.

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Late Quotations in Building Materials Markets—*Continued*

	New York	Chicago	San Francisco	Seattle	Birmingham
PIPE					
Cast iron:					
6 in. and heavier	$67.30	$72.80	.....	.....	$63.00
4 in.	70.30	75.80	.....	.....	.....
3 in.	.....	82.80	.....	.....	.....
(And $2 additional for Class A and gas pipe)					
(Discounts to jobbers for carload lots on the Pittsburgh basing card; freight rates from Pittsburgh to New York, and also from Pittsburgh to Chicago, in carloads, per 100 lbs., are 27c. An additional 5 per cent discount is allowed to large jobbing interests over those listed below.)					
	F. O. B. Pittsburgh	F. O. B. Chicago			
Wrought: BUTT WELD					
Steel:					
Black, ⅛ to 3 in.... 47 to 54 %		38 to 45%	.....	.....	4.05 net	.....
Galv., ⅛ to 3 in.... 20½ to 41½%		10.1 to 30.1%	.....	.....	6.10 net	.....
Iron:					
Black, ⅛ to 1½ in.. 29½ to 34½%		11.9 to 22.6%	.....	.....	.....	.....
Galv., ⅛ to 1½ in.. 2½ to 23½%		39.9 to 4.6%	.....	.....	.....	.....
LAP WELD					
Steel:					
Black, 2½ to 6 in.. 50 %		41.1%	.....	.....	.....	.....
Galv., 2½ to 6 in.. 37½%		27.1%	.....	.....	.....	.....
Iron.					
Black, 2½ to 6 in.. 34½%		18%	.....	.....	.....	.....
Galv., 2½ to 6 in..... 21½%		3.6%	.....	.....	.....	.....
PLASTER					
Neat wall cement in 15-cent bags, per ton	23.50	19.00	18.50 to 20.00	$22.50	24.00
Finishing plaster	25.00	19.50	19.50 to 21.00	24.00	24.00
Lath mortar, in cloth bags, per ton	16.50	.....	.....	.....	.....
RADIATION					
Discount from list on standard heights	45%	41 to 42	.....	.....	44.45
REINFORCING BARS					
High carbon steel from mill	48.50	.....	4.00	5.00	.....
Medium steel from mill	48.50	.....	4.00	5.00	4.00
ROOFING MATERIAL					
Tarred felt paper:					
No. 1—25 lbs. to 100 sq. ft., per ton	81.00	90.00	.....	per cwt. 2.50	.....
No. 2—16 lbs. to 100 sq. ft., per ton	81.25	90.00	.....	per cwt. 3.25	.....
No. 3—12 lbs. to 100 sq. ft. per ton	81.63	90.00	.....	per cwt. 3.35	.....
Rosin sized sheathing, per ton	75.00	.....	.....	cwt. 105.00	.....
Corrugated roofing, galvanized, 2½ in. corrugation, over flat sheets, per 100 lbs	0.30	.....	.....	.....	.....
SHINGLES					
Red cedar, 5 to 2, clear, per thousand	15.00	10.00	16.00	7.15	.....
White cedar, extra star, A star, per thousand	16.00	9.50	17.00	5.75	.....
SLATE ROOFING					
	F. O. B. Cars Quarry Station				
Pennsylvania:					
Best Bangor	$7.75 to $9.00	.....	.....	.....	.....	.....
No. 1 Bangor Ribbon	6.75 to 7.00	.....	.....	.....	.....	.....
Pen Argyl	6.50 to 7.25	.....	.....	.....	.....	.....
Peach Bottom	10.50 to 12.50	.....	.....	.....	.....	.....
No. 1 Chapman	6.25 to 7.25	.....	.....	.....	.....	.....
Vermont:						
No. 1 Sea Green	4.25 to 6.75	.....	.....	.....	.....	.....
Unfading Green	9.00 to 10.50	.....	.....	.....	.....	.....
Red	12.00 to 20.00	.....	.....	.....	.....	.....
Maine:						
Brownsville, U'f'g Black, No. 1	12.00	.....	.....	.....	.....	.....
Slaters' felt, 30 lb. roll	0.92	.....	.....	.....	.....	.....
Slaters' felt, 40 lb. roll	1.22	.....	.....	.....	.....	.....
STRUCTURAL STEEL					
Beams and channel, 3 to 15 in. per lb	3.47	3.47	4.75 to 5.00	4.70 to 5.00	0.05½
Beams and channel, over 15 in., per lb	3.57	3.57	.....	.....	0.05¼
Angles, 3 to 6 in	3.47	3.47	.....	4.10	0.05
Zees and tees	3.57	3.47 to 3.52	.....	.....	.....
Steel bars, half extras, from mill	.....	.....	4.90	4.00	4.25
STUCCO					
In cloth, per ton (white, mixed)	22.50	20.50	.....	.....	.....
STUCCO BOARD					
Medium weight stucco board, plain, per thousand sq. ft	42.50	65.00	.....	.....	60.00
Medium weight stucco board, creosoted, per thousand sq. ft	50.00	70.00	.....	.....	.....
Heavy weight stucco board, plain, per thousand sq. ft	55.00	75.00	.....	.....	.....
Heavy weight stucco board, creosoted, per thousand sq. ft	60.00	80.00	.....	.....	.....
Medium weight stucco board, plain, narrow key, per thousand sq. ft.	50.00	75.00	.....	.....	.....
Medium weight stucco board, narrow key, creosoted, per thousand sq. ft.	55.00	70.00	.....	.....	.....
Insulating board, heavy felt background, per thousand sq. ft.	50.00	70.00	.....	.....	.....
SHEATHING BOARD					
Heavy weight sheathing board, per thousand sq. ft	50.00	70.00	.....	.....	65.00
Medium weight sheathing board, per thousand sq. ft	46.00	63.00	.....	.....	.....
Stucco or plaster board, sheathing board and insulating board are in rolls containing one sheet 25 ft. long and 4 ft. wide (100 sq. ft.)					
WALL BOARD					
Wall board, shipped any length, 4 ft. wide, per thousand	45.00	50.00	.....	46.00	53.00
Packed flat in cars if ordered in less than car lots. Add $5.00 per thousand ft. for crating.					

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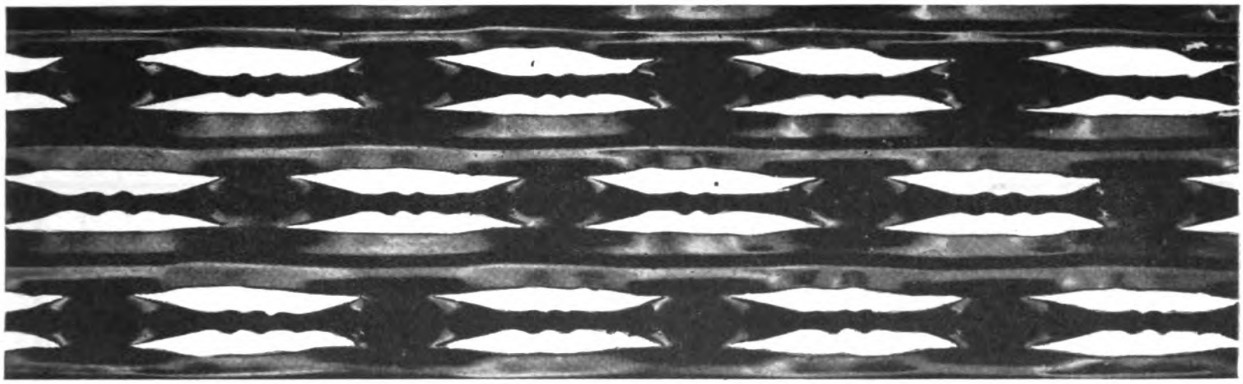

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Necessity has forced them to a comparison of lathing materials, and they find that Bostwick Truss-Loop, always superior to other plaster-backing because of its unique "steel truss and loop" construction—

(a) Gives faster erection
(b) Is Self-furring
(c) Requires the same amount of plaster
(d) Trowels faster—

and yet—cost practically the same as wood lath with none of wood lath failings.

Every item is a "cash" entry in favor of the contractor.

Faced by a building season of exceptional activity, the observing builder is getting ready to "cash-in" on the profit-making advantages of Bostwick Truss-Loop—and, *at the same time, he is going to build better homes.*

A pocket-size sample of Truss-Loop, cut from an actual section, together with complete data and exact form of specifications for use, will be mailed on request.

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BUILDING PRODUCTS

Ambler Asbestos Shingles (Century Brand). Made in 3 styles, 4 permanent colors: Newport grey, natural slate, red and green. Lie snug to the roof, forming water-tight and fire-tight covering.
Also ¼-inch mixed color shingles in seven shades of reds, browns and greys.

Ambler Asbestos Building Lumber. For siding, partitions, fire doors and wherever fire resistance is essential.

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Send for samples and Literature showing reproduction of installations.

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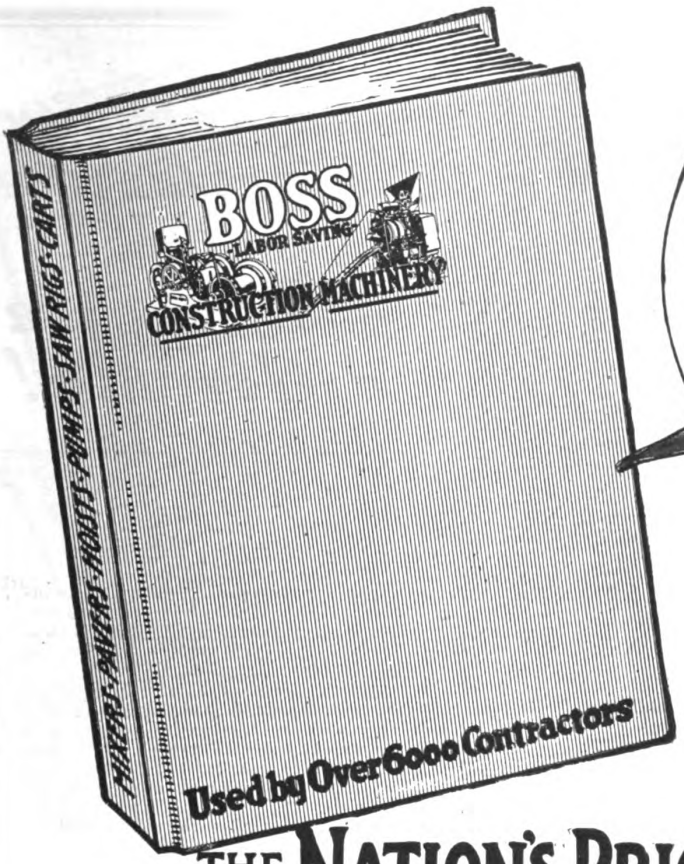

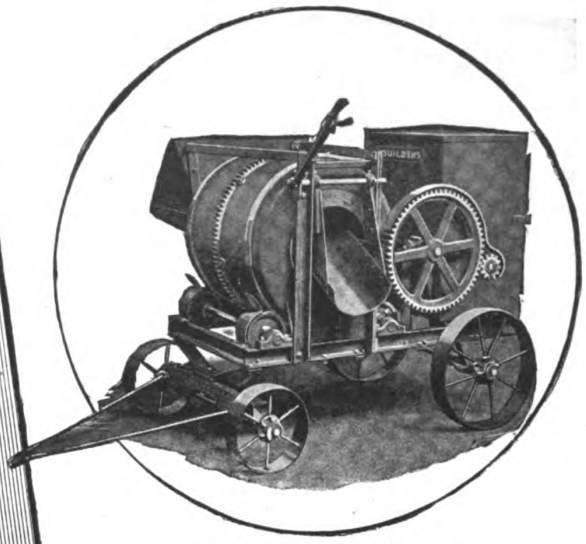

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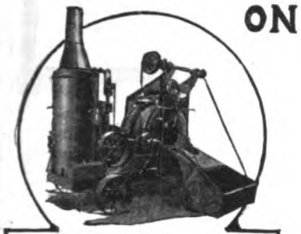
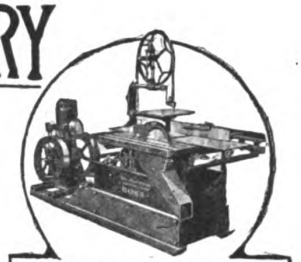
THIS HALF-BAG LOW CHARGER
WITH NOVO ENGINE

Just one of the many real bargains in this book.

THE NATION'S PRICE MAKER ON CONSTRUCTION MACHINERY



½ to 4-Bag Capacity, Any Type Loader—Gas, Steam, Electric.



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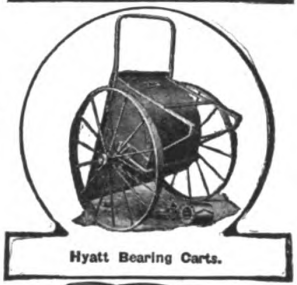
The American Cement Machine Co. Inc.
Keokuk Iowa
THE 300,000 H.P. ELECTRIC CITY

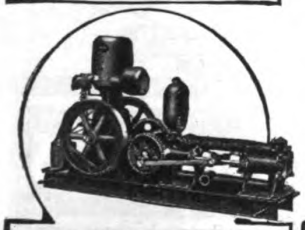
Branch offices—warehouses in all principal cities



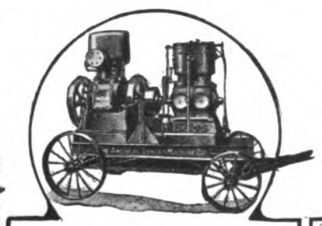
One and Two-Bag Pavers—High Drum.



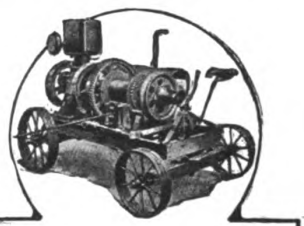
Hyatt Bearing Carts.



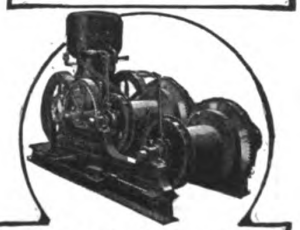
Force—Trench or Diaphragm Pumps—Gas, Steam or Electric.



Portable Air Compressors.



Heavy Duty Backfillers.



Single and Double Drum Hoists—Gas or Electric—Any Size.

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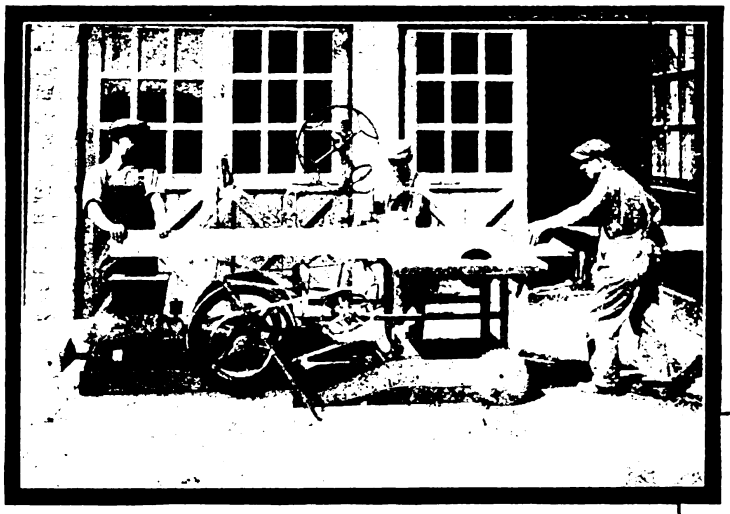


This garage was put up by the aid of a Parks Four-in-One rip, crosscut, band saw and jointer. Even the construction for the eight doors was turned out on it. A Parks machine makes it possible to dimension lumber right at the job.

Full capacity or just full time ~which? ~There's a difference!

IT'S NOT going to be a question of keeping busy when the building rush hits you. There is at present a great shortage in buildings—over 500,000 in homes alone. With removal of restrictions on building, active campaigns to promote construction are being pushed everywhere. The most prosperous year in the history of the business is assured. There will be full time work for all and then some.

The question will be how much of that "then some" business are you going to handle. Labor is scarce; you cannot always increase your force to meet increased requirements. You can however multiply its productiveness by using Parks Woodworking Machine—saving time of 2—4 carpenters.

A Parks is easily carried from job to job. It will enable you to take on work you couldn't otherwise tackle. It does the hard work—better than by hand—for nearly nothing and does it right at the job, reducing haulage and shop bills. Always dependable; lowers expense, reduces delays, increases profits, volume of business and clients' satisfaction.

Read what one man has to say of the

Parks Four-in-One

Combined circular rip and crosscut saw, band saw, and jointer and boring machine. Made of heavy 2" angle steel—almost vibrationless—quickly adjusted—easily hauled.

Each Parks Machine is guaranteed for 10 years against defects in material or workmanship.

Write for our catalog and get full information on just how the Parks Machines will solve your labor problem and increase your business. 10 days free trial.

The Parks Ball Bearing Machine Co.
Station A **Cincinnati, Ohio**

The Parks Ball Bearing Machine Co.
Cincinnati, Ohio

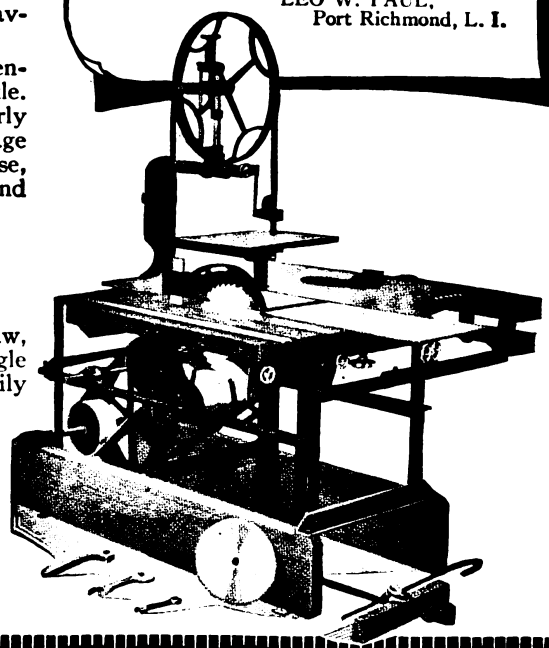
Gentlemen:—

The machine I have (the Parks Four-in-One) saves about three men's labor a week. I can do more work with machine in one hour than a man can all day working by hand.

What I like most about the machine is the price; considering all the work it turns out it is very reasonable. It has never up to the present time fallen down on the job. Since I have installed the machine I can turn out much more and better work with less men.

At present I have the machine set between the garage and the house that I am building. The eight doors of the garage have been turned out by the machine.

I am, very truly,
LEO W. PAUL,
Port Richmond, L. I.



WOODWORKING PARKS MACHINES

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Hollow Tile Advertising Now Appearing in Over Six Million Copies of the Above and Similar Publications Each Month

Are you prepared to take full advantage of our country-wide advertising in these well-known magazines?

Prospective builders in your locality will insist on Hollow Tile construction. Our advertising in these national magazines is showing them its many decided advantages, economies and comforts; that Hollow Tile construction costs practically the same as well-built frame; that it is the last cost because the walls are permanent and never require repairs and paint; that it is much cooler in summer, more economically heated in winter, and always dry because of the two or more air spaces in each unit of the wall; that it offers a fire protection seriously needed in every locality.

Hollow Tile

The Most Economical Form of Permanent Construction

Are you going to lose out, or learn to figure and build of Hollow Tile *now?*

Be sure that your local lumber or building-material dealer furnishes **MASTERTILE**. It is made in accordance with Association standards for your protection.



THE HOLLOW BUILDING TILE ASSOCIATION

Representing America's Leading Manufacturers

BY THIS TRADE MARK MASTERTILE YOU SHALL KNOW IT

CONWAY BUILDING · CHICAGO

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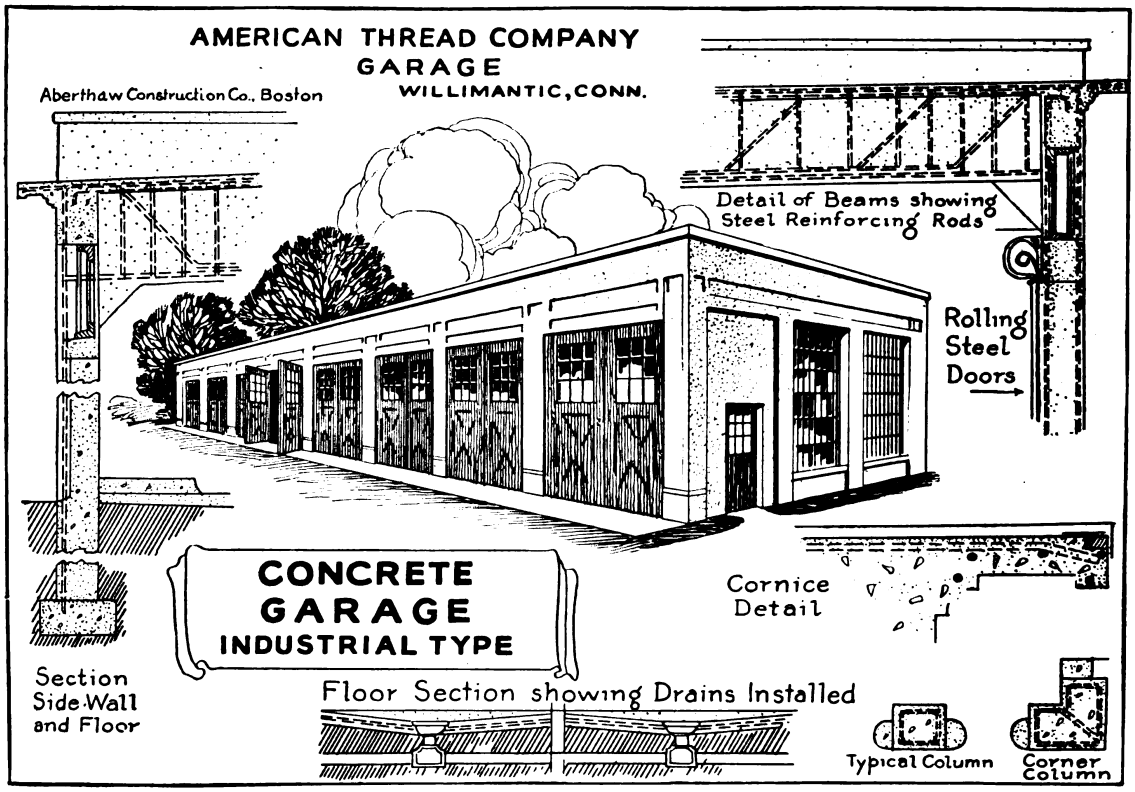
Get these Practical ALPHA service sheets on Concrete Construction



The above illustrations give an idea of the practical suggestions offered by the ALPHA Blueprint Service Sheets and Special Bulletins, which cover the following concrete improvements:

Workingmen's Homes	Small Dam	Corn Crib	Greenhouse
Walkways and Driveways	Milk House	Storage House	Coal Pocket
Concrete Roads	Ice House	Smoke House	Post and Walls
Bridges and Culverts	Manure Pit	Hog House	Walls, Sills and Lintels
Foundation and Hatchway	Septic Tank	Poultry House	Garages and Runways
Gutter and Curb	Oil Storage Tank	Dipping Vat	Overcoating of Old Dwellings.
Storage Cellar	Tennis Court	Tanks and Troughs	Porch, Cellar and Stable Floors
Small Warehouses	Inclosure Walls	Piers for Small Boats	
Spring House	Barn and Silo	Garden Furniture	

Ask for the Sheet or Bulletin that interests you most. A copy of our Handbook ALPHA CEMENT—HOW TO USE IT—96 pages illustrated—will also be sent free on request if you live East of the Mississippi. We are obliged to ask inquirers out of our sales field to send fifty cents to cover the printing and mailing expense of this literature.

ALPHA PORTLAND CEMENT COMPANY
GENERAL OFFICES: EASTON, PA.
BRANCH OFFICES: New York Boston Pittsburgh Philadelphia Baltimore Savannah

Concrete for Permanence

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DUPLEX TRUCKS

BUILT FOR BUSINESS



The Duplex Limited

Built to handle a normal load of 3,000 pounds, or a maximum of 5,000 pounds, including body, at a speed limited only by legal restrictions—or from 5 to 30 miles on high.

Such speed in the Duplex Limited does not depend upon gear ratio but upon engine power—greater power in fact than is usually specified in trucks of equal capacity.

The Duplex Limited was constructed in response to the insistent demands of Duplex owners and dealers for a general purpose 2-wheel drive, medium capacity Duplex Truck, designed and built to the high mechanical and proven service standards of the famous heavy duty 4-wheel Drive Duplex.

And the Duplex Limited is worthy of the Duplex name—for it is a Duplex, every inch of it, from tail light to radiator cap.

4 Cylinder, enclosed type motor—water-cooled—cast enbloc. Bore 4", Stroke 5¼". 3 Point Suspension. Pneumatic Cord Tires. 145" wheel base. Equipped with Wind-shield, Electric lighting and starting; Ammeter; Boyce Motometer; Speedometer; Electric Horn; Tools; Jack; Rim Wrench; Front fenders; Alemite Grease gun. Driver's seat without extra charge. (Power Tire pump at extra charge.)

Write for Booklets Describing the Duplex Limited.

Duplex Limited, $2,575 f.o.b. Lansing



DUPLEX BUILT FOR BUSINESS

What does it cost you to haul materials?

The records show that the Duplex 4-Wheel Drive Truck is the Practical Truck for Contractors and Builders

The great secret of the success of the Duplex 4-Wheel Drive in the transporting of dead weight loads is the fact that the Duplex 4-Wheel Drive Truck is not merely designed to carry such loads but to *haul* them.

There is power in *every wheel*—no straining and excess vibration to get started. The motor power is applied simultaneously and steadily to all four wheels and the truck starts easily and without strain.

Whether the roads are good or bad the Duplex 4-Wheel Drive can keep going so long as any *one* wheel can find traction.

The Duplex 4-Wheel Drive has 14 inches clearance as against the average 9 inches. There is five inches extra leeway for ruts, stumps and stones.

Gear Housings are on top of the axles—out of danger from obstructions.

Because all the motor power is applied simultaneously through all four wheels it gets even, steady traction *at once*—and the start is made without strain or shock.

The saving in wear and tear on motor and chassis because of this ease in starting *alone* saves a big percentage of depreciation and repair bills.

Remember this—the Duplex 4-Wheel Drive is an *established* success in actual business practice. There is nothing theoretical about it. Its lower cost records are actual records as established by business men under business conditions. Its efficiency is a matter of every day performance in many lines and under conditions as they are.

Write us for folders which give the facts as *Owners* find them. Talk to the Duplex dealer near you. He is a practical truck man and he can and will tell you frankly how and why the Duplex 4-Wheel Drive is a very safe investment for this class of work. Get the facts.

Duplex 4-Wheel Drive, 3½ Ton Capacity, $4,250 f.o.b. Lansing

Duplex Truck Company

Lansing · Michigan

One of the Oldest and Most Successful Truck Companies in America

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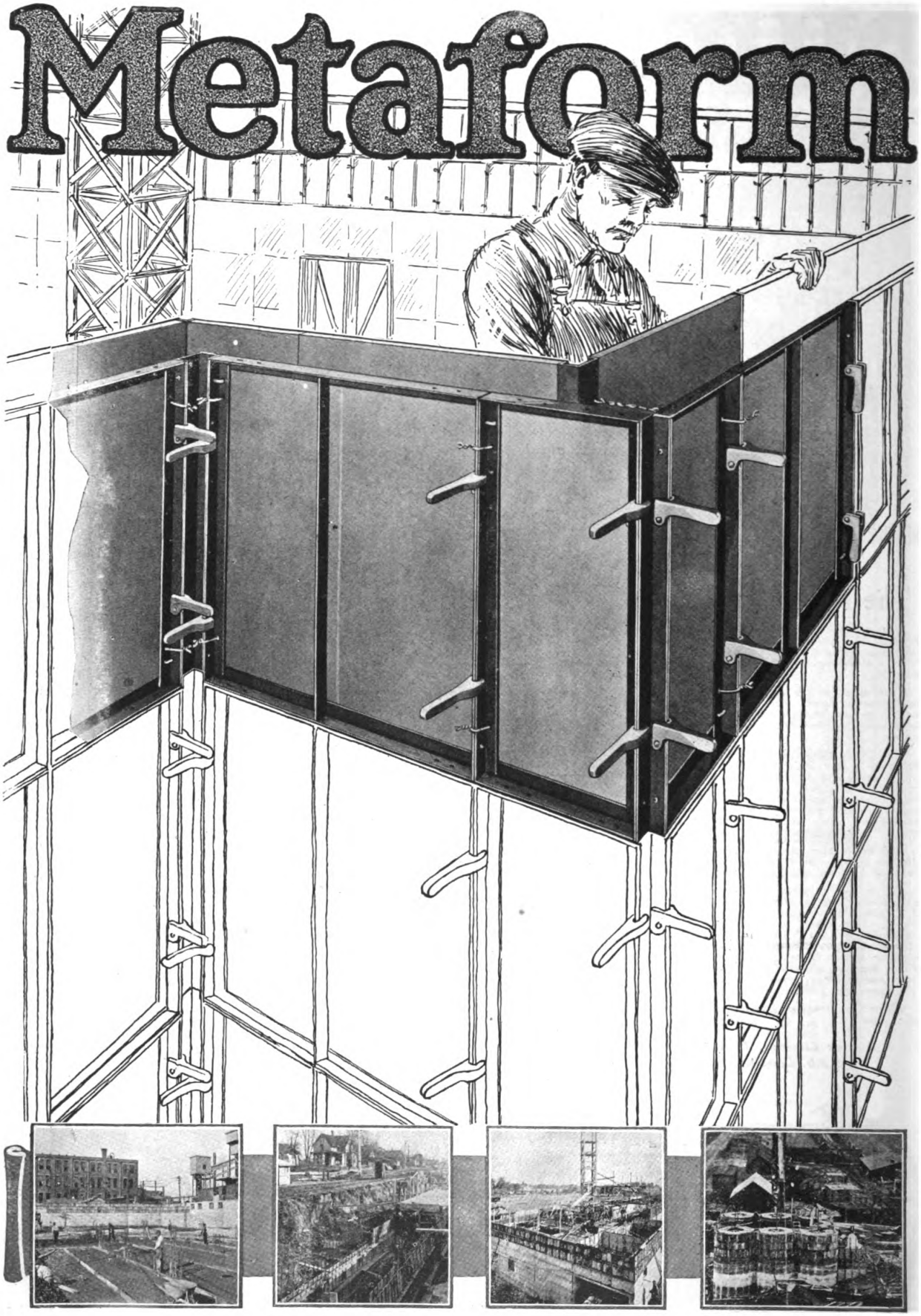
Metaform



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Methods —Increase Profits

Bigger Profits!—they are tied up in the handicaps you strive against on every job.

You want speed—more speed—faster construction—for time means money! Lower labor costs; less material wastage—there's where the extra profits are.

Study these facts about Metaform equipment:

Metaforms Cut Labor Costs. A few common laborers are substituted for several skilled form carpenters. Two men can erect the simple Metaform units into a complete set-up in a shorter period than it would take several times as many carpenters to build a wood form of the same area.

Metaforms Eliminate Lumber Wastage. As against the twenty-five per cent wastage of expensive lumber which wood forms entail on every job, Metaforms are permanent equipment, practically everlasting and can be used again and again without affecting their utility.

Metaforms Speed Up Construction. Metaforms may be set up in hours where it would take days to erect wood forms. They require no cluttering, work-obstructing maze of props and braces. They allow the contractor to start pouring sooner, and they are always on the job, ahead of the pouring.

Metaforms Do Better Work. Metaforms are absolutely accurate. They turn out more exact work and better finished surfaces. With Metaforms, a wall can be carried upward in perfect plumb without a single wave or variation in thickness to any height desired.

A complete answer to every form problem on concrete structures of every size—circular walled as well as straight—is found in the Metaform patented system of standardized, interlocking, self-aligning metal forms.

The constantly increasing use of Metaforms in the hands of the most progressive contractors in every part of the country testifies to their superiority over wood forms—testifies to the fact that their savings are substantial and sure.



Metaform methods on straight wall and on circular concrete construction are completely described in the two Metaform books. These books are worthy of a place in every contractor's files. Write for them to-day.

Metal Forms Corporation

1436 Booth St. Milwaukee, Wis.



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What Would a 30% Reduction in the Cost of Compensation Insurance Mean to You?

SUPPOSE you could cut a considerable percentage off your annual cost of Workmen's Compensation Insurance—

Suppose you could get, in addition, an actual reduction in your *rate* of 20 to 50 per cent—

Can you remember figuring jobs where such a saving in this item of Labor Cost would probably have brought you the business?

There is a *way* to make this saving. It is a way now used by many of the biggest contractors, and some of the smaller fast-growing ones.

It involves simply the exercise of the same common sense and buying instincts you use in purchasing raw material.

It means buying your Workmen's Compensation Insurance through a company operated by the business concerns insured in it —the Liberty Mutual.

* * *

The Liberty Mutual is a cooperative association of over 4000 of the best-rated contracting, public-utility, and commercial concerns in the United States.

Some of these concerns are: Fred T. Ley & Company, Inc.; Norcross Brothers; Roydhouse Arey Company; Hugh Nawn Contracting Company; McClintock-Marshall Company.

A directorate, chosen from these concerns, manages the Liberty Mutual through an executive force of experienced insurance men, who handle all technical insurance details.

The Liberty Mutual provides compensation protection to its members *at cost*. It pays no commission to brokers—no profits to stockholders—its profits are paid back to the policyholders.

Since 1912, it has returned in cash dividends more than $3,000,000—30 per cent of the annual premiums.

The Liberty Mutual Accident-Prevention Service has in many cases reduced the insurance rates of its policyholders 20 to 50 per cent. Here is a typical case:

NEW ENGLAND CONTRACTOR—
33.2% RATE-REDUCTION

First year, 1916, Accident Ratio reduced 22%.

Second year, 1917, Accident Ratio reduced 54%.

Third year, 1918, Accident Ratio reduced 66%.

In addition to this 33.2 per cent rate-reduction, this contractor received a cash dividend of 30 per cent.

Liberty Mutual service also effects reductions of time-loss, through accident-prevention, which often save more than the total cost of the insurance.

Are *you* getting savings like these?

You can see how such savings in cost would mean lower bids and more business for you. Then, as a simple matter of good buying, *investigate* Liberty Mutual protection.

Telephone or write to our nearest district office for further facts. This will incur absolutely no obligation.



STRONG

LIBERTY MUTUAL

Established 1912

INSURANCE COMPANY

HOME OFFICE · BOSTON

District Offices: NEW YORK 30 East 42nd St. · RICHMOND Mutual Bldg. · PHILADELPHIA 20 South 15th St. · CHICAGO 220 South State St.

Branch Offices in All Principal Cities

WORKMEN'S COMPENSATION, PUBLIC LIABILITY, AND AUTOMOBILE INSURANCE

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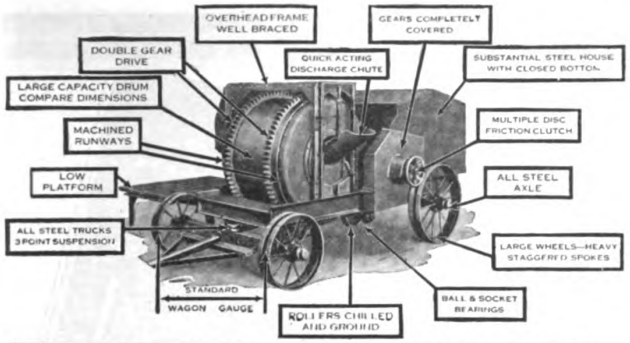




DANDIE

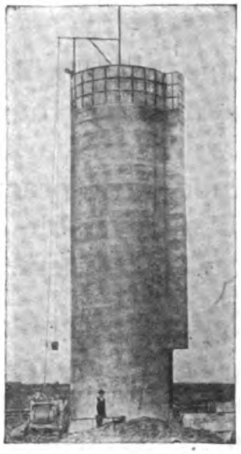
The Big Value Light Mixer

Send back the coupon at the bottom of this page—and get the full facts about the remarkable value of the light mixer field—the light mixer built first for **reliability,** and then built in **volume** to keep the price down.

No, Sir, the Dandie is not the cheapest mixer—it is the first light mixer built as strong as a light mixer can be built. It stands up to all the work you can give it—is dependable to stick on the job without costly delays.

But the price is within the range of light mixer prices—that is why it is the **remarkable value**—you are surprised that you could get such construction for the price. It is only made possible by scientific design, big production and standardization of every part. This is how we get the price down, not by skimping.

Get the Dandie Catalogue—get the full details of how volume production has put new reliability into the lighter mixer field—see for yourself why the Dandie is the remarkable value of the industry.



4 cu. ft. and 7 cu. ft. capacities Wet Batch Rating, No. 104-S, gasoline, No. 107-S, steam or gasoline. *May be equipped with low charging platform, power charging skip, automatic water-measuring tank and light duty hoist.*

The Big Yardage Mixer for Footings, Sidewalks, Silos, Culverts, Etc.

SEND BACK THIS COUPON

KOEHRING MACHINE CO., Milwaukee, Wis.

Please send, without obligation, your Dandie Big Value Catalog M 5, and advise me where I can see a Dandie Mixer.

Also send me information on items marked X in ☐ ☐ *Bar Benders* ☐ *Bar Cutters*

*Name*_____

*Address*_____

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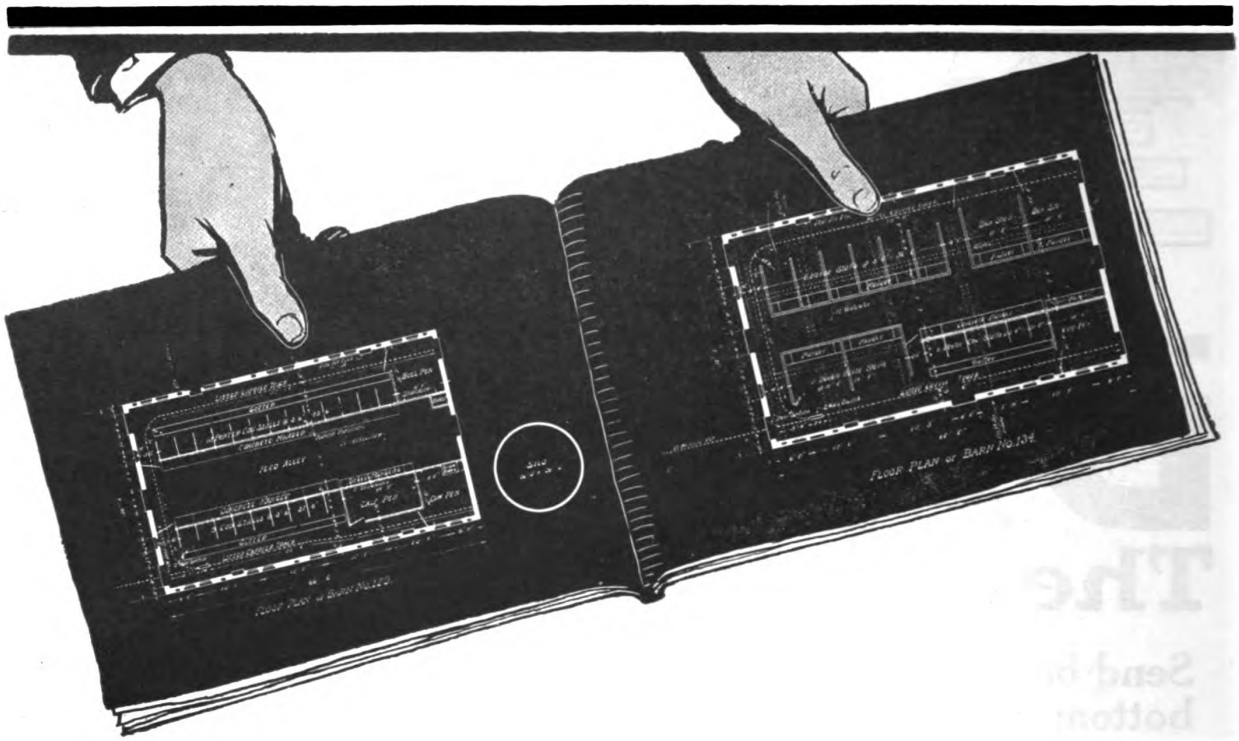

This Book of Barn Plans Free

This book will be of much practical value to every builder who builds barns. It will familiarize him with modern methods and practices in barn construction, and enable him to anticipate the wants of farmers.

Complete detailed drawings of a modern, sanitary barn are shown, with floor plans of several barns of various sizes. While these will not meet the needs of all farmers, they enable the builder to determine the space required to house the stock most economically and practically.

PORTER FREE

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Special Blue Prints Furnished

This book is issued in conjunction with our free planning service. We maintain a department which furnishes to builders detailed blue prints prepared to fit specific requirements.

There is absolutely no expense or obligation involved, and the long, varied and practical experience which our experts have had in designing barns for all localities insures the most modern and approved methods. The floor space will be utilized to the best advantage and your own ideas will be incorporated if desired.

For many years Porter Barn Equipment has been known to farmers for its simplicity of design, strength of construction and economy and convenience of operation. Barn plans drawn by us combine staunch construction and perfect sanitation with convenient arrangement and economy in the use of space.

If you would become known as the leader in barn building in your territory, write for this free book and become acquainted with Porter Free Planning Service.

J. E. PORTER CO.

802 Guion St. Ottawa, Ill.



J. E. PORTER CO.,
802 Guion Street
Ottawa, Ill.

Gentlemen: Without any expense or obligation on my part, please send me your free book of Modern Barn Plans, including catalogs of Hay Tools, Door Hangers and Barn Equipment.

Name .....

Address .....

City ..... State .....

PLANNING SERVICE

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Another FEDERAL

"Shorten the Miles to Market—Build Better Roads"



Federal three and one half ton truck operated by Peter Judlin, Inc., New Orleans, La.

Here's a Truck of Sound Value

It's this soundness of value found in Federal trucks that commends them so highly to the builder and contractor. Go over, point by point, Federal specifications, ask any of the hundreds of Federal owners in your business about Federal's mechanical efficiency, and you cannot help but be impressed with the fact that here is a truck in which sound value has been built.

The man who has used a Federal year in and year out on such jobs as a contractor's work requires of them will speak, too, of their unusual economy and trouble-free service.

FEDERAL MOTOR TRUCK COMPANY
39 FEDERAL STREET DETROIT, MICH.

FEDERAL

One to Five Ton Capacities

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Labor Saving Devices

To illustrate concretely how labor saving devices make possible the reduction in Unit costs, figures are given on the Mills Building, San Francisco.

This was originally built in 1891. At that time day labor received $1.25 for ten hours' work and mechanics $3.00 for nine hours. The cost per cubic foot was 49c.

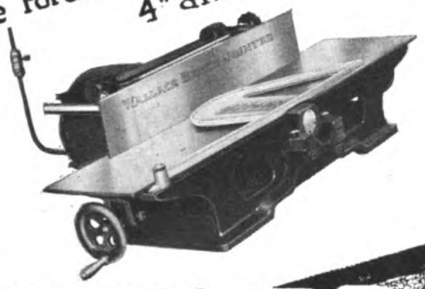
At the time of the San Francisco fire in 1906 this building was partially destroyed. In the reconstruction and addition to this building the cost was only 33c per cubic foot, despite the fact that common labor received $2.50 a day for eight hours and mechanics $6.00 a day for eight hours.

Thus, in spite of an increase of about 125% in labor cost, there was a decrease of approximately 33% in the unit cost.

Wallace Portable Bench Saw



Wallace Portable Planer and Jointer 4" and 6" sizes



WALLACE

Portable Bench Saws; 4" Planers, 6" Jointers

GIVE HIGH COSTS THE SOLAR PLEXUS

The contractor who studies his business, and who uses labor saving devices and plans his work with the greatest efficiency will continue to get all the contracts he can handle and also make a greater profit than ever before.

You can cut your costs by doing 85% of your cutting, fitting, trimming, jointing on these handy portable machines.

You save many minutes running back and forth to your stationary machines—and minutes run into hours and hours into dollars.

SAVE THIS TIME

These machines are portable—operated on an ordinary electric light circuit or by belt.
Speed up your jobs and get more than your share of the contracts.
You can try out these machines at our expense for 15 days. Wire or write today.

J. D. Wallace Company
1419 Jackson Boulevard Chicago, Ill.

Take the machine to the job

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MacArthur Concrete Pile & Foundation Co.
Foundation Contractors
Pedestal Concrete Piles
120 Broadway.

New York, August 6, 1919.

Oshkosh Manufacturing Co.
154 West 38th Street
New York City, N. Y.

Attention of Mr. Moses Hunter
Eastern Sales Manager

Gentlemen:

We have used Gasoline Driven Mixers of various types for the past few years and have experienced more or less trouble in keeping them in continuous operation, a fact more or less found, we believe, by all contractors using gasoline engines for motive power.

Recently at Brooklyn, N. Y., where we were installing MacArthur Pedestal Piles for a new structure for the Mohegan Tube Company, our mixer became so troublesome it could not be kept running continuously. We called in a gasoline engine repairman who spent two days putting same in running condition without any real results. Meantime we had to put another mixer on the work. We then called in a firm with a reputation of gasoline engine experts who spent three more days locating the trouble.

We then were advised your Company had a Special Service Department and upon getting in touch with you were further advised you would have pleasure in giving us all assistance, stating that was a special feature of your Company. Upon our solicitation you sent a mechanic to our work above mentioned and he got the mixer going without any considerable difficulty and it ran thru the entire balance of the job without further trouble. And the most prominent point was your service amounted to only $10.75. All this after we had spent close to $100.- for the other experts' services.

We feel assured now that we have at last located a long sought for necessity - A gasoline engine service department that delivers the goods.

Yours very truly,

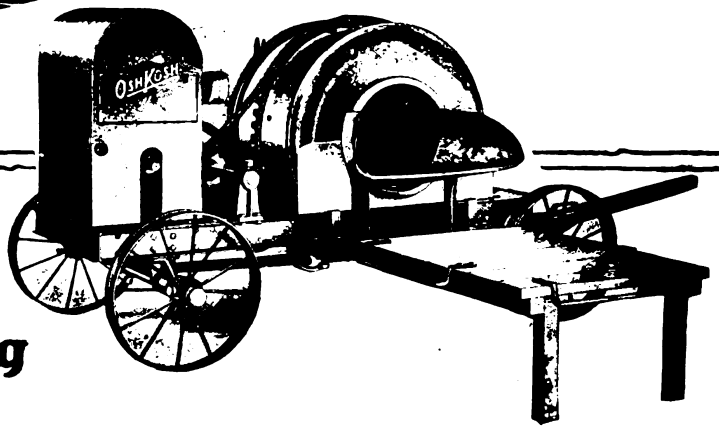
MACARTHUR CONCRETE PILE AND FOUNDATION CO.
(Signed) By R. E. Talmadge
Plant Superintendent

Oshkosh Service Is Real Service

Read what the MacArthur Concrete Pile and Foundation Co. went through before Oshkosh Service solved their difficulties. Think of holding up a job 5 days and spending $100 on expert repairmen!

Oshkosh Service did the work in a few hours—a charge of $10.75—no more trouble. That's one reason so many contractors are buying Oshkosh Mixers.

OSHKOSH



Heavy Duty Low Charging MIXER

is the fastest charging, mixing and discharging mixer on the market; 60 to 70 batches an hour is common performance for this rapid worker. Loads right from a wheelbarrow and discharges directly into a wheelbarrow or the forms. Charging platform only 21 inches above the ground. Powered by a simple, sturdy gasoline engine.

An Oshkosh Mixer rarely gives trouble, but if it does, step to your telephone and you can get a new part or an expert repairman at once. That's *Oshkosh Service.*

OSHKOSH MFG. CO.

800 BUCK ST., OSHKOSH, WIS.

New York Branch.....154 West Thirty-eighth St., New York City
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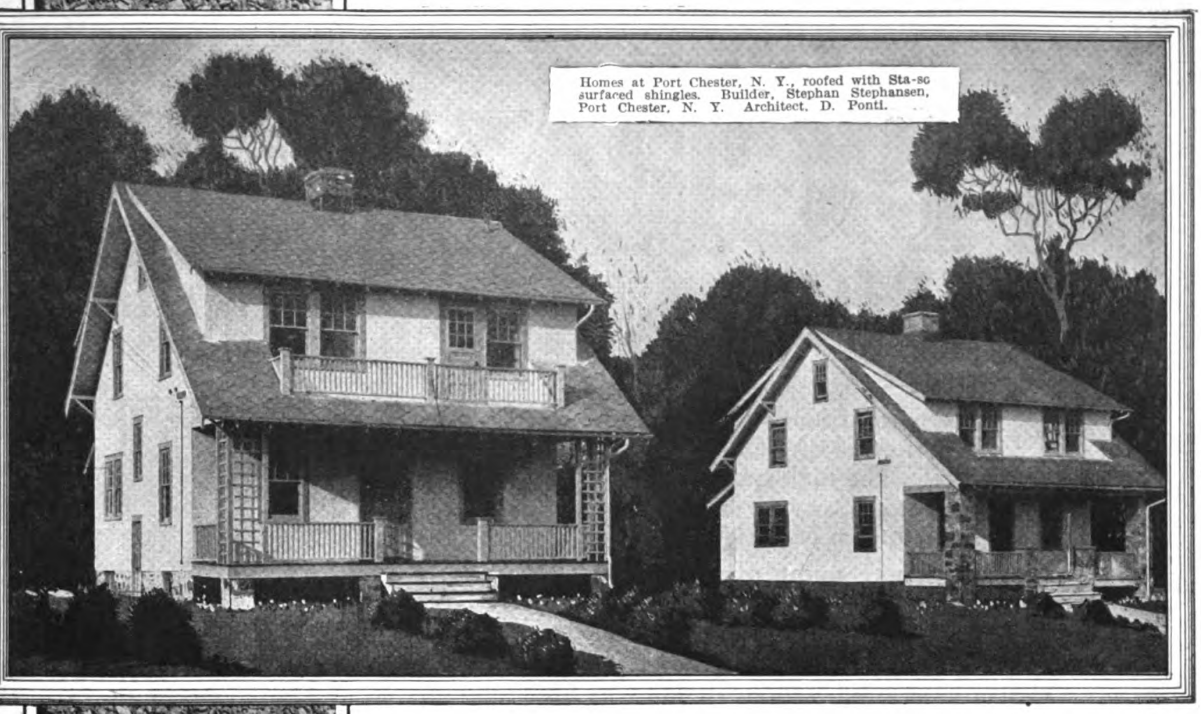

Homes at Port Chester, N. Y., roofed with Sta-so surfaced shingles. Builder, Stephan Stephansen, Port Chester, N. Y. Architect, D. Ponti.



Photographic reproduction of Sta-so Crushed Slate Roof Surface. Sta-so's granular texture lends itself to every style of architectural treatment

Mr. Stephansen, Builder, Says:

"Sta-so Protects Me Against Complaints!"

STEPHAN STEPHANSEN, Port Chester, N. Y., has been a builder for 15 years. Mr. Stephansen recently completed several houses at Port Chester, two of which are shown above. These houses are protected by roofs surfaced with Sta-so Laminated Slate. Mr. Stephansen volunteered to tell why Sta-so-surfaced roofing had been selected.

"One of the most annoying things in the builders' business," writes Mr. Stephansen, "is customers' complaints. For example, you lay an ordinary roofing today. In a year or so, back comes the customer complaining.

"Right here Sta-so'd roofing performs a real service for contractors or builders like myself.

"Sta-so protects me against complaints that the roofing has faded to a dirty brown or turned black. I know that Sta-so's beautiful tones of red and green *cannot* fade or change.

"Sta-so protects my customers, not only because it never fades, but also because it increases the durability of the roofing, and is fire-resisting, thus taking a low rate of insurance.

"Another thing about Sta-so is its economy. It is economical to buy; economical and easy to lay, fitting snugly even into odd-shaped corners.

"These are the reasons why I prefer Sta-so'd roofing and recommend it regularly to my customers."

Are you protecting yourself and YOUR customers by recommending Sta-so-surfaced roofing? You can recognize Sta-so'd roofing by the Sta-so label. Insist that your stock bears this Sta-so label. The following manufacturers made enough Sta-so surfaced roofing last year to cover a city of 42 square miles.

Amalgamated Roofing Co.....Chicago, Ill.
Barber Asphalt Paving Co.....Philadelphia, Pa.
Barrett Co. .....New York, N. Y.
Beckman-Dawson Rfg. Co.....Chicago, Ill.
B. F. Belson Mfg. Co.....Minneapolis, Minn.
Bird & Son, Ltd.....Hamilton, Ont., Can.
Bird & Son, Inc. .....East Walpole, Mass.
Philip Carey Mfg. Co.....Cincinnati, Ohio
Flintkote Co. .....Boston, Mass.
Ford Mfg. Co.....St. Louis, Mo.
The Heppes Rfg. Division, The Richardson Paper Co. .....Chicago, Ill.
Keystone Roofing Mfg. Co.....York, Pa.
McHenry Millhouse Mfg. Co.....South Bend, Ind.
National Asbestos Mfg. Co.....Jersey City, N. J.
National Rfg. Co.....Tonawanda, N. Y.
Pioneer Paper Co.....Los Angeles, Cal.
Reynolds Shingle Co.....Grand Rapids, Mich.
H. H. Robertson Co.....Pittsburgh, Pa.
Richardson Paper Co. .....Cincinnati, Ohio
Safepack Paper Mills.....Boston, Mass.
St Fo Products Co. .....St. Paul, Minn.
Standard Paint Co. .....New York, N. Y.
Usona Mfg. Co.....Aurora, Ill.
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We manufacture a complete line of Refrigerators and Cooling Rooms in stock sizes to meet the requirements of Residences, Hotels, Hospitals, Clubs and Institutions, Grocery Stores, Meat Markets, etc. These are arranged for either Ice or Mechanical Refrigeration.

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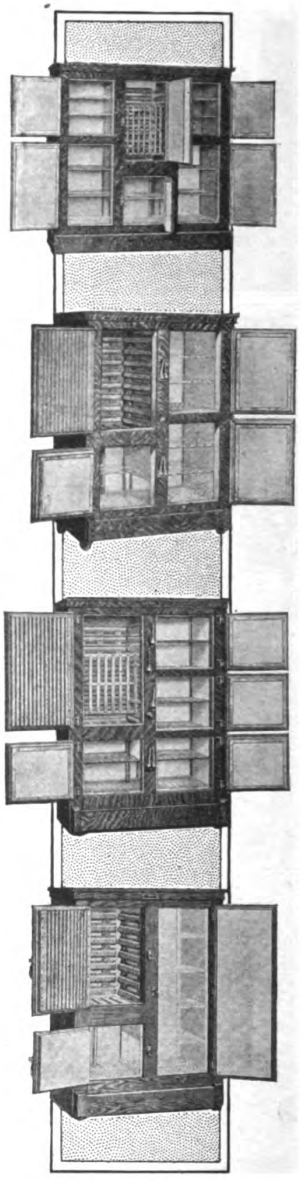
SEND FOR CATALOG—Our Catalogs will assist you when you are confronted with Refrigerator Problems. No. 95 for Residences. No. 52 for Hotels, Restaurants and Clubs. No. 63 for Meat Markets. No. 71 for Grocery Stores. No. 74 for Florists.



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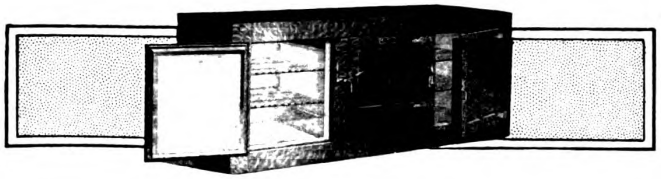

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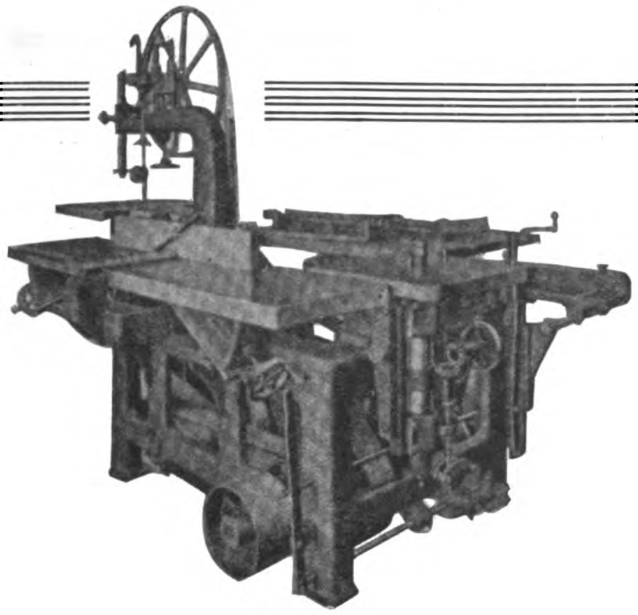

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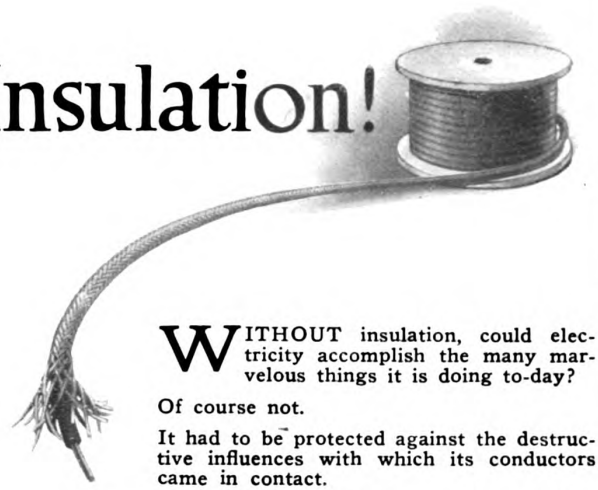
Insulation!



WITHOUT insulation, could electricity accomplish the many marvelous things it is doing to-day?

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Even in the building field, insulation is a factor of paramount importance.

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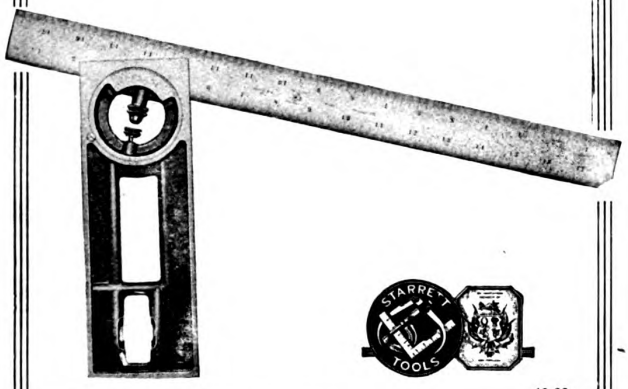

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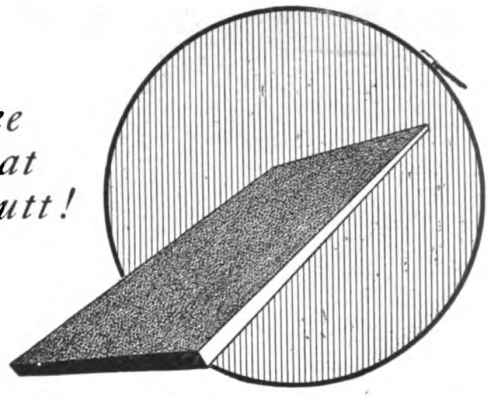
See that Butt!



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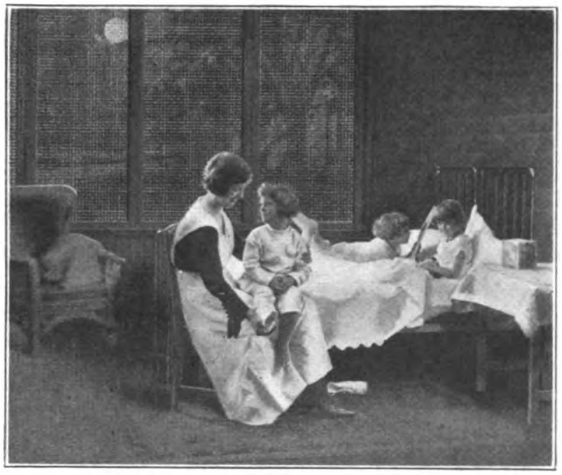

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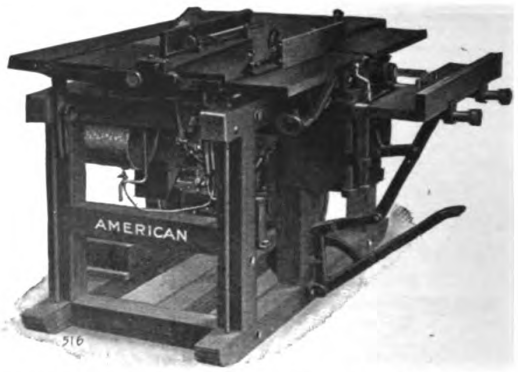

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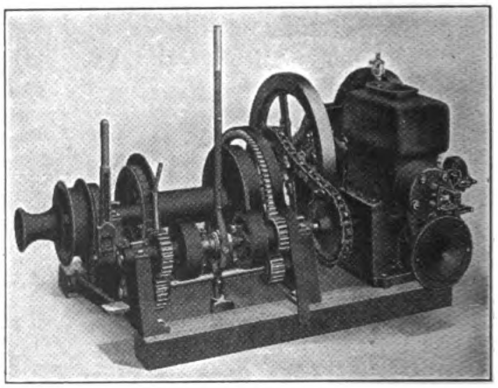

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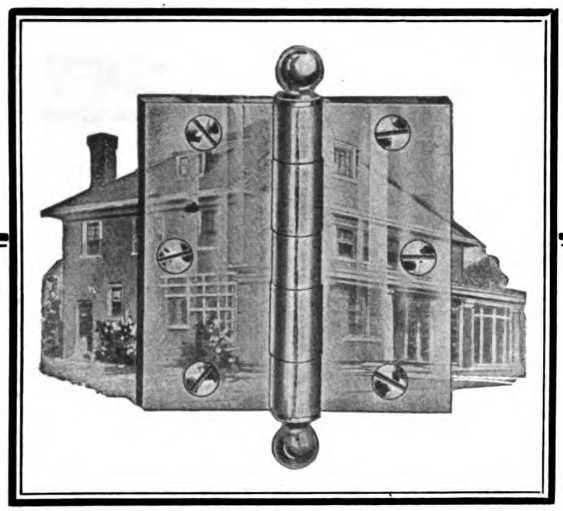

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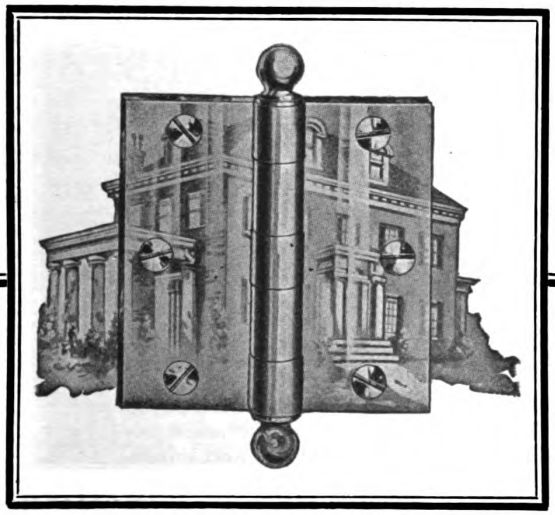



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Sargent Steel Framing Squares are the only squares which will calculate the lengths and cuts of Jack, Valley, Hip and Common rafters without any figuring on the part of the carpenter.

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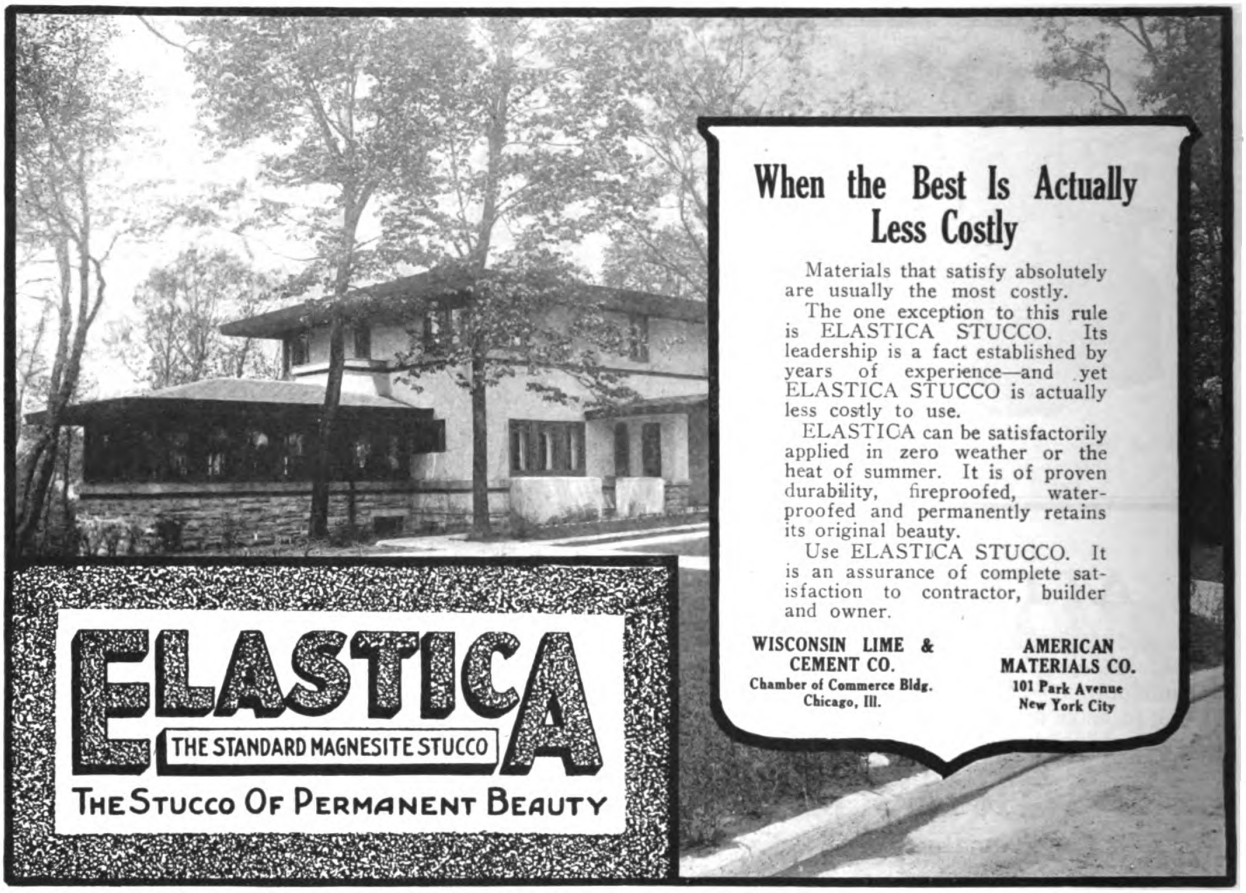

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CONTRACTOR'S HANDY AUTO TRAILER

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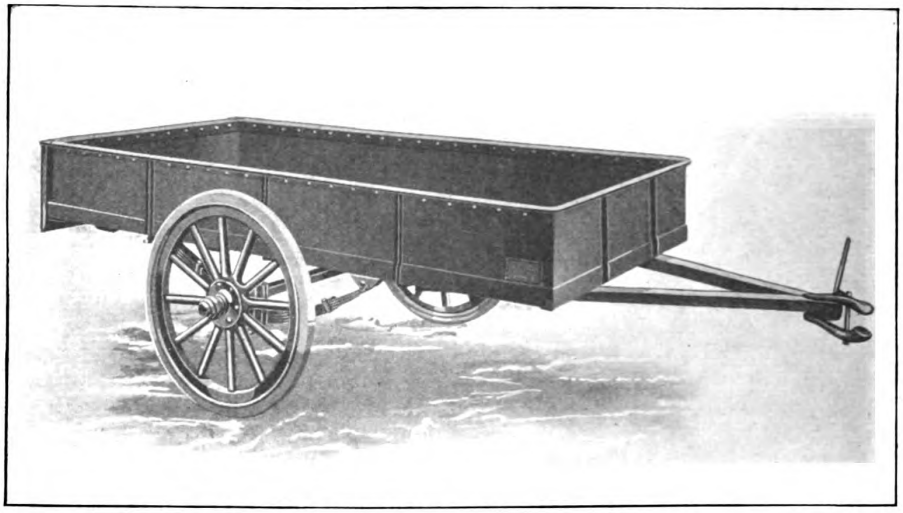

Capacity—2,000 pounds. Body—8 feet long, 46 inches wide, 12 inches high. Body and under frame built of open hearth steel. Axles—1½ inch square bed, special high carbon steel. Springs—Semi-elliptic, oil tempered and double heat treated. Bearings—Roller. Wheels—1½ inch spoke, artillery type, second growth hickory. Tires—32-2, solid rubber. Weight—534 lbs. Other models with gates at front; also extension tongue which permits carrying lumber, poles, ladders, etc., 30 feet long.

Write for Catalog A

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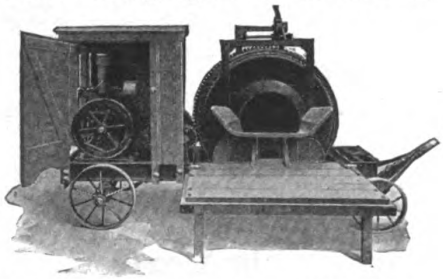
ROGERS BROTHERS COMPANY **Albion, Penna.**

"THE STANDARD"

Low Charging Concrete Mixers



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Speed and thorough mixing are the most important points to be considered when you are in the market for a concrete mixer. The faster you can place thoroughly mixed concrete, the more money you will make on the job.
"The Standard" Concrete Mixer is adapted to every sort of a building project.
In addition to Concrete Mixers, "The Standard" line includes Hoists, Pumps, Air Compressors, Wheelbarrows, Engines, Block Machines—everything needed by the contractor.

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The Standard Scale & Supply Co.

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Thoroughly reliable and up-to-date

A NUMBER OF STYLES AND SIZES

All features are exclusive.
The cut shows the overhead machinery of our hand power, automatic lock dumbwaiter, and we furnish these machines either in this manner or complete, ready to erect.
It is an efficient machine in every way.
There is never any binding, scraping or jarring in STORM dumbwaiters, either hand or electric.
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Send for completely illustrated circular giving description and prices.

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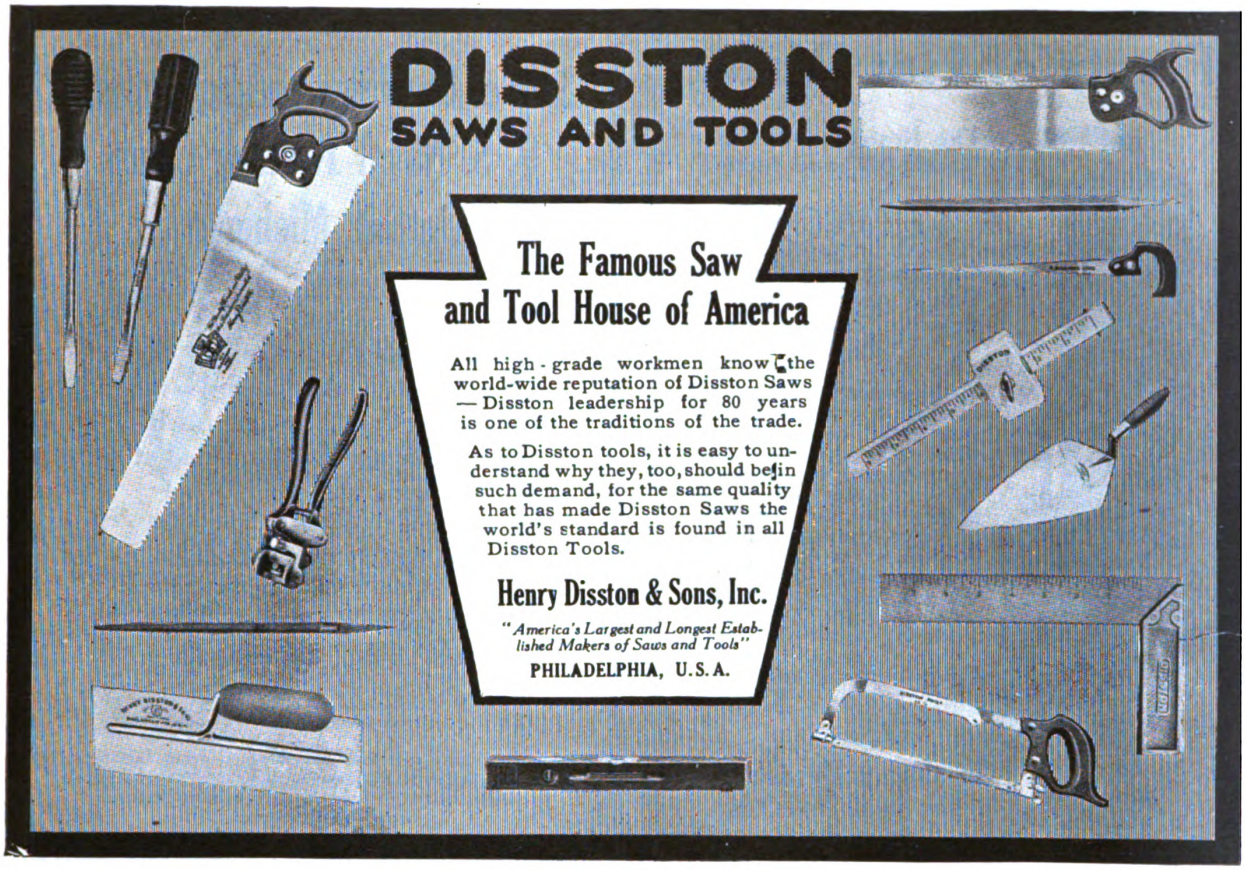

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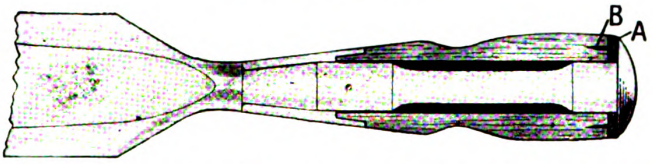

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Blade, Shank and Head One Piece of Solid Steel

This not only insures great strength and durability but enables the full power of the blow struck by a hammer or mallet to be transferred directly from the head to the cutting edge.

The Blade is forged from one end of the steel rod, the other end being upset to form the Head.

A leather washer (A) is placed between the head and the handle. This acts as a cushion, relieving the handle from shock when a blow is struck, thus preventing same from splitting. A Brass Ring (B) is driven into the large end of the handle, providing an additional safeguard.

The illustration shows the general construction of all "Everlasting" Chisels.

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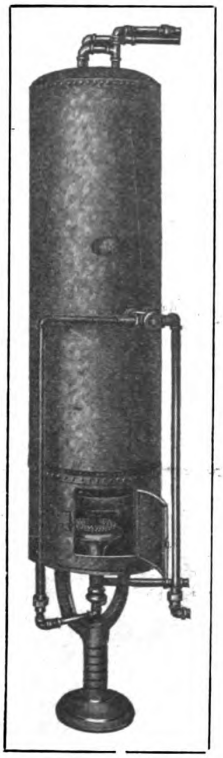

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You drive the screw holes with a hammer in any material.

The screw holes are made for wood screws or machine screws to fit all sizes of screws. The head is removed and you leave a permanent screw hole.

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Once a Screw Hole, Always a Screw Hole

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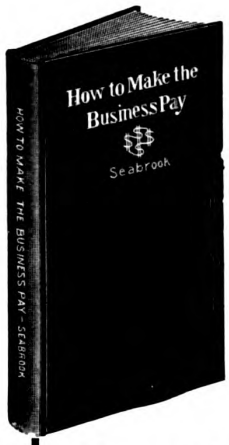
The Biggest Little Thing in the World

Some of the Reasons Why Screw Holes Will Be Bought and Used and Not Become Dead Stock for Anyone

1—They can be used without damage to receiving material
2—They enable you to standardize to wood or machine screws in all material.
3—They are made of brass and will not rust under atmospheric or moisture conditions.
4—ECONOMY—They save more time value than the holes cost.
5—You get them for nothing and are paid for using them when you count time saved.
6—Screw holes have been needed ever since the first screw was used.
7—Special tools are NOT needed in using them in any material.
8—They can be used in any place a screw can be used.
9—By using screw holes, screws can be used in many places, and in many materials where it is impossible to use screws without them.
10—These are the only ready-made screw holes in the world
11—No special screws are needed. These screw holes fit any wood screw or machine screw now in stock.
12—They make the neatest possible job in any material.
13—Every store where screws are sold must carry them in stock, because the line of screws is not complete without screw holes for them.
14—Every shop and factory where screws are used must also have these screw holes to fit the screws.
15—They are endorsed by all dealers in screws and by all users of screws
16—Screw holes are entirely new and the world supply is yet to be furnished.
17—This is a progressive Old World of ours, and every active person in it must adopt all improved methods, and all new articles that will help him keep in the front line of progress.
18—Be among the first to stock up in screw holes if you are a dealer in screws.
19—Be among the first to install screw holes in your shop or factory, as you begin to save money soon as you use them.
20—In spite of the high cost of brass, screw holes are yet cheap.
21—We are letting the world know that screw holes can now be secured, by means of extensive advertising in all the principal Trade Journals that have the largest circulation among dealers in screws as well as users of screws.
22—Do not let your customer ask you for screw holes before you have them in stock. BE A LIVE WIRE.
23—They make everlasting holes in any material.
24—They mean "Plug-No-More" screw holes.
25—They are the result of Necessity being The Mother of Invention.
26—Anyone who can drive a nail can use screw holes.
27—Send for a sample and convince yourself.
28—Mechanics who see them say, "What do you think of that?"
29—In fact there are NO REASONS why screw holes should NOT be used.

Each of these reasons are enough to sell Screw Holes. There are many other reasons.

Write at once for our handsome **Color Card** showing screw holes in various materials which will be sent on request, together with samples and price list.



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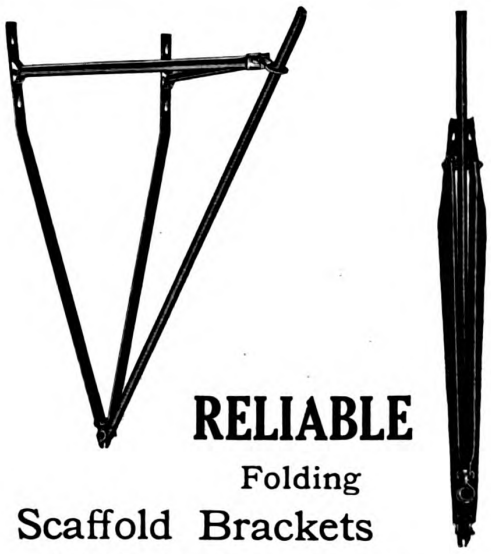

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Unfolded and hung on a building in a moment. Four nails hold each bracket perfectly rigid. No loss of time, unnecessary labor or defacing of the walls.

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Reliable brackets pay for themselves on the first job. Only $3 each.

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for building reinforced concrete

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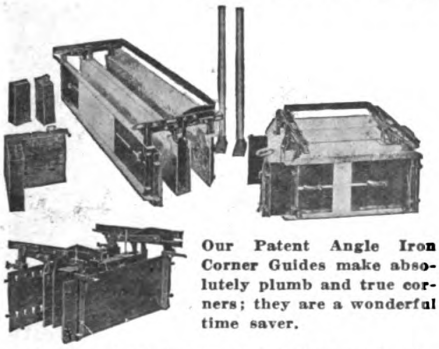

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The window frames are set in place and cemented tight, with air space brought up to frame by the sliding plates on sides of machines—no solid wall anywhere to carry dampness through.

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Fiberlic Wall Board

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HUGO FRANK, a Berloy Steel Ceiling erector, says: "I've been putting up

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Here is a chance to build up an independent, profitable business for yourself right at home. Many of our agents are now devoting their entire time to selling our metal roofing. Others have made big profits simply devoting part of their time to selling and laying our Metal Spanish Tile and other styles of Metal Roofing.

Edwards' Metal Spanish Tile

Architects are specifying Edwards' Metal Spanish Tile, for they know it will do away with roofing "troubles." Builders like it because of the finished appearance it gives any house on which it is used.

Don't delay, write today for new roofing catalog and special agent's proposition.





Note the construction of patented interlocking device protecting nail heads from weather and providing perfectly for expansion and contraction of the metal.

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3

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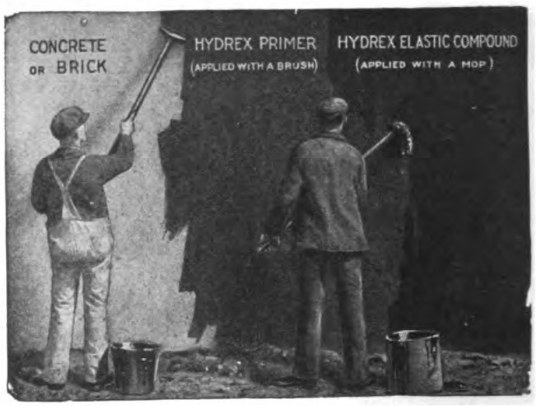

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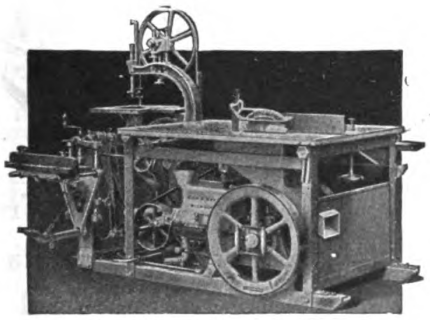

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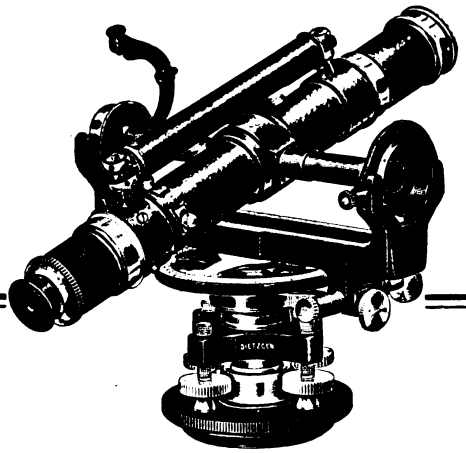

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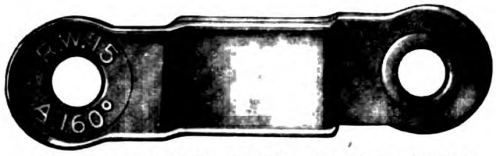

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So sensitive to fire it will function instantly when fire approaches. So strong it will support hundreds of pounds under test without breaking.

R-W fusible link No. 97 is made of phosphor bronze in two parts. These two parts fit perfectly together on absolutely smooth cleaned surfaces joined with specially prepared solder. No chemicals are used in the fabrication of the link, as any chemical element might incite corrosion and cause the two parts of the link to stick together.

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ARCHER
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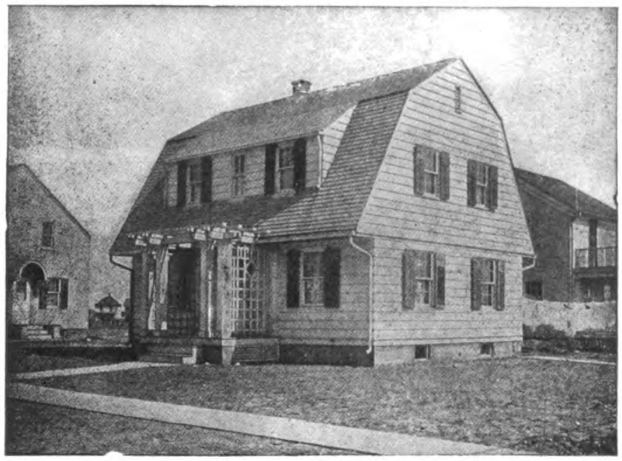

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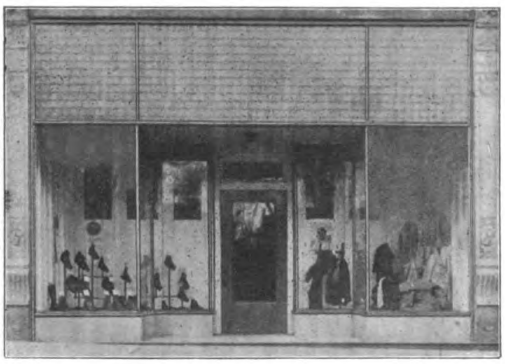

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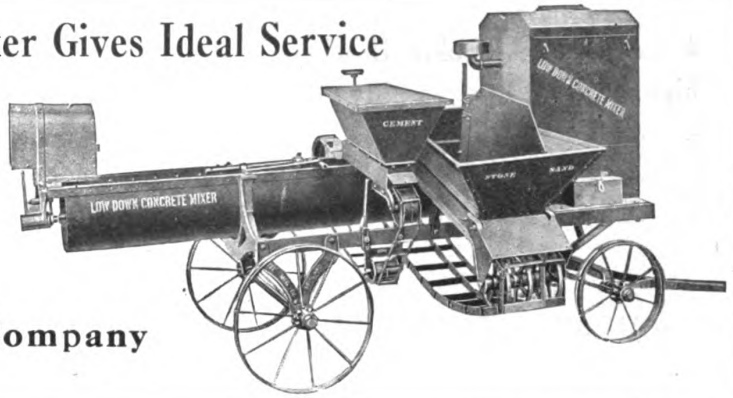

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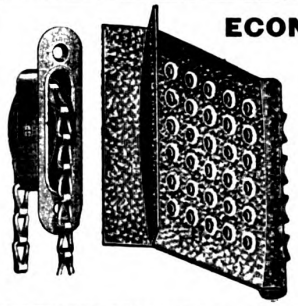

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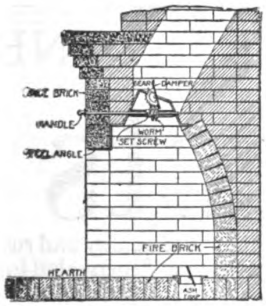

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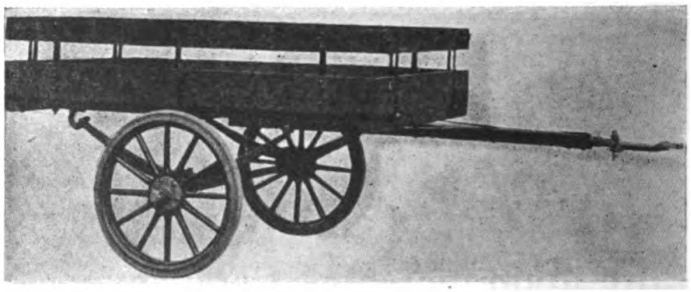

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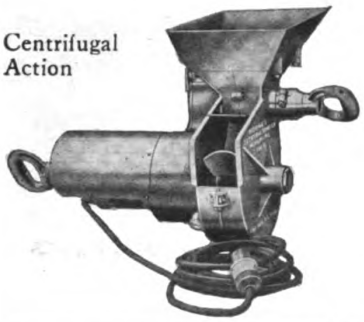

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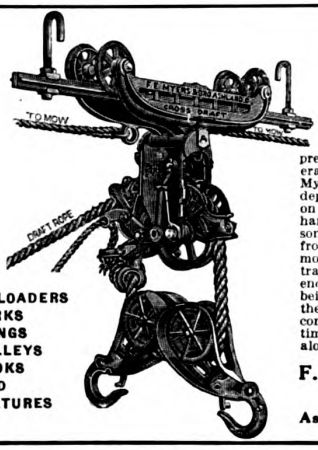

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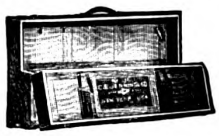



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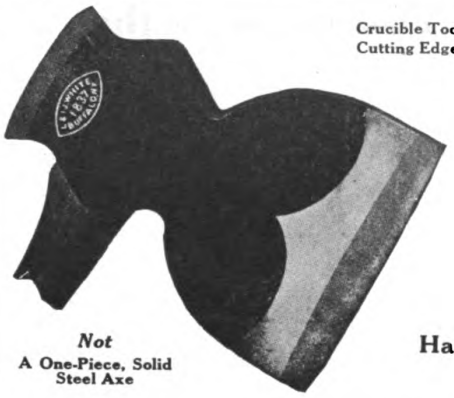

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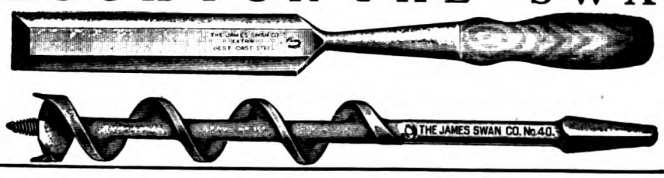

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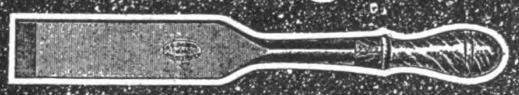

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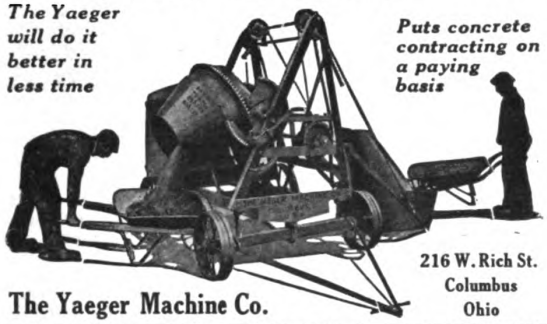

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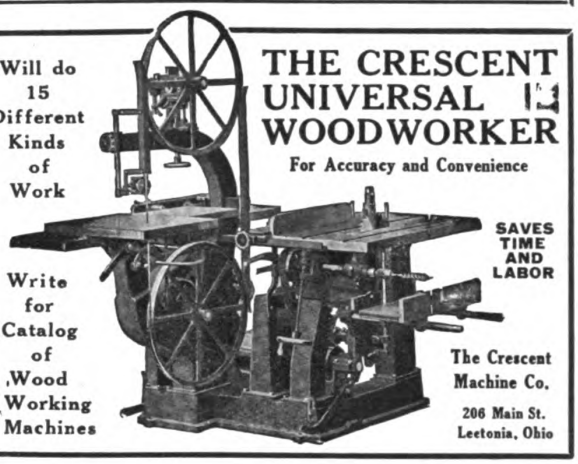

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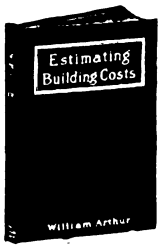
A List of "Guaranteed" Books on Building

Money Back If They Are Not Satisfactory

Arthur's Estimating Building Costs

This book contains the most authoritative and comprehensive data on figuring labor and material on building work ever published in a book of its size or price. The builder who starts contracting does not treat himself squarely if he fails to purchase the experience of many contractors in all lines of building work. It is all well enough and necessary to get experience of our own; but to fail to get that of others when it may be had at a low price is unwise.



In modern engineering, architectural and contracting offices there is not time to teach estimating to young workers. They are supposed to know something about the fundamentals, just as they know that there are 27 cubic feet in a cubic yard. If they do not know they must, at least, be able easily to find the information. The index of this book is arranged to serve them. Why get "stuck" when an investment of $1.50 will save you both time and worry? You may not know how much material you actually need to send per cubic yard of concrete at various proportions, but if you can turn to the table that gives the quantities you are not apt to be hindered. With your time worth a dollar or more an hour just think how soon you would save the price of the book.

Quite frequently people come into a lumber office and ask what amount of material is required for certain parts of a building. The lumberman often knows, but sometimes forgets. This book, Estimating Building Costs, gives quantities for all purposes. If a customer has received the wrong kind of information and has taken home too much material he is displeased, because he has spent more than he needed to, while if he did not get enough material and has to return for more, he feels just as sore about it. Is it worth while to run the risk when a dollar and a half will give certainty?

It should be remembered that this book is based on work actually done and time taken. Different conditions change the necessary labor time, as excavating in frost compared with the work in summer; but a fair average can always be made out if we know what others have actually done.

This book is arranged to be of great service to builders, contractors, students and instructors. Each chapter has a series of questions for a test of progress. The Key is printed at the end of the book. In technical classes of colleges and Y. M. C. A.s this feature will be appreciated. For certain requirements Estimating Building Costs is a superior book to even The New Building Estimator. It is written on simpler lines, and is new from title page to the end.

The book begins with the excavation and ends when the house is finished. The chapters are: Excavations and Piling, 7; Concrete, 18 pages; Brickwork, 24; Stonework, 7; Plastering, 5; Metal, 9; Roofing; Painting, 9; Plumbing and Heating, 7; Miscellaneous includes Hardware, Electric Wiring, Tiling, Bonds, Tables, Rafters, Cisterns, Weights, Comparisons of Cost between Brick and Frame Buildings, 18; and a final chapter entitled, Hints on Drawing, taking up 41 pages.

218 Pages. 4½ x 7 in. 29 Figs. 91 Tables. Fabrikoid. $1.50

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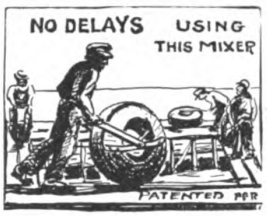

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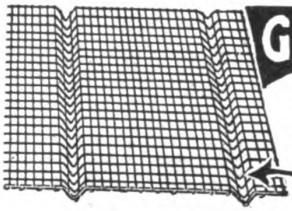

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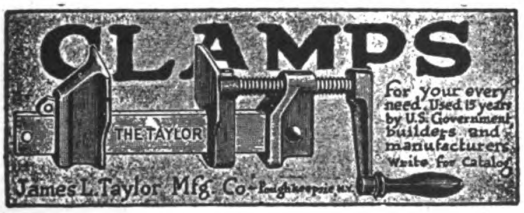

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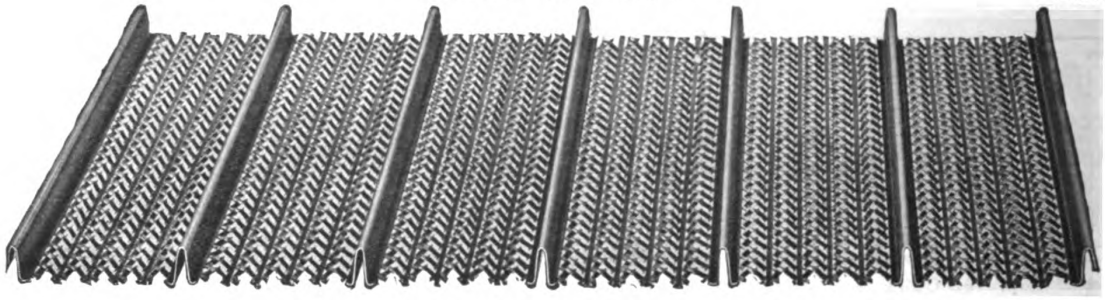

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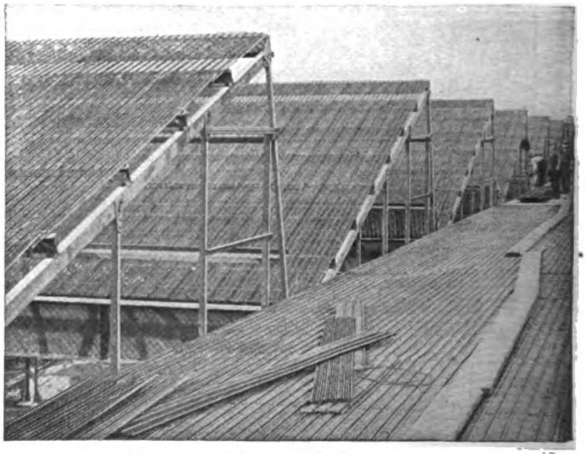

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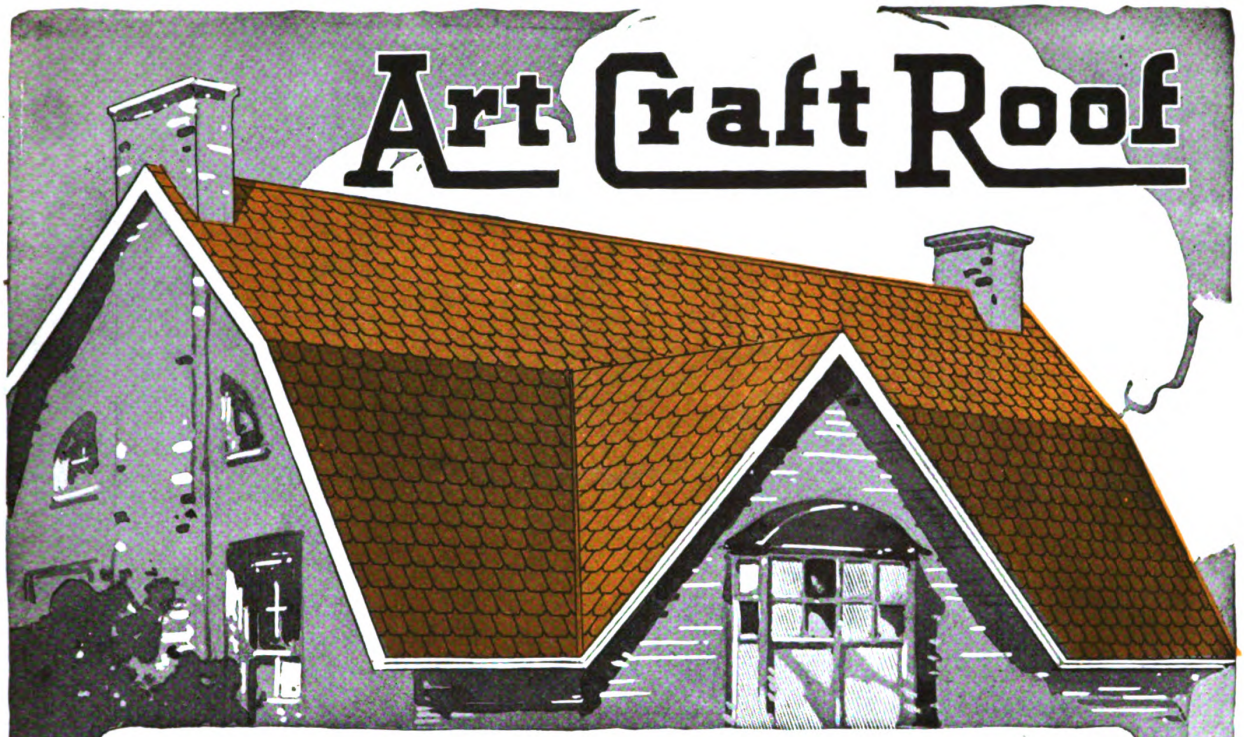

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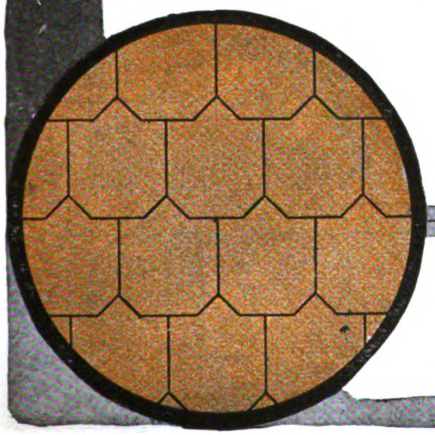

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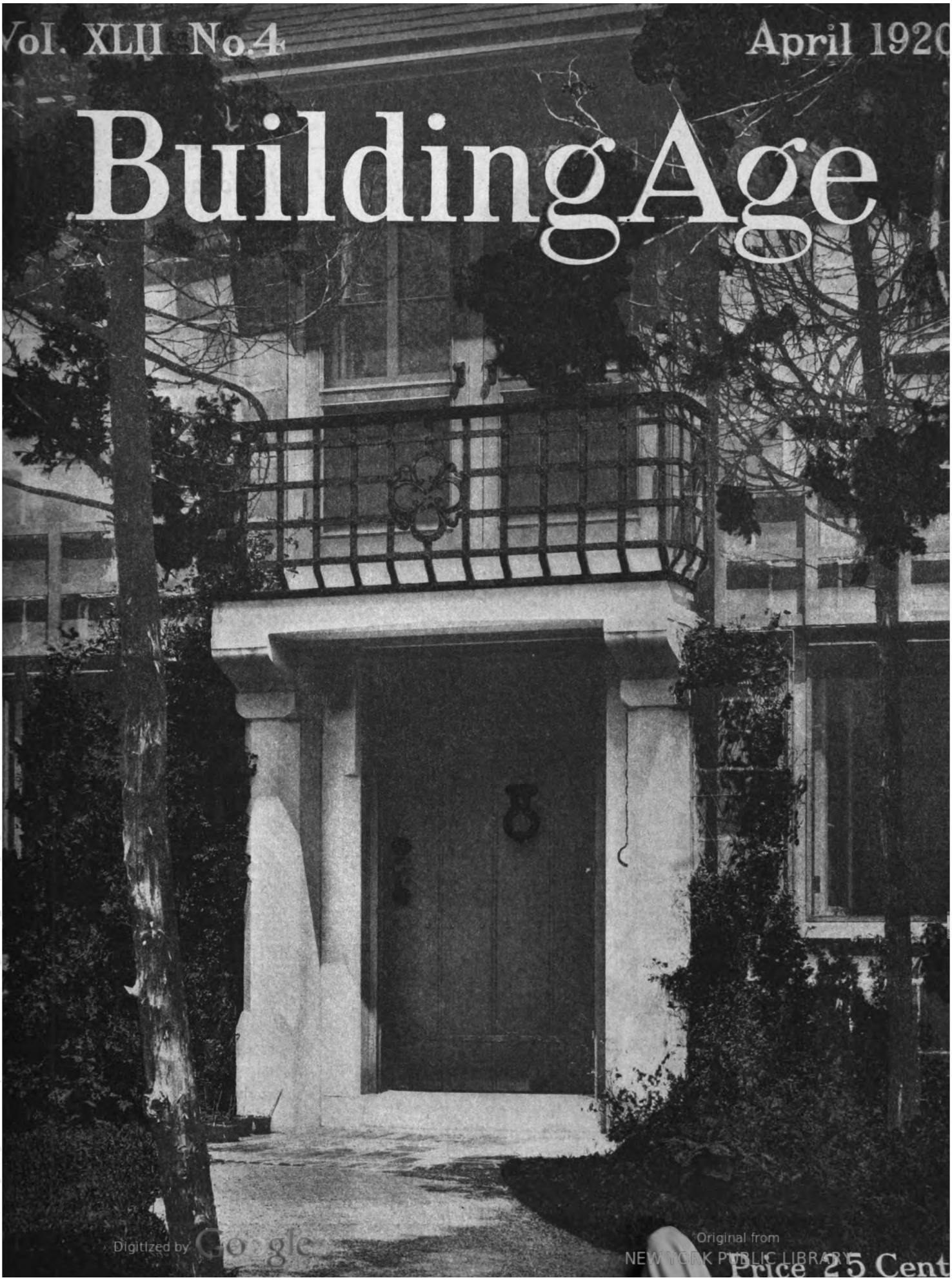

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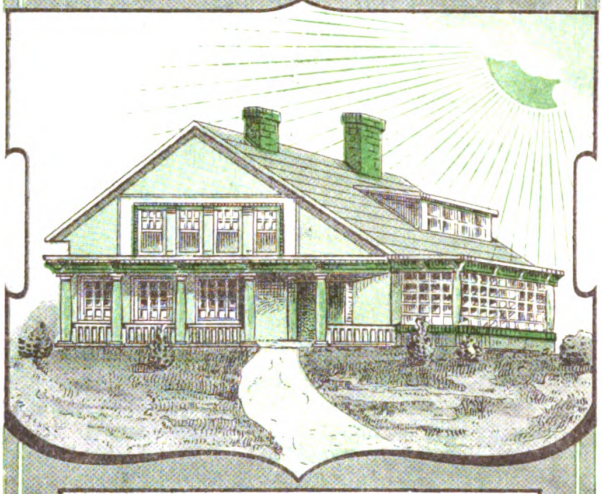

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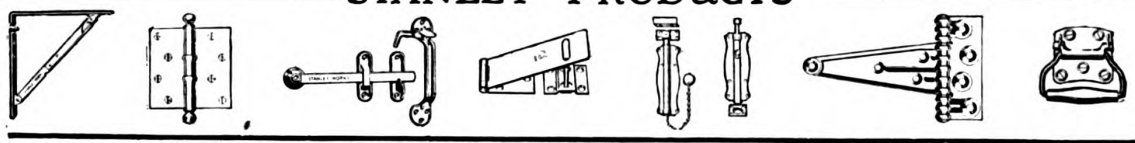

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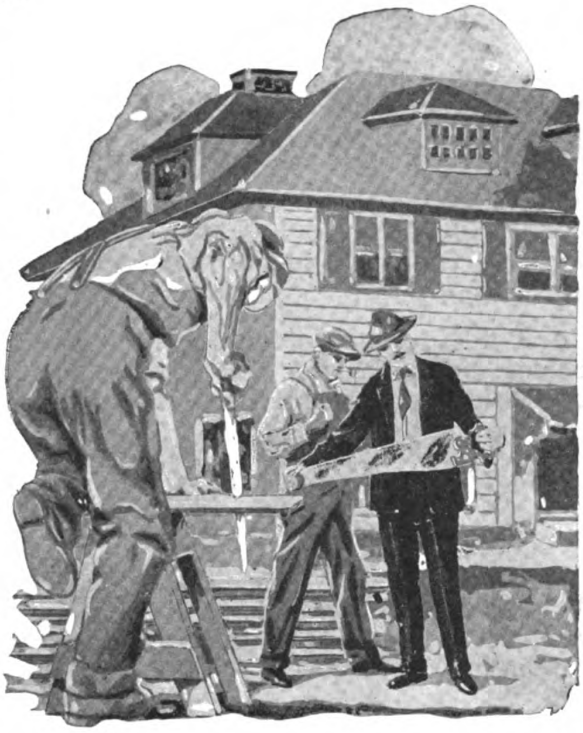

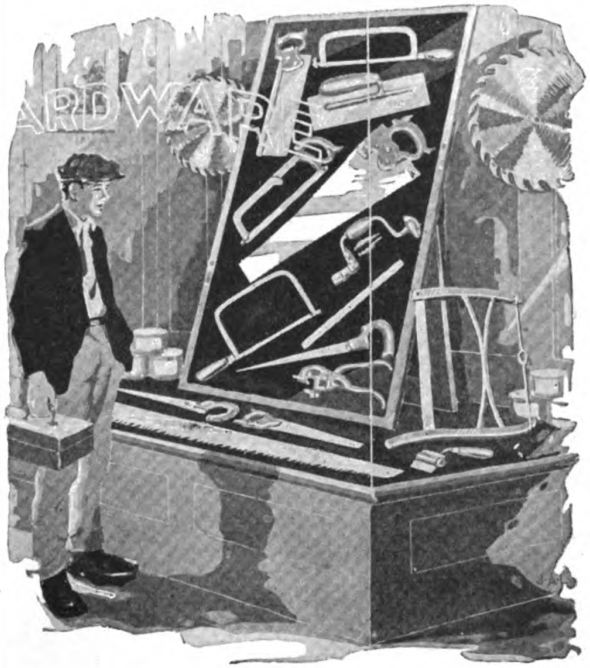

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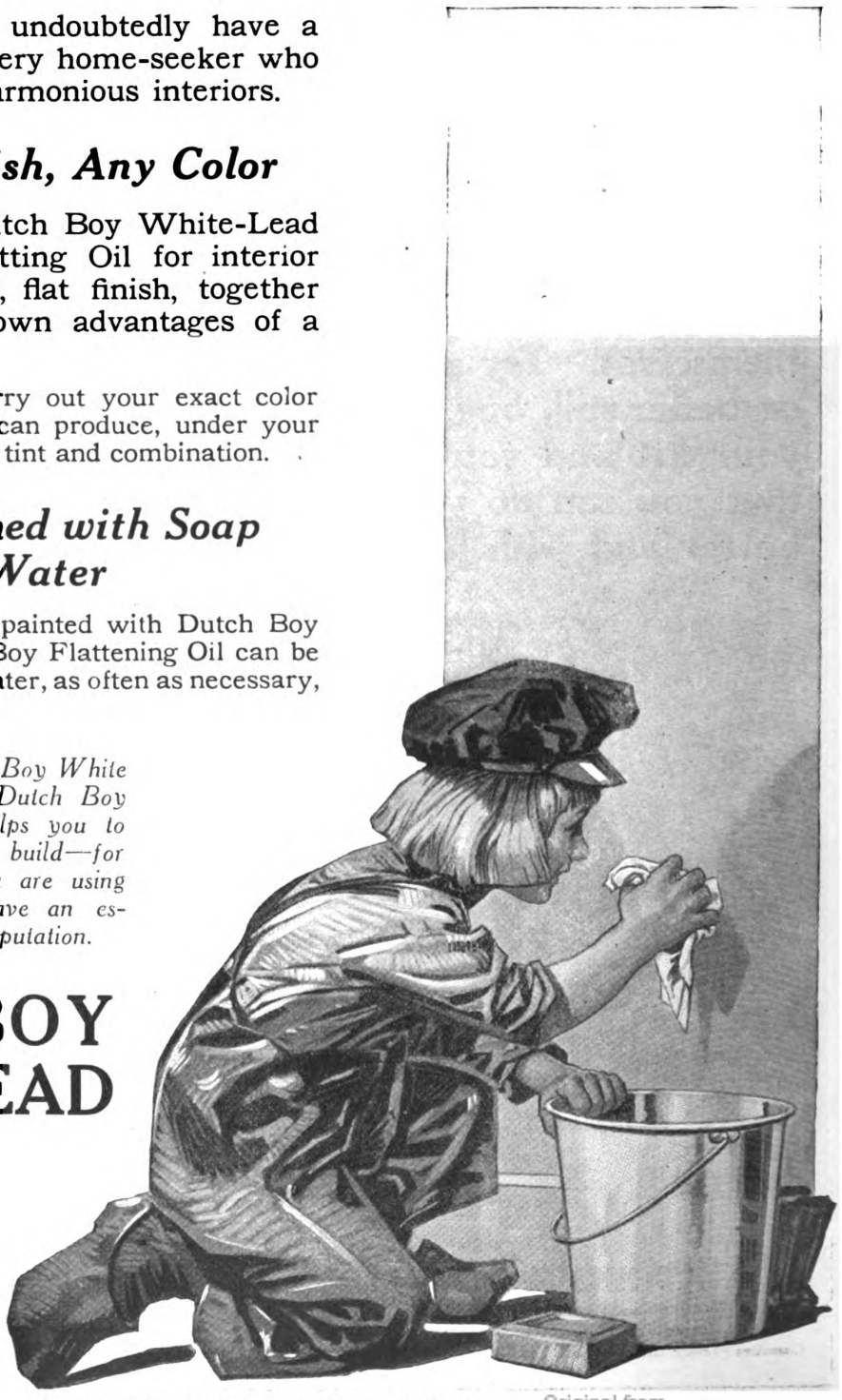

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These Hollow Tile books will solve many of your daily building problems.

The House Book and the Farm Book will enable you to give prospective builders a great number of mighty good building suggestions. They are elaborately illustrated from actual photographs of Hollow Tile homes, garages and farm buildings erected in every part of the country.

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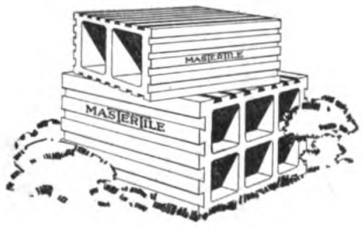

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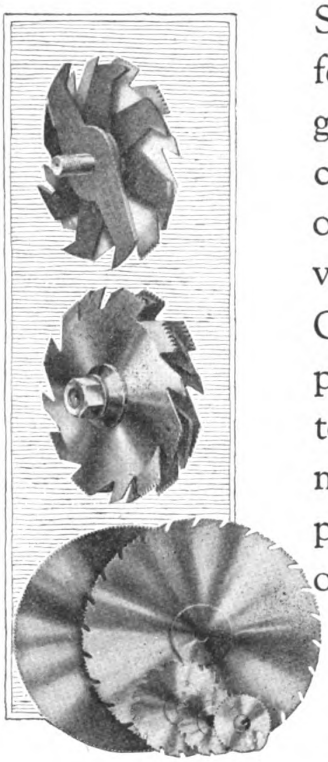

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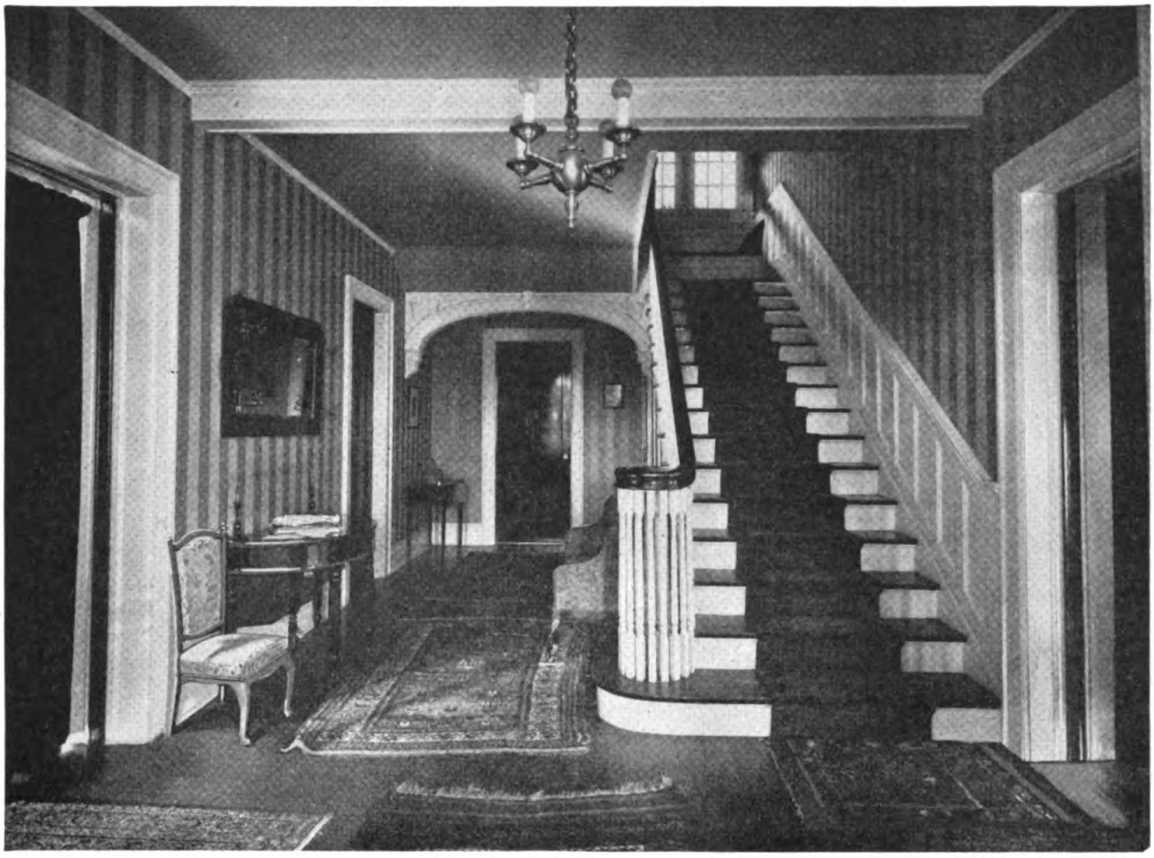

Arkansas Soft Pine Is Less Expensive for White Enamel

STILL more important is the definite fact that it is a thoroughly practical and satisfactory base for enamel. During various building exhibits in recent years many architects, after examining this wood in its natural state and seeing with their own eyes its non-resinous character as well as its close grain, have confessed they had not appreciated the vast difference between this wood and similar species of heavy resinous content.

In physical make-up Arkansas Soft Pine has those qualities which actually insure against raised grain or discoloration. Properly sanded, the surface holds its satin-like face permanently. Being non-resinous, no primary coat of shellac is necessary, but zinc or white lead priming coats are applied *first*. This procedure provides a thorough engagement of pigment and fibre upon which the enamel may be built up to a perfect finish.

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Arkansas Soft Pine is trade-marked and sold by dealers East of the Rockies.
Technical literature, natural and finished samples on request

Arkansas Soft Pine Bureau, 1361 Boyle Bldg. **Little Rock, Arkansas**

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"WHEN you think North Carolina Pine will do as well as the more expensive woods for our walls and floors," said the wife, as she turned the sample panel over and over in her hands.

"I am positive it will," said the contractor. "Woods are expensive more on account of their scarcity than anything else. I know of no other wood that has a more beautiful natural design. It contains very little resin and takes stains, paints, varnishes and enamels with no discoloration whatever. North Carolina Pine is cut in such a way that when used for floors, you save over ten per cent. in the amount of lumber you would otherwise use. If people would only realize the economy of North Carolina Pine for their interior woodwork, they would surely use a great deal more than they do now."

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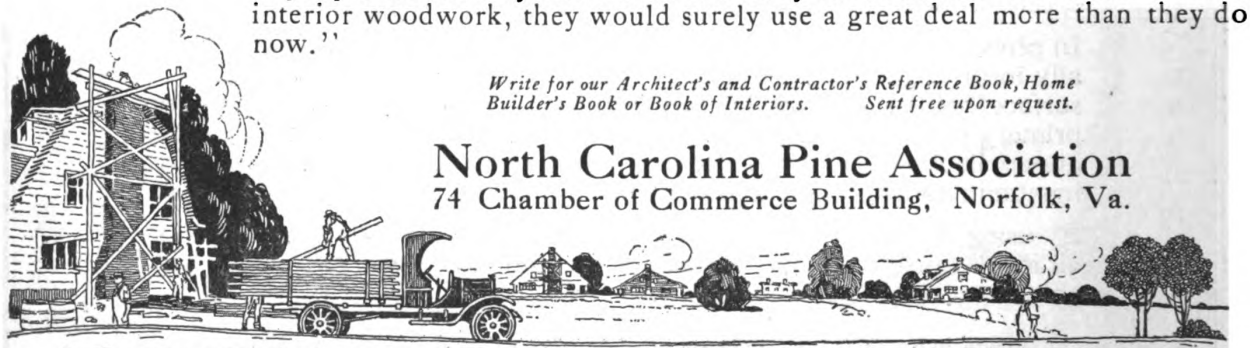

NORTH CAROLINA PINE

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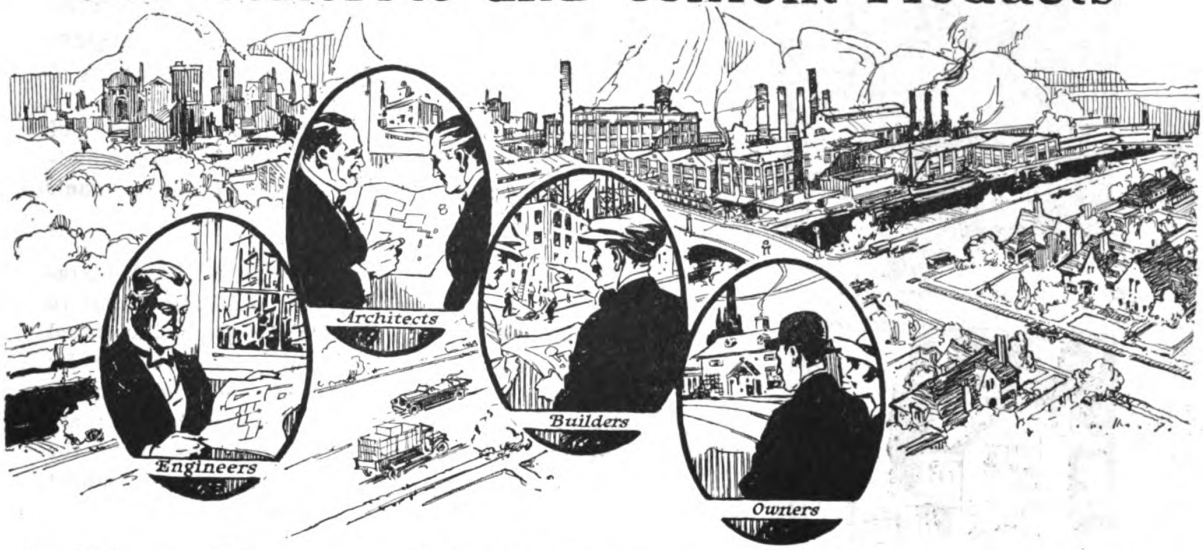
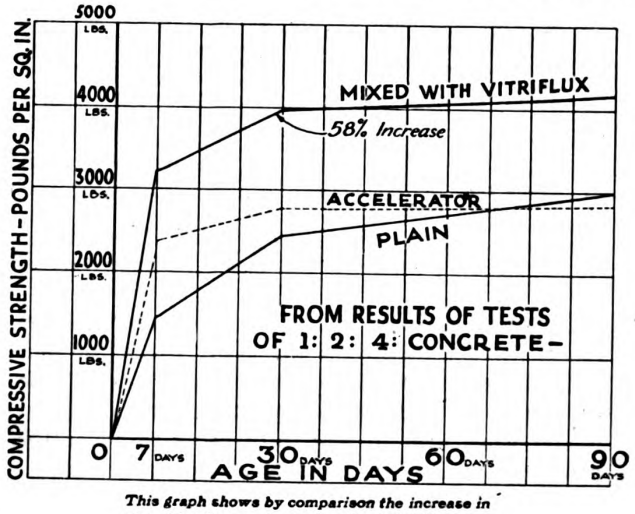


A New Thoroughly-Demonstrated Integral Flux Which Vitrifies Concrete



This graph shows by comparison the increase in strength of concrete made with VITRI-FLUX

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VITRI-FLUX by its unique chemical action produces a stronger, tougher, denser, more homogeneous concrete. Because of its vitrifying action, it hardens, waterproofs, and strengthens concrete to a remarkable degree in one operation.

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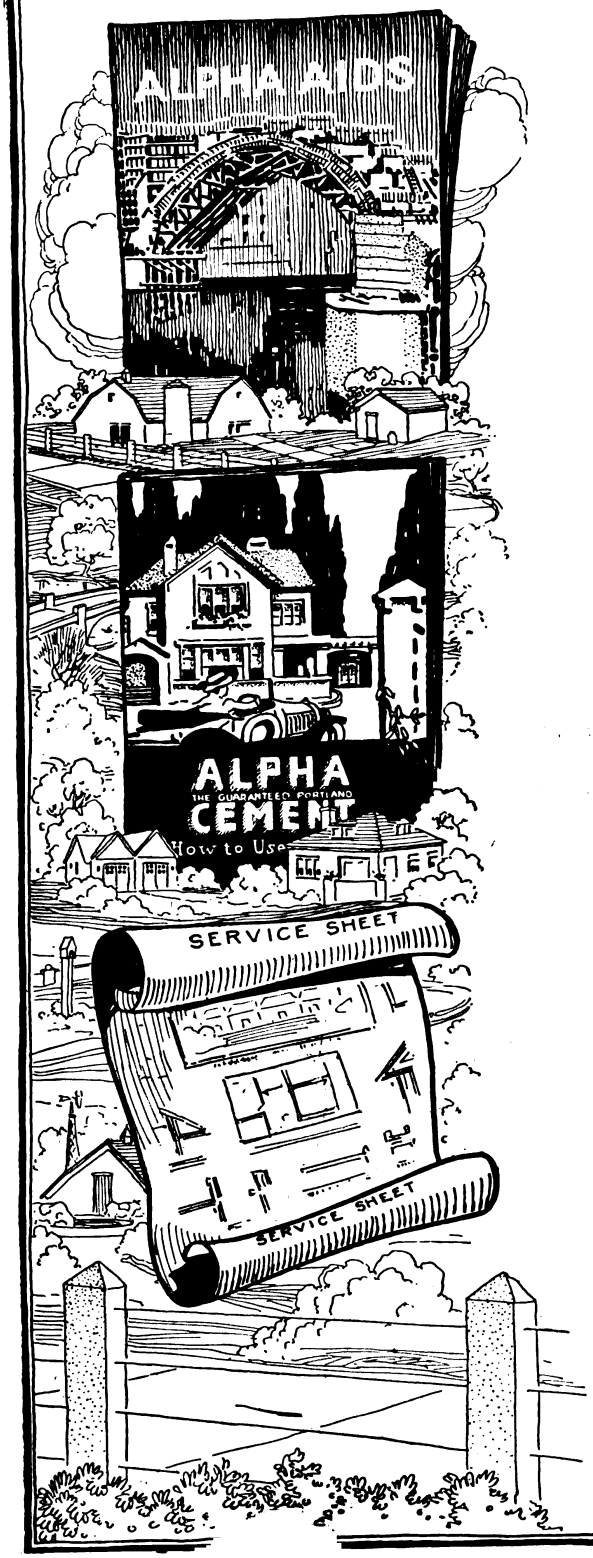
Get These Free Suggestions on Concrete Improvements



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Workingmen's Homes	Corn Crib
Walkways and Driveways	Storage House
Concrete Roads	Smoke House
Bridges and Culverts	Hog House
Foundation and Hatchway	Poultry House
Gutter and Curb	Dipping Vat
Storage Cellar	Tanks and Troughs
Small Warehouses	Piers for Small Boats
Spring House	Garden Furniture
Small Dam	Greenhouse
Milk House	Coal Pocket
Ice House	Post and Walls
Manure Pit	Walls, Sills and Lintels
Septic Tank	Garages and Runways
Oil Storage Tank	Overcoating of Old Dwellings
Tennis Court	Porch, Cellar and Stable Floors
Inclosure Walls	Warm-weather Concreting
Barn and Silo	

Ask for the Sheet or Bulletin that interests you most, also for a copy of the Handbook. All sent free of cost or obligation if you live East of the Mississippi. We are obliged to ask inquirers out of our sales field to send fifty cents to cover the printing and mailing expense of this material.

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It is more sanitary—no ash dust in the cellar.

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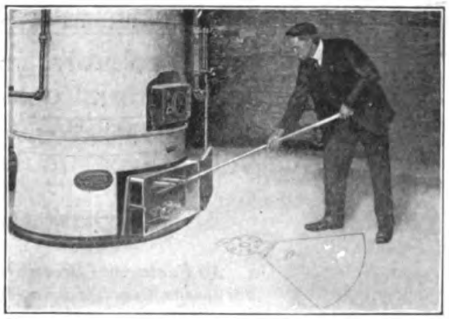

Let us send our booklet which describes fully the advantages and conveniences of the Sharp Rotary Ash Receiver.

THE SHARP ROTARY ASH RECEIVER COMPANY

20 PHELPS BUILDING **BINGHAMTON, NEW YORK**

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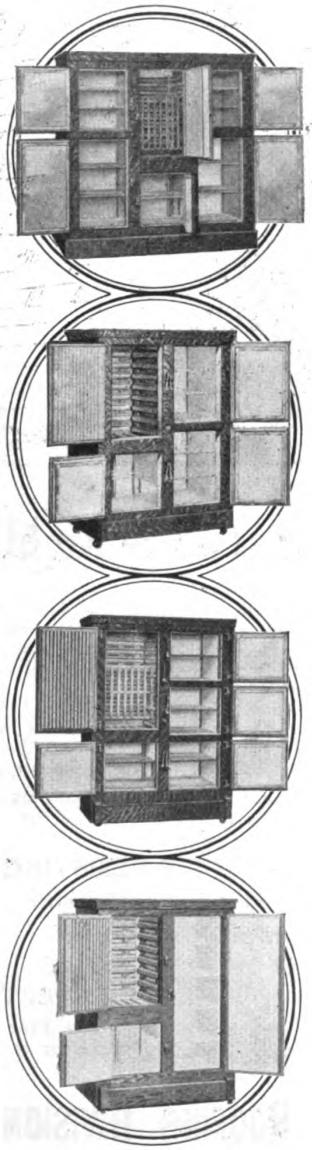

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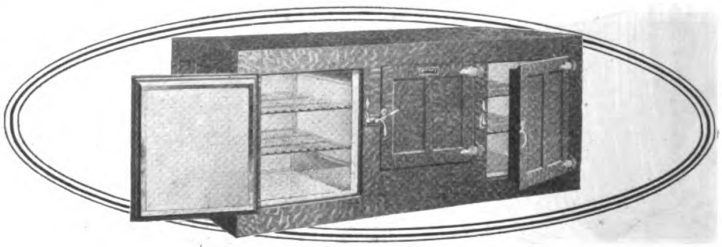

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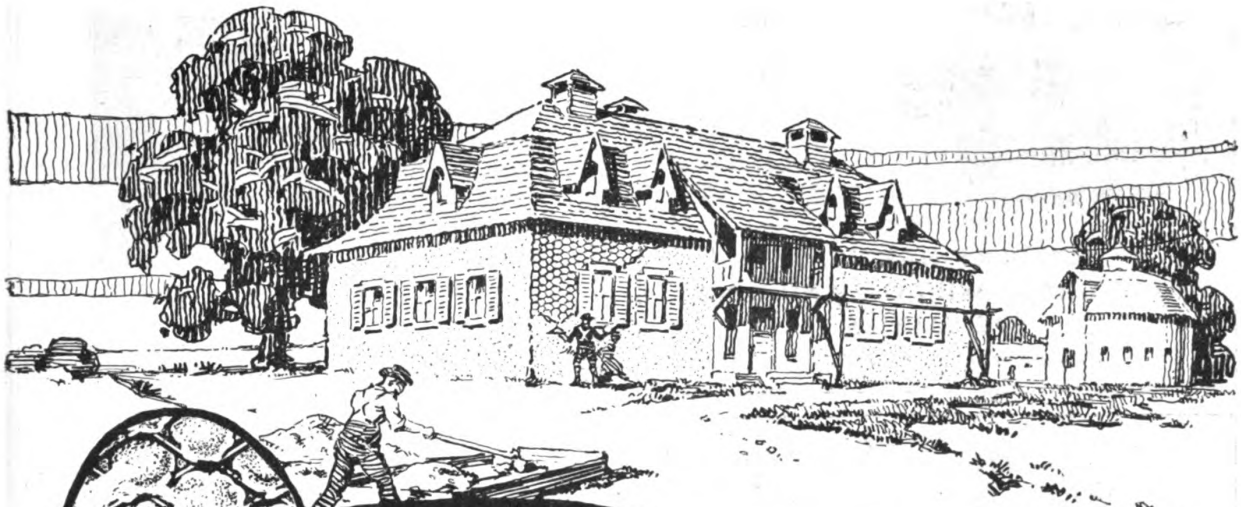

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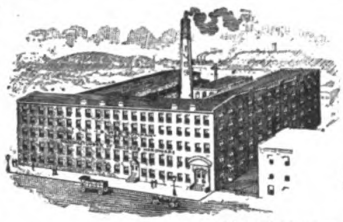

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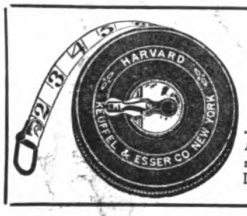

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Farm house of George Ade, the author, at Brook, Indiana, shingles, siding and timbers stained with Cabot's Creosote Stains

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where beautiful and lasting colors, cheapness and preservation of the wood are desired, use

Cabot's Creosote Stains
They have *proved* their merit in every climate for over thirty years, and are endorsed by nearly all the architects, who have specified them for years. The colors are soft, rich and harmonious, the Creosote penetrates the wood and preserves it, and *they* make wood less inflammable. Shingles make the warmest and cheapest outside finish, and a shingled house stained with Cabot's Stains is the ideal, cozy American country home.

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Section of Sound-Proof and Fire-Proof Partition. Can be used for outside walls also.

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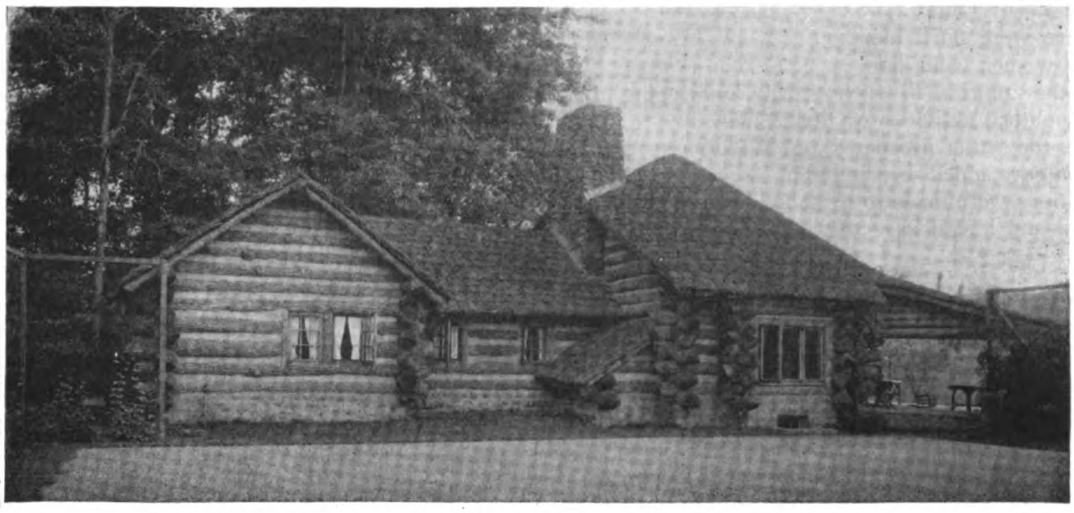
BUILDING AGE

NEW YORK, APRIL, 1920



A LOG HOUSE AT ST. DAVID, PA.
D. KNICKERBACKER BOYD, *ARCHITECT*

Log Houses

A Picturesque and Easily Constructed Type, Suitable for the Camp and Outlying Rural Communities

WHEN the Mayflower, bearing its human freight of devout Pilgrims, touched at Plymouth Rock, the sturdy men and women who had sought a new country where they might pursue the rights of religious freedom untrammeled, spread along our eastern seaboard and established their homes. Later, and following the Edict of Nantes, others came to these shores until what is now called the New England Coast became dotted with the settlements of the colonists.

Everywhere where these sturdy people settled, the forests rang with the firmly driven strokes of the woodsman's axe, and where once a primæval wood existed now appeared a clearing. In these clearings there were erected the log houses built of huge timbers notched and fitted to make a dwelling that would protect the dwellers from the rigors of the climate and serve as a fortress from which to repel the marauding activities of the Indians.

In their building, these log houses displayed the skill and ingenuity of the colonists. The logs were carefully selected and trimmed to leave the smallest possible crevice through which might filter the snows of the long Winters or the driving rains of the Spring and Fall. In the crevices of the logs, clay from the banks of nearby brooks was closely plastered, while the floors were either of the tightly packed earth or of huge planks hewed out of solid logs. The whole fabric was one of absolute solidity. The windows were closed with huge plank shutters, while the outer doors were of the heaviest construction, built to withstand any attacks by the savages.

As time passed and the thrifty housewife found opportunity, a simple garden with simple planting

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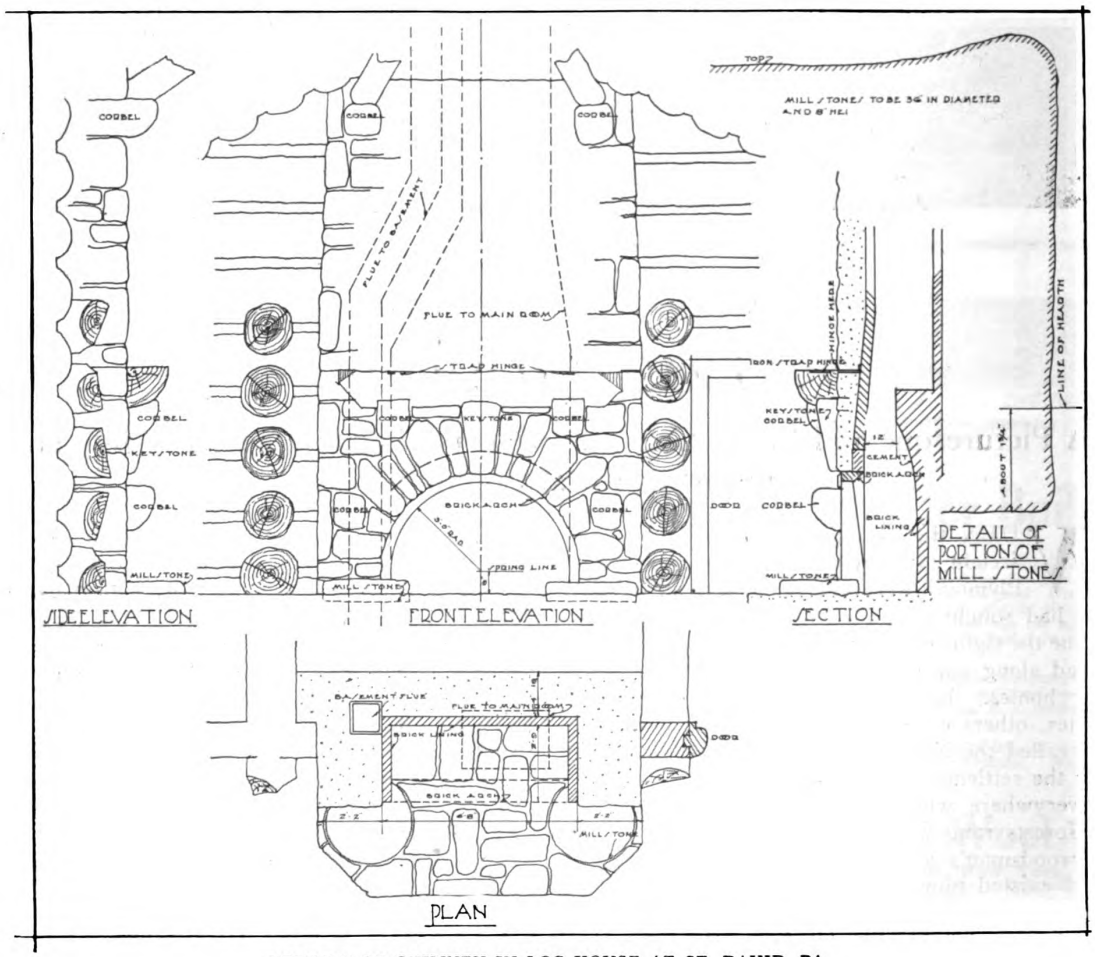
was created, vines overran the house or crept to the very top of the huge stone chimney. These log houses in the truest sense were homes. There the colonists lived and there they raised their families. It was in houses of this type where were born men and women who later set the impress of their sturdy upbringing upon the political activities of their times.



A LOG CABIN BUNGALOW
D. KNICKERBACKER BOYD, *ARCHITECT*

As the settler prospered and the increase of population gave added security from Indian depredations, additions were made to these log houses, all of one-story and irregularly covering a large area. Survivals of this form of building may be seen all over New England. The main houses from which there extend the barn, the stable, granary, corncrib and woodshed, were common forms. In the neighborhood of the main entrance a well was usually dug. This was protected by a stone curbing, with a high well sweep, balanced by a rock. These adjuncts, like the house and dependent buildings, were vine-clad and picturesque. This picturesque aspect of the New England countryside was produced by the same causes that have made the old England countryside the most attrac-



DETAILS OF CHIMNEY IN LOG HOUSE AT ST. DAVID, PA.

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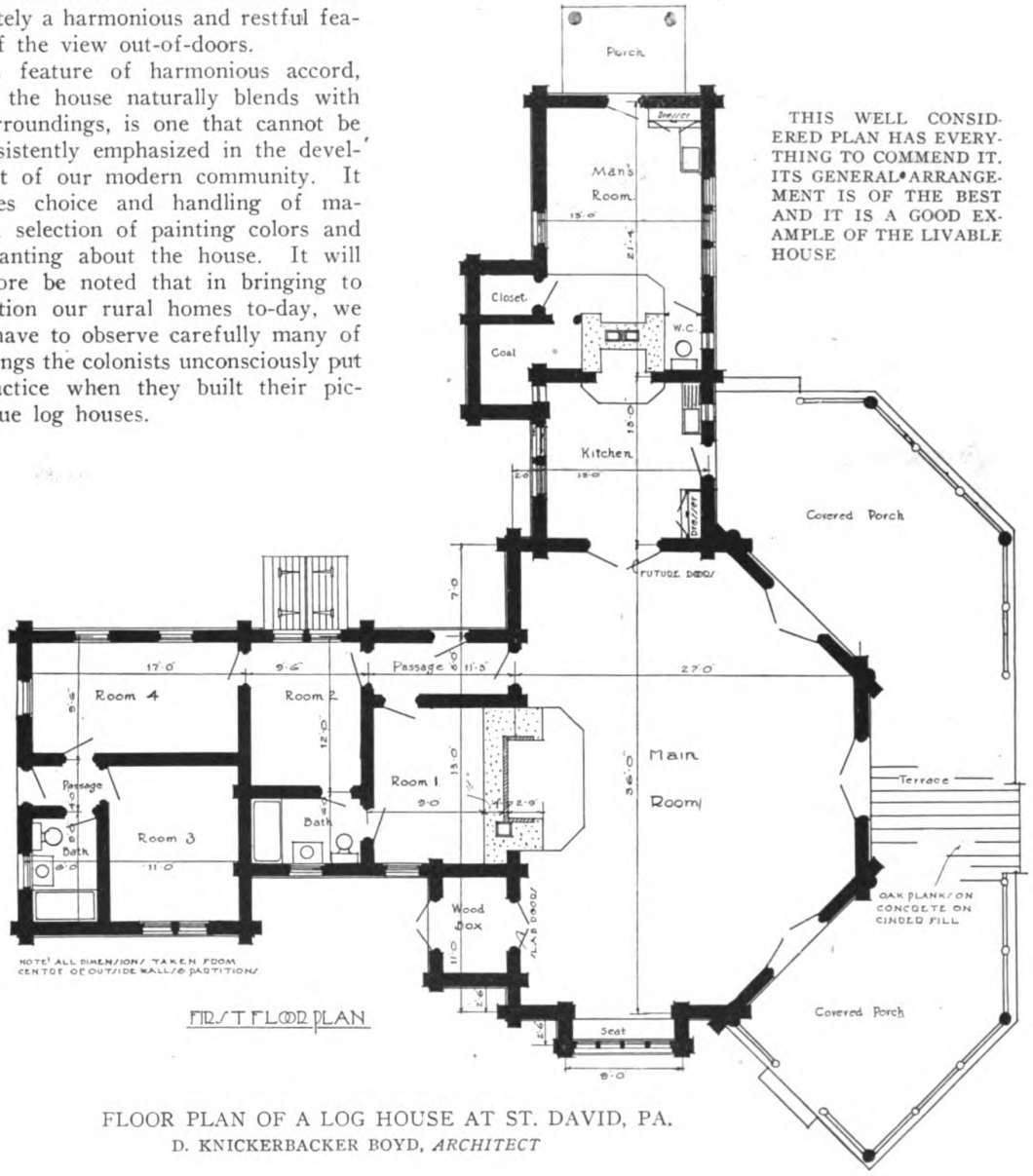
tive rural feature of possibly any country. The houses sprang from the ground as from the very soil itself. Every material employed was taken from the nearby fields and it weathered exactly in harmony with the fields and trees about it. These log houses took on the varying hues of the seasons and for that reason became absolutely a harmonious and restful feature of the view out-of-doors.

This feature of harmonious accord, where the house naturally blends with its surroundings, is one that cannot be too insistently emphasized in the development of our modern community. It involves choice and handling of materials, selection of painting colors and the planting about the house. It will therefore be noted that in bringing to perfection our rural homes to-day, we shall have to observe carefully many of the things the colonists unconsciously put in practice when they built their picturesque log houses.

shown in this issue. Besides the usual accompaniment of picturesqueness, these houses have been carefully studied by the very competent architects who have designed them. It is not necessary of course in selecting this type for a summer home to



THIS WELL CONSIDERED PLAN HAS EVERYTHING TO COMMEND IT. ITS GENERAL ARRANGEMENT IS OF THE BEST AND IT IS A GOOD EXAMPLE OF THE LIVABLE HOUSE

FLOOR PLAN OF A LOG HOUSE AT ST. DAVID, PA.
D. KNICKERBACKER BOYD, *ARCHITECT*

NO type of house may be more fittingly selected for camping lodges, for lakeside homes or for those who for certain periods of the year like to get away from the cares and the daily grind of city living. Three attractive types of log houses are adhere to the primitive and inconvenient plans of the colonists. The architects have given to the planning of these houses the same careful consideration of convenience and comfort as to more costly and permanent dwellings. But in affording these

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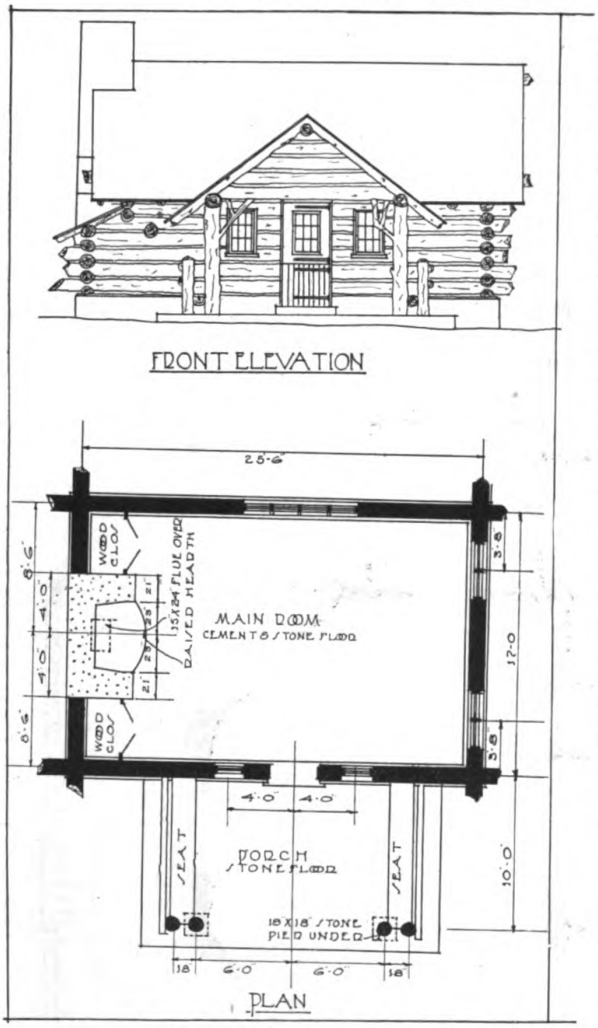
necessary comforts, none of the characteristics of the early type of log house have been neglected.

Possibly the question of labor that will be able to construct this type may become one of serious consideration. While the plans show the main essentials



FLOOR PLAN AND ELEVATION OF A LOG CABIN BUNGALOW AT HAVERFORD, PA.

of construction, the builder will undoubtedly be compelled to give more constant supervision than otherwise if the correct result is to be attained. Fortunate will he be if he can call to his aid men who have worked in lumber camps, who know how to handle an axe and get results that it would tax some men to accomplish with a whole chest of tools. The owner, if of a mechanical bent, will find recreation and much satisfaction in co-operating in the building of his log bungalow and will feel the keenest zest in putting to test all the ingenuity he has in securing features of good artistic character.

THE log cabin at St. David, Pa., illustrated in this issue, is a particularly well-done example of this type of house. In this case the house is one that might properly be placed in an outlying suburb. It has the aspect of permanency and domesticity very strongly emphasized. The plan of this house is particularly good. The living room, 27 x 36 feet, is unusually large and provides a living space in the strictest sense. It is well lighted, making a cheerful interior. The large stone fireplace, with its nearby handy wood box, is the central feature of the room and suggests the comforts that may be had during chilly evenings when the family is gathered about this ingle-nook. It is houses like these that are in the truest sense homes. It is in such an interior that our young men and women may experience those daily associations which make for the best manhood and the highest type of womanhood. The kitchen or service wing is so planned as to afford such elements of privacy as are desirable. There



VIEW OF A FIREPLACE IN LOG HOUSE AT ST. DAVID, PA.
D. KNICKERBACKER BOYD, *ARCHITECT*

are practically three well placed bedrooms with two well located bathrooms. The covered porch with its wide oak planked floor will in pleasant weather be as much used as the interior. Here there is room for hammocks, tea-tables and all those equipments

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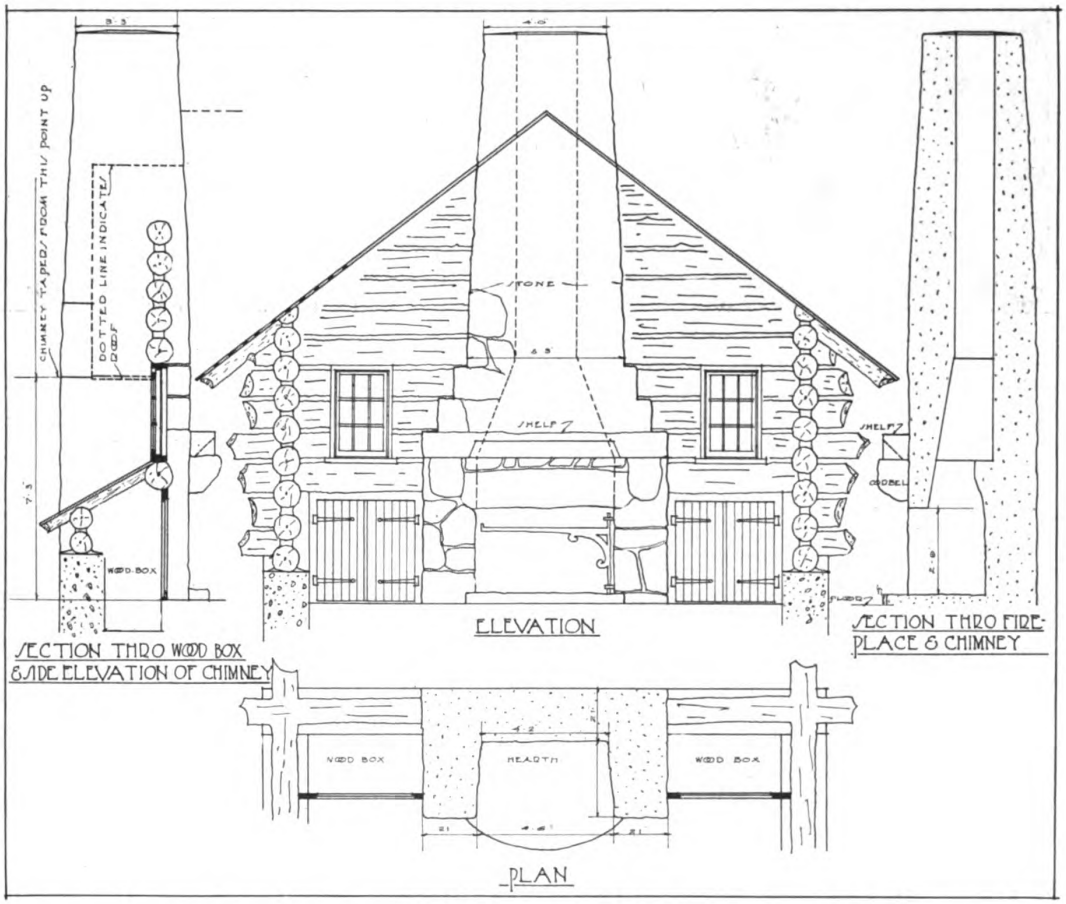
of porch furniture that make the porch an important adjunct to the living room.

When the photograph from which our illustration was made was taken, the planting about the house had not yet been carried forward to its artistic possibilities. Undoubtedly, with the course of time, this house will become an embowered and beautiful home.

place, there are no partitions. The required privacy can be readily attained by movable screens or easily arranged draperies. A detail of the fire-place, show- a decorative treatment of a chimney breast, may be taken as the keynote for the treatment of the entire room. Here are affixed trophies of many a day's sport. Note the rustic chandelier and the pendent lanterns. The furniture might well be selected with



DETAILS OF FIRE PLACE AND WOOD CLOSETS, LOG CABIN BUNGALOW AT HAVERFORD, PA.
D. KNICKERBACKER BOYD, *ARCHITECT*

THE Lloyd bungalow at Haverford exactly fits into its surroundings. It is a picturesque and delightful place where tired people may find a delightful week-end camping place. The spacious fire-place, with its convenient wood closets, bespeaks a most cheery interior. When this fire-place is heaped high with logs the changing shadows will throughout this large room create a weird and restful effect. As this bungalow is not designed for continuous living, but to serve more as a "tenting" a view to the general rustic character of the interior. It is in this instance too new and apparently shop-made to be in keeping with the other appointments.

Through the courtesy of the architects we have been permitted to present to our readers a very comprehensive series of details, plans, etc. With these intelligent guides the builder will experience little if any difficulty in constructing, with such modifications as may be thought desirable, equally picturesque log houses.

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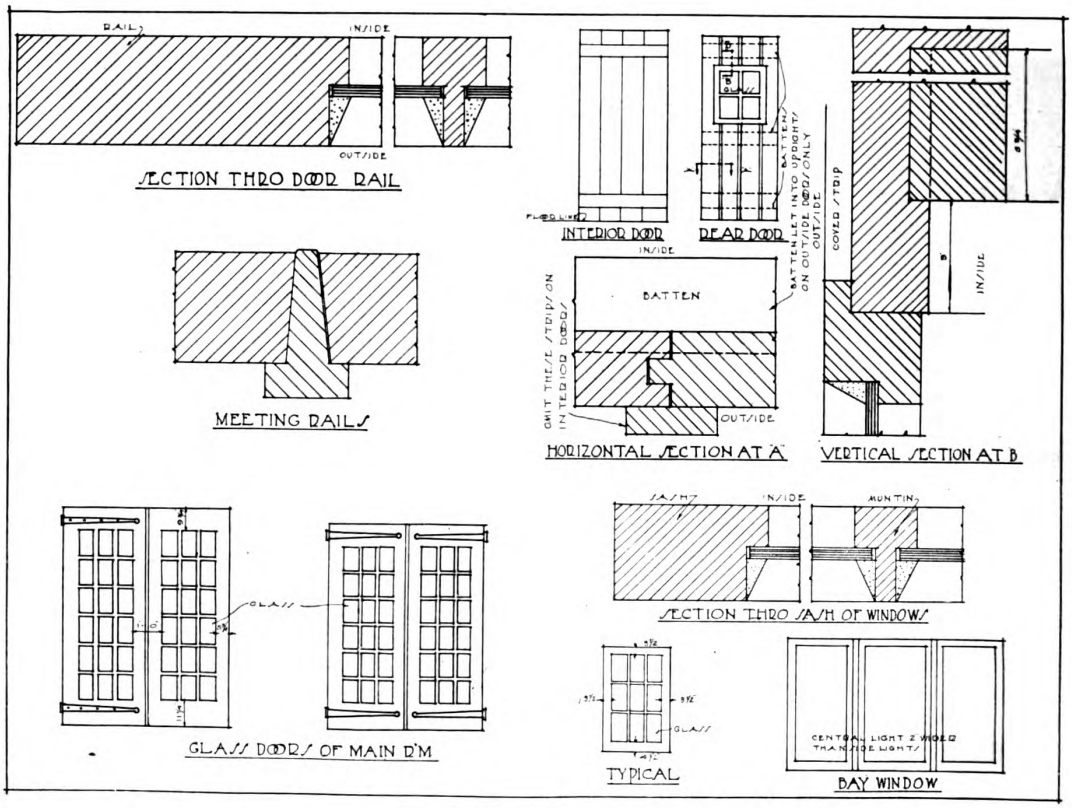
A LOG CABIN BUNGALOW AT HAVERFORD, PA.



DOOR AND WINDOW DETAILS OF LOG HOUSE AT ST. DAVID, PA.
D. KNICKERBACKER BOYD, *ARCHITECT*

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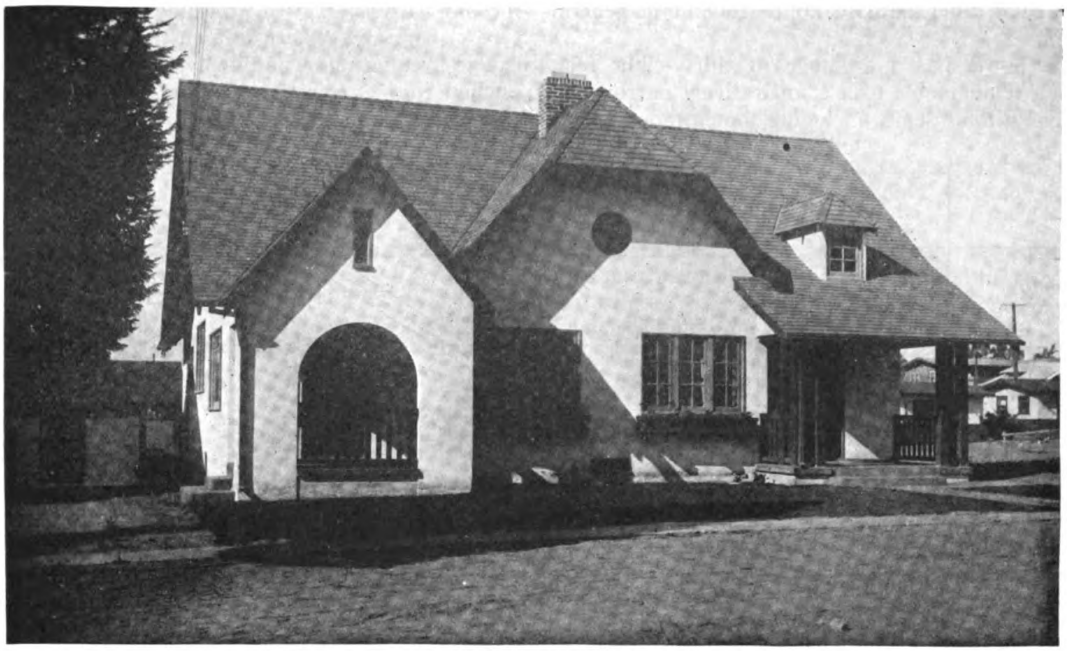

TWO-FAMILY HOUSE AT LOS ANGELES, CAL.
HAROLD BOWLES, *ARCHITECT*

A Well-Planned Two-Family House

By CHARLES ALMA BYERS

IT is often that, for the improvement of city property, a house especially designed for two families constitutes a very practical and desirable arrangement. This is particularly true in respect to some localities and when the building improvements are planned, wholly or in part, for income purposes. The neighborhood in which one's property is located, for instance, may be of such character that only families dependent upon small salaries can be catered to as tenants, and yet the realty investment may represent an amount too great to make the rental income from a single-family house so located sufficient to constitute adequate interest. Then, too, it is not infrequently that the owner of a somewhat similarly located lot desires to create thereon a home for himself, and yet is financially unable alone to bear the burden of interest on the investment and of upkeep expense. It is in instances such as either of these that the two-family house affords a quite practical solution of the problem. In cases like the former the monthly income may be wholly or nearly doubled, and in those of the latter kind the returns from the renting of one of the divisions will often prove sufficient to pay the interest and other expenses entailed on the entire investment. Naturally the building cost of the double house will be somewhat greater than for a single one, but, on the other hand, a single city lot of ordinary size is made the site of two homes instead of but one.

The plan of property improvement suggested above is excellently illustrated in the house here shown. Designed somewhat after the English style of architecture, this two-family house is of especially attractive outside appearance, and is both of practical design and of warm and substantial construction. A center partition divides the interior into two entirely separate apartments of exactly equal size, and each of these divisions is provided with its own private front entrance. Yet, despite the presence of these two entrances on the front, the house, as seen from the street, appears to be but an ordinary single-family residence—a fact no doubt largely due to the clever manner in which

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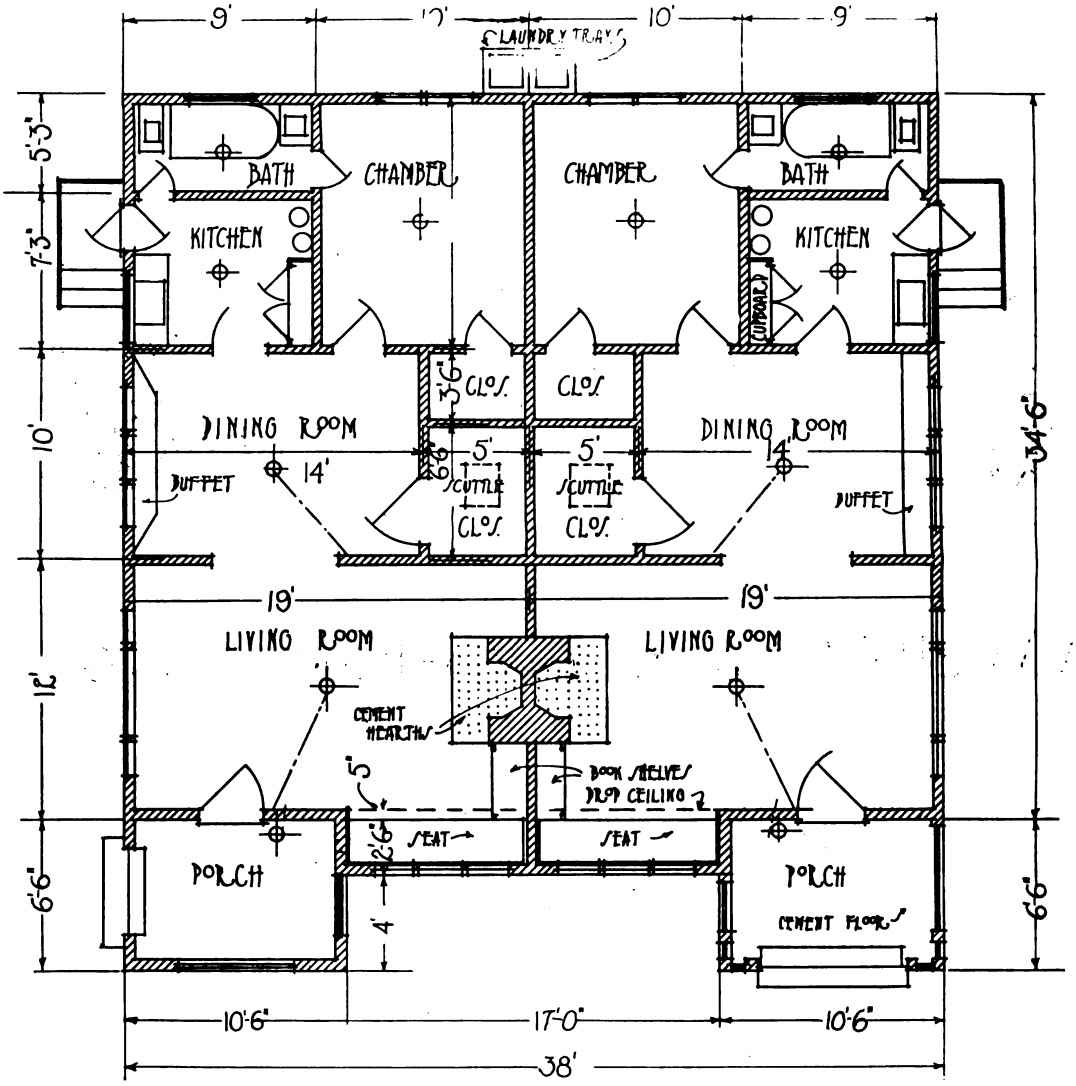
the two small entrance porches are differentiated from each other both in approach and in general design.

The house has a frontage of thirty-eight feet, making it adaptable to a comparatively narrow lot, and has a total depth, including the entrance extensions, of only forty-one feet. It is, therefore, nearly square, and, save on the front, the wall alignments are unbroken. Resting on a foundation of solid concrete, the building is of frame construction, with its walls surfaced outside with white cement-stucco over diagonal-set sheathing boards and metal lath. Both the concealed framing and the outwardly exposed finishing timbers are of Oregon fir, everywhere left rustic, or unsurfaced, except in the window and door frames. The steeply pitched roof is shingled, and its main slopes, both front and rear, are effectively, though differently, broken up with gables. The roof, as well as all outside woodwork, is painted a dark shade of green; the two front entrance porches are floored with red cement, and the double chimney that rises through the roof of the main front gable is of red brick. These colors, together with the white stucco walls,



GROUND FLOOR PLAN
A TWO-FAMILY HOUSE AT LOS ANGELES, CAL.

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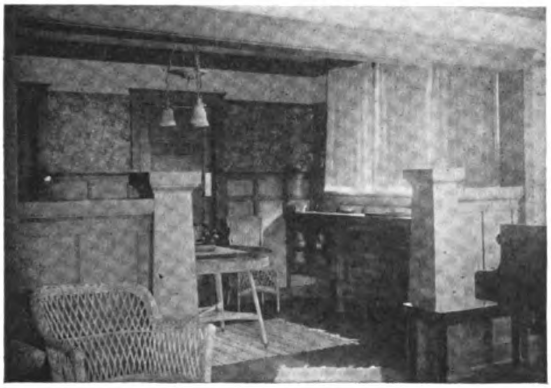
naturally produce a very attractive color scheme.

The windows, with which every room is quite liberally provided, are largely of the casement kind, and beneath each of the two groups of three on the front is a neat little flower-box. The rear, or kitchen, entrance to each apartment is by way of a step-elevated stoop of wood; and in the rear is a pair of stationary laundry trays occupying a small cement-paved area, which, with no enclosing walls, is protected overhead by a lean-to roof supported on wood posts.

Each division of this house contains living room, dining room, kitchen, bathroom and one bedroom, besides two roomy closets—one adjoining the dining room and the other belonging to the bedroom. The



A DINING ROOM WITH BUILT-IN SIDEBOARD AT RIGHT

front door, in each case, opens directly into the living room, and between this room and the dining room intervenes but a pair of wood paneled buttresses. In the way of built-in features, the former room contains a box seat, with a hinged top, and a case of open book shelving; the dining room possesses a conveniently planned buffet, consisting of a combination of china-cupboards, four drawers and a deep sideboard shelf, and in the kitchen are found the usual sink, some excellently designed cupboard space and the customary water heater.

In respect to both arrangement and finish, each department is an exact duplicate of the other. The woodwork throughout consists of Oregon fir, which in the living rooms and dining rooms is treated with wood dye to produce a dull-toned bluish gray shade, and elsewhere is enameled white. A neat wood cornice edges the ceilings of both living rooms and dining rooms, and the walls of the latter are attractive y finished with a paneled wainscot and plate-rail, the design of which may be studied in one of the accompanying illustrations. The floors of these rooms are of oak, while the flooring elsewhere is of pine, that of the bathrooms and kitchens being covered with linoleum.

In the matter of wall decorations, however, the two apartments are given somewhat different appearances. The paper employed for one of the living rooms, for instance, is of varying shades of gray, indistinctly figured, and for the dining room of the same apartment it, above the plate-rail, consists of dark gray and old-rose figures on a light gray background, while imitation leatherette of dull gray is used for the panels of the wainscoting. In the other apartment the living room paper is of soft blues and buffs, likewise indistinctly figured, and that of the upper portion of the dinging room walls is predominantly of Dutch blue shades, with the imitation leatherette of the paneled portion toned a very pale grayish blue. The walls of the bedrooms are merely tinted, but in different shades, and in the bathrooms and kitchens they are finished with smooth-surfaced hard wall plaster, marked off in tile-like squares and enameled like the woodwork.

The house has neither basement nor cellar, and, as yet, is without heating equipment, although floor gas-furnaces are to be installed later. Each of the living rooms, however, contains a fireplace, which, constructed of wood and buff-colored brick, is designed somewhat along Colonial lines. The house is located in Los Angeles, California, and was built from plans prepared by Harold Bowles, architect, of that city.

As may be readily realized from the illustrations, this two-family house presents a very pleasing outside appearance, and is fully the equal in attractiveness of any home in the neighborhood. In fact, it is, in this respect, somewhat above the average, and as an investment it is quite remunerative, for it yields a monthly income of nearly double the amount that could be realized from a single residence similarly located. All in all, it comprises a very satisfactory arrangement, especially when considered from the standpoint of economy.

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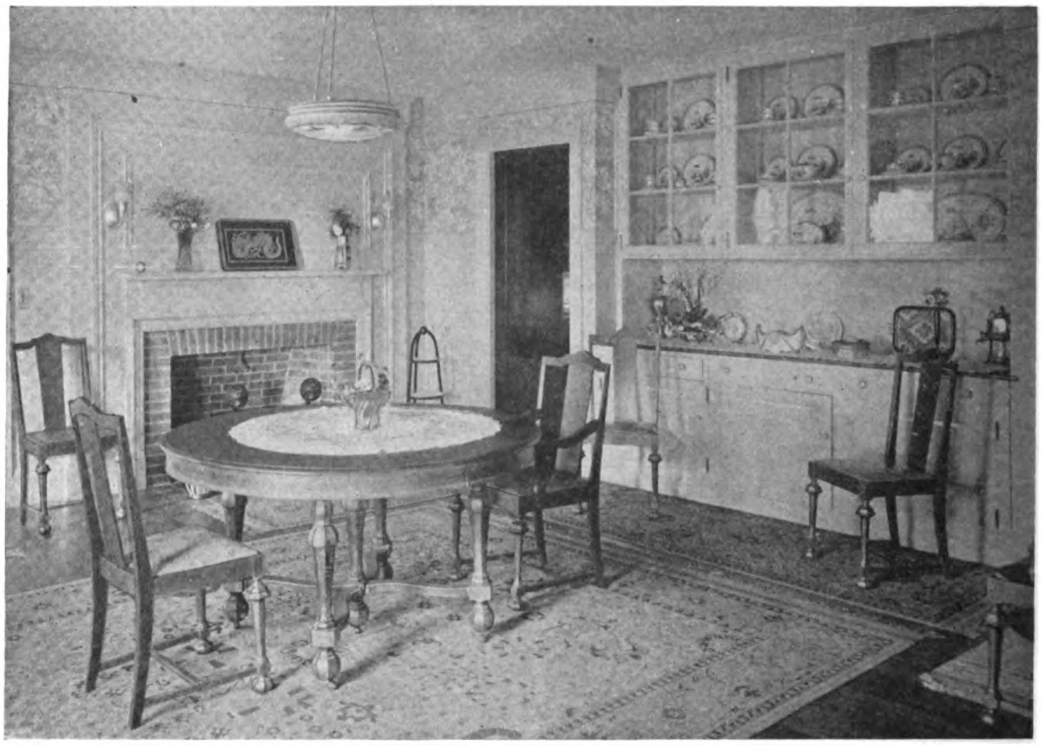

A WELL APPOINTED DINING ROOM WITH A BUILT-IN SIDEBOARD AND CHINA CLOSET

Built-In Furniture

Features of Permanence, Utility and Artistic Effect that Largely Contribute to the Homelike Aspect of the House

THE difference between a house and a home is mainly a difference in the degree to which its aspect indicates a close relation with the development of the house and its transformation into a scene of intimate and cherished association. There is a sense of desolation in the contemplation of an empty house. The unoccupied floors, the bare walls, all express loneliness. Animation may only be had when the furniture and all the many utilities that make up one's "Lares" are in place. A house is but partly complete that lacks the built-in features, which, when properly designed and placed, become permanent pieces of furniture, add an appropriate artistic touch to the interior treatment and, what is very well worth considering, greatly reduce the cost of furnishing.

Many years ago, when most people owned their own homes and lived in them from birth to death, built-in furniture was a usual and essential feature. These utilities created a sense of permanency; they were a certain indication of ownership. There was no question of doubt as to the permanent placing of a cupboard or a settee; no question in the mind that their many advantages might be reaped by some succeeding tenant. This built-in furniture literally grew into the fabric of the building and so complemented the domestic convenience as to become an essential element.

There has steadily grown a tendency in the modern house, particularly of moderate cost, to avail of all the various opportunities where built-in furniture can be with advantage located. Probably the dining room, kitchen and library will be the rooms where these features will be more generally found, but the entire house may receive attention with a view to installing built-in conveniences.

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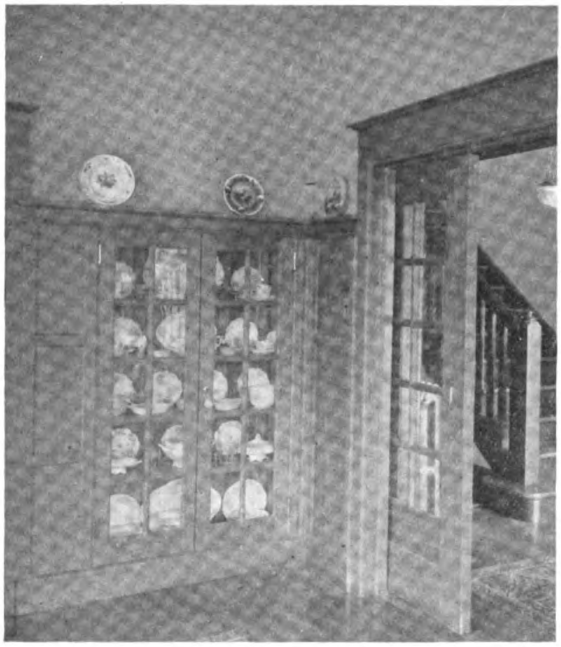
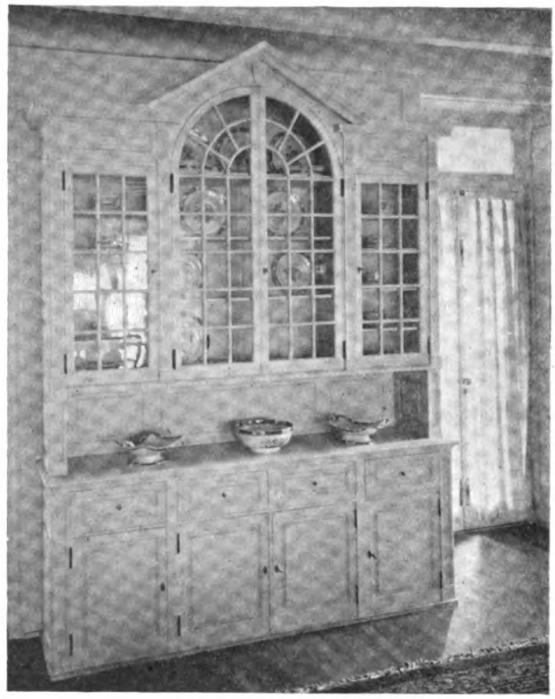


BUILT-IN CHINA CLOSETS CARRYING OUT THE EFFECT OF THE INTERIOR TRIM

Closets for china are logically located in the niches formed on either side of the dining room chimney breast. These closets should be in their general aspect in accord with the trim of the room and treated as to their finish in the same way. They may be built low, so as to afford a top that will be convenient for placing decorative jars, or that may be used for the tea and coffee services or such pieces of cut glass as the housewife will pridefully desire to display. These closets may further find a suitable location in the corners at either side of wide windows and above window seats, another type of built-in furniture which may be constructed so as to afford storage for such articles as may properly be placed there.

The most important piece of built-in furniture in the dining room will be the side-board. As a matter of fact, one of these permanent side-boards presents many advantages, not only from an artistic viewpoint, but also on the score of utility, that are not shared by the usual movable type, generally but indifferently designed and but a makeshift of convenience. More and better closet space and drawers are provided by built-in types, and when the overhead closets are added, as shown in the illustrations accompanying this article, there is created a very decidedly advantageous feature of economy and efficiency.



A GEORGIAN COLONIAL BUILT-IN SIDEBOARD WITH CHINA CLOSETS



A BUILT-IN WINDOW SEAT WITH CORNER CLOSETS

In the living room, built-in bookcases, low in height and forming a part of the "interior finish," always suggest an air of good breeding and make this important domestic center a most livable place. These cabinets may be utilized for other purposes than for books, and when the glass fronts are screened by some well-chosen fabric a convenient place is formed where the young people may store away tennis rackets, golf clubs and all the various impedimenta unfortunately often strewn about the

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house, and serving as a trap during darkness for some unwary one. Window benches with lidded seats are attractive and cozy things to install.

The feature of the modern living room about which the family congregates during long Winter evenings or cold and rainy days will be the fireplace. It is just here that a most artistic and desirable placing of built-in furniture may appear. Wide-seated settees with high backs to screen from drafts are appropriate, and they form a place where the older people may sit in semi-seclusion from the noisier younger element. In fact, it would seem to be certain that built-in furniture gives an added charm to the domestic atmosphere. This charm becomes in reality a part of the house in a truer sense than it is possible to attach to those other pieces of furniture that are movable and which are constantly changing their location.

The modern well-appointed kitchen is one where built-in furniture has been completely installed. Closets, cupboards, bins, drop tables and window seats may all properly be placed in the kitchen. The very character of their construction makes for easy cleaning and therefore a better and much to be desired sanitary condition. This feature is equally true of the bathroom, as may be seen by reference to the accompanying illustration. Here the linen closets and window seat have been white enameled to be in keeping with the porcelain accessories. The effect is one very much to be desired and the first cost, if introduced at the time of building, is no more than would be entailed by the purchase of any of the many things that are sold for modern bathroom equipment.



THE BUILT-IN CHINA CLOSETS FLANKING THE FIREPLACE EFFECTIVELY CARRY OUT THE ARCHITECTURAL TREATMENT OF THIS WELL APPOINTED DINING ROOM

Unfortunately the modern house is not provided with the closet space that the housewife regards as necessary to serve the ordinary necessities. There are never enough wardrobes or places where clothes in constant use may be hung against dust and damage. These places are logically in the bed chambers. It is almost always possible to find space for shallow built-in wardrobes. These, like the bookcases in the living room may be only sufficiently high to permit of hanging skirts and coats or may extend from floor to ceiling with an overhead closet and a mirror let in to the panel

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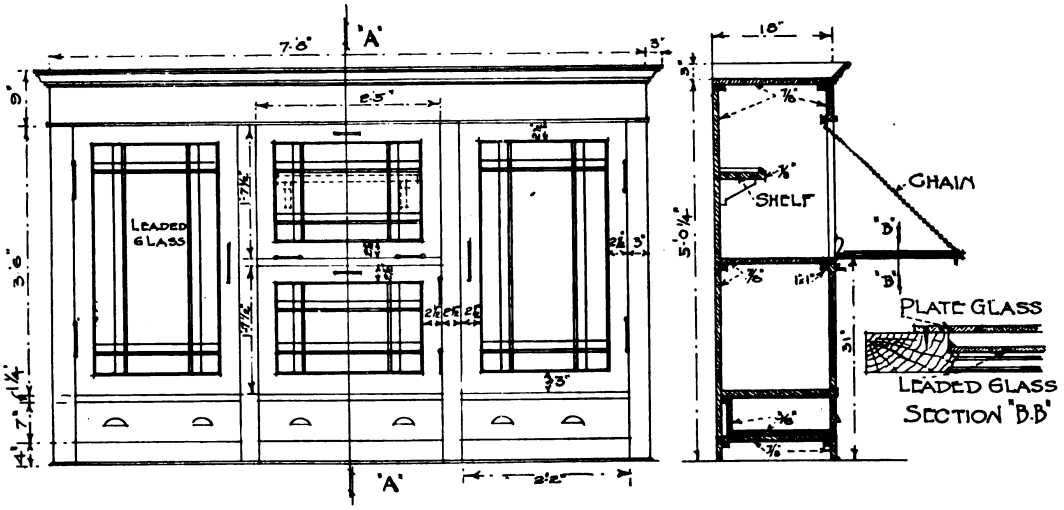
of the doors. The amount of comfort, convenience and saving that these built-in wardrobes afford is very considerable, and they will repay the moderate outlay necessary for their construction.

The owner of the low-cost house who is able to use tools will find a constant source of satisfaction in constructing built-in furniture. Particularly if his daily work is of concentrated mental



A BOOKCASE WITH BUILT-IN DESK

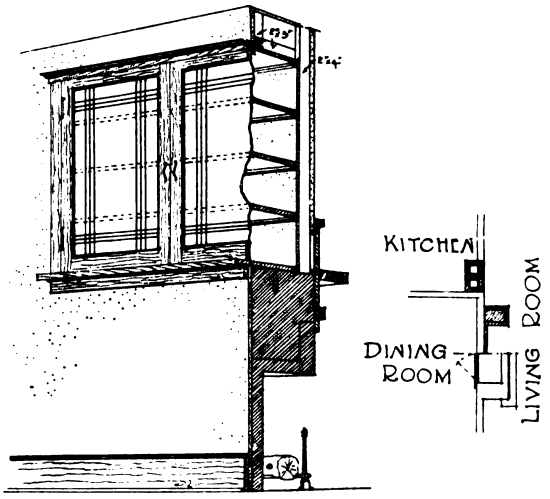
This bookcase is designed with the idea of providing space for a writing desk, at the same time giving ample room for books. The center section is built so that the top part drops to serve as a writing table. The writing space is constructed so that a perfectly smooth surface is obtained by a piece of plate glass the size required, screwed to stiles and rails or a nailed strip of moulding placed around the glass.

Section "B-B" shows this construction. The inside of desk is built with a shelf with a quarter-round mould, and can be used for envelopes, writing paper, etc.

All other details are shown and explain themselves.

Let the cellar not be forgotten when built-in furniture is contemplated. It is this space below ground where built-in furniture becomes a first sanitary necessity. Here, where coal and ash dust is ever present, there is seldom given the serious consideration to proper closets or bins that there should be. The season's "canning" will be stored here, and, in fact, all the impedimenta of the household laid aside for use until the return of certain seasons. Properly speaking, the cellar should be divided so as to form a room that would be dustproof. In this room there may be constructed the closets, bins and swing shelves that are always desirable and convenient features.

There are no limits to the directions in which the "handy man about the house" may turn his efforts. When he has made his house a home by these methods, provided every simple convenience that will suggest itself in the interior, he may find opportunities out-of-doors on the porches and verandas. Here there might be built substantial benches, a closet for garden tools and often—a small cupboard where the milkman can leave the milk, the paper man his paper and the tradesmen the various parcels, safe from the depredations of the prowling cat and the ever-hungry dog.



CHINA CLOSET BUILT OVER FIREPLACE

This particular construction can be readily adapted to a fireplace with a gas log. In the living room the fireplace is constructed as usual of brick or tile with the projection running to the ceiling, as is customary in the usual fireplace. The part above this fireplace is framed out for the china closet, and shelves built in as shown.

The doors are of leaded glass with brass or bronze butts.

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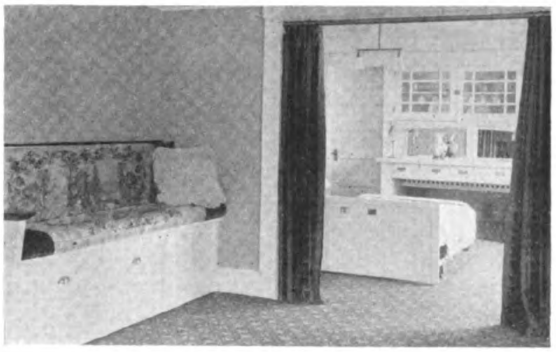
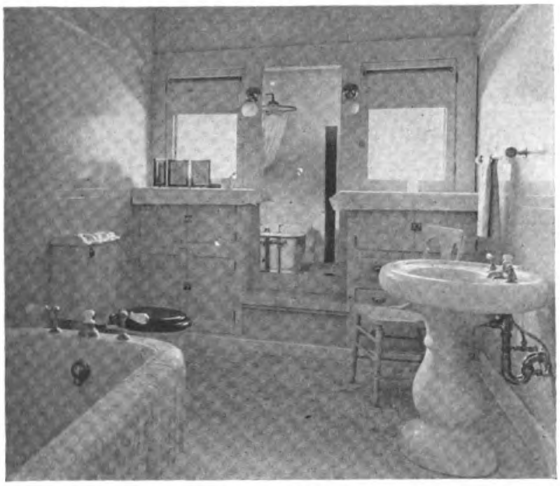
effort will this home carpentry appeal to him, for who does not know that rest is not absence of occupation but the doing of something different from the absorbing daily activities of bread-winning.

There is included among the illustrations an interior showing a modern type of built-in furniture carried to the last extreme. Here by simple manipulation a dining room or living room may be converted to a sleeping room and as easily restored to its original purpose. These things have been designed for the convenience of the city dweller, where rental space is high, in order that the cost of living may be reduced as much as possible. It is not believed that they will be generally adopted in the rural community. Nevertheless, there are certain advantages that might in some cases be worth consideration. The home-maker, however, will probably not care to undertake so serious a matter of construction and will need to consult the manufacturers who install these things.



A MODERN APARTMENT WITH BUILT-IN AND CONCEALED BEDS, WHICH TRANSFORM A DINING ROOM AND LIVING ROOM BY DAY TO BED ROOMS AT NIGHT



A VERY WELL LAID OUT BATH ROOM WITH BUILT-IN CLOSETS WHICH PROVIDE NECESSARY SPACE FOR LINEN, ETC.

Spring Painting

It is pretty nearly time for master painters and paint dealers to get after property owners and start them to thinking about spring painting. Some newspaper advertising will help. Letters to owners of shabby buildings is a little more direct and specific appeal. Personal solicitation is the most effective of all.

Impress on owners the fact that painting is not really an expense, but an investment. That a little paint now will save the cost of new lumber and carpenter work later on if woodwork is permitted to decay.

Walking along the street and noting the many shabby, dingy buildings, leads to the conclusion that the paint trade is not "on its toes" looking for business. Owners of many of these properties could be induced to paint.

Here's a true story: A tenant had lived in a certain house for thirteen years. It had never been painted during that period of time. Meanwhile the backsteps had fallen down, also the fence around the back yard; the shingles on the front porch had decayed and, as a result, the roof timbers had rotted so that several boards had fallen off the porch ceiling. The whole house presented a dingy appearance.

The tenant moved out; said he wouldn't stay in such a tumble-down structure. Then the landlady got busy. Spent a lot of money on repairs and painted the building.

And what do you think she said?

"It's funny no painter ever noticed that house and asked me for the job of painting it, isn't it?"

And there's many another painter and paint dealer asleep at the switch on thousands of similar prospective jobs, waiting for somebody to solicit them.

Building Age for May

The May issue of BUILDING AGE will be a special Own Your Home issue. Articles specially prepared and illustrations carefully selected to accent the true meaning of a home as distinguished from a house will constitute an issue of particular interest. As rentable space everywhere is now absorbed, the home-owning idea presents the solution for many difficulties.

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Scientific Methods of Sewage Disposal

A Description of Moderate Cost Installations Suitable to the Country Home

By WILLIAM C. TUCKER, *Sanitary Engineer*

IT cannot be said that sewage disposal is the most important branch of sanitary engineering, but it is of major importance to the general healthfulness of the country home. Not many years ago the whole question of sanitary disposal of household wastes was treated with indifference, often resulting in disease and epidemics. During recent years sewage disposal has become an exact science. The entire subject has been carefully studied, important data has been gathered, and there is no longer any excuse for those who fail to make use of modern disposal methods.

Sewage, as generally understood, consists of solids and household wastes held in suspension and must be disposed of as soon as possible before putrefaction develops. It must be rendered innocuous, the solid matter being reduced to a state in which it may readily be resolved into its component parts for final disposal. This, accomplished in a scientific manner by bacterial reaction based upon natural laws, is most simple in operation, continuous in action, and requires little or no attention. The underlying principles to produce complete bacterial reaction, are quiescence, sedimentation, and the delivery of the material for treatment in as dense a form as is expedient, with sufficient fluid only to hold the solids in suspension so that they may be moved in the sewer with celerity and freedom. To produce these results the sewage must be delivered to a water-tight masonry chamber of sufficient capacity to retain the accumulation of two days' supply. The receiving basin must be so constructed that the movement of the sewage during its passage to final disposal may be most leisurely.

To obtain this condition a short masonry wall two feet high is usually built across the bottom of the receiving tank, located at the center, to act as a baffle plate and assist in producing the most sluggish and retarded flow. Thus fermentation and sedimentation will be most thorough, accompanied by complete bacterial activity. This action changes the solids into insoluble and mineral components which settle to the bottom in the form of a thick black viscous sludge into which bacterial activity continues, as well as the formation of gases which escape to the outer air. The resulting effluent should be free of suspended matter, and is generally of

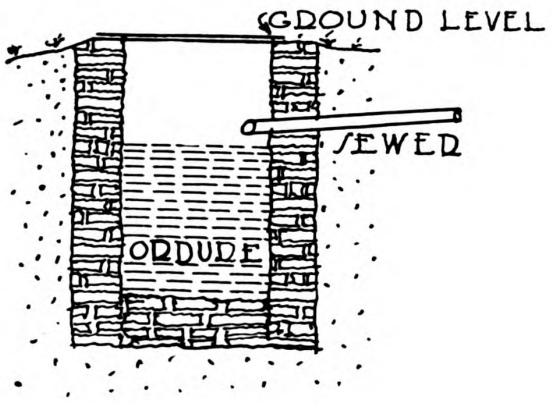

FIG. 1

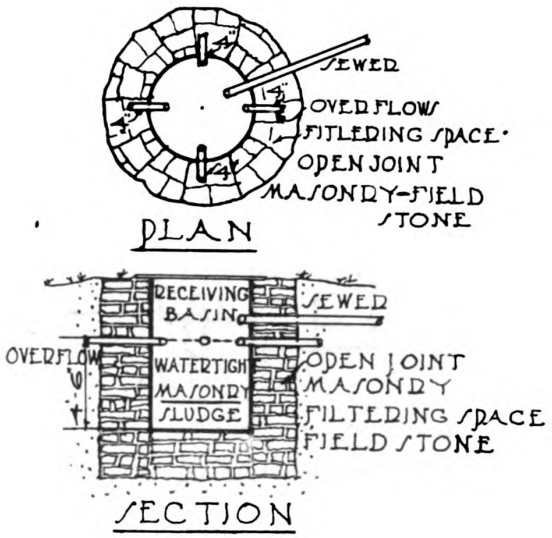

FIG. 2

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grayish color, with slight sweetish odor, and retains much heat.

The receiving basin must be of the correct size. This cannot be determined until the daily water consumption within the house is known. The depth of sewage should, if possible, not be over 4 ft. 6 in., which has been generally accepted as correct from numerous scientific experiments. The receiving basin may be circular in form for smaller units, including those of 600 gallons capacity; if larger the rectangular form will be found more advantageous. The determination of the water consumption within the house is somewhat difficult and is dependent upon its availability, whether there be running water

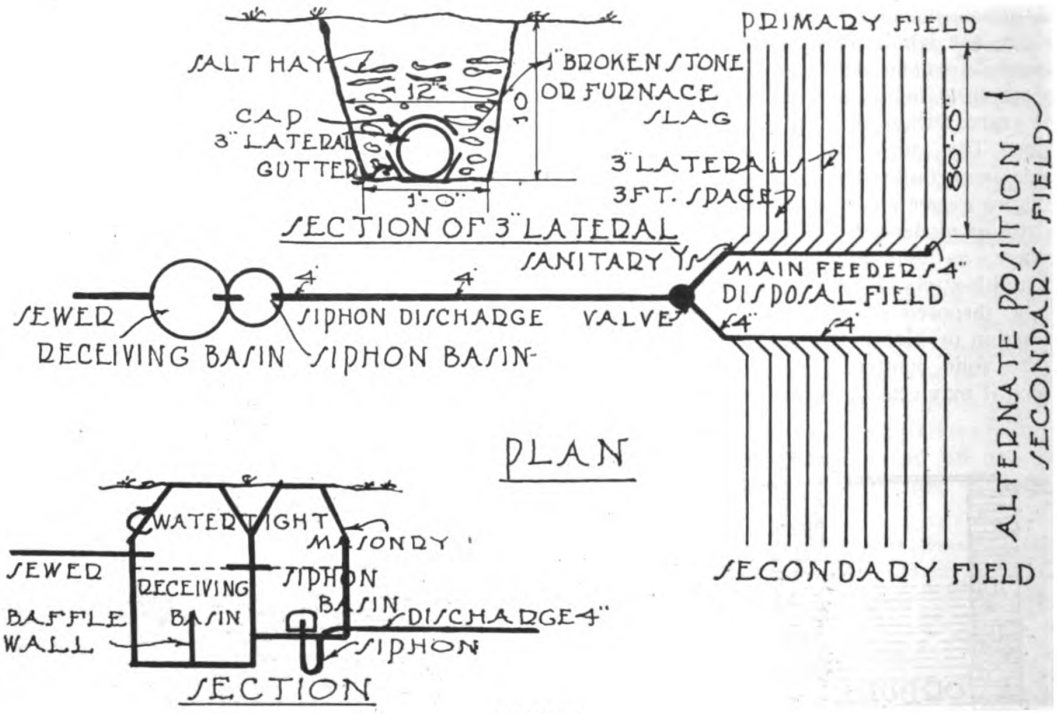

FIGURE 4

may be employed, is most important and cannot be selected with indifference. The location should be upon gradual, sloping, unshaded ground exposed to the sun and at considerable distance from growing shrubbery or trees whose root tendrils may seek the nitrogen in the effluent, enter the sewer pipe and interfere with the free absorption by the earth. The surrounding material must be of gravel or sand; loam and hardpan should be avoided as much as possible on account of their non-absorbent qualities. When this is impracticable the means of disposal must be considerably increased or the unit subdivided. An area of generous proportions is necessary for final disposal, situated at some rather remote and protected point and should not be used for general farming purposes, nor traversed by the farm implements. It should be placed at as great a distance from the source of the water supply as is practical, so that there may be no danger of contamination.

or not. In the former instance 60 gallons per head per day may be assumed as a fair allowance. No animal stall or wash table drainage should enter the sewage disposal system, since that from the former contains finely masticated food of the animals, which fails to settle in the receiving basin, causing clogging and serious interference with the proper action of the filtering media. The road material carried by the drainage from wash tables quickly settles in the sewers, causing interruption of flow and final stoppage.

The location and character of the surrounding material, for final disposition, for whatever mode

The scientific method of sewage disposal is most elementary and mechanical in its application, and consists of consigning the effluent to the earth in such quantities and manner that it may be readily and continuously absorbed. This may be accomplished in a number of ways which differ radically from each other in form and cost, but the underlying

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principle is the same. The use of the leaching cesspool of time immemorial should not be considered in these days of progress and scientific attainment. It is most unscientific in principle, archaic in design, malodorous and a habitat for insects and vermin, as well as a standing menace to health. Such a cesspool is shown in Fig. 1. The liquid wastes from the house are deposited through a sewer into an excavation in the ground lined up with open joint masonry. The liquids permeate the surrounding earth until it becomes saturated, and slowly but constantly extend and often may reach an unknown subterranean water course, causing contamination and an epidemic of unknown origin.

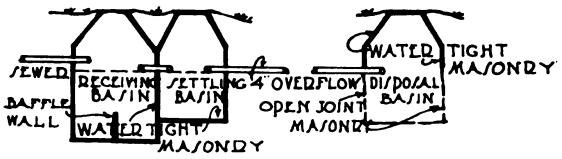

FIG. 3

The disposal basin shown in Fig. 2, designed by the Aqueduct Commission for use upon the land adjoining the Croton Water Shed of New York City, is most simple in construction, moderate in cost and of high scientific efficiency. It consists of a water-tight masonry basin into which the sewer empties and in which the bacterial action occurs. The effluent and gases rise to the top, the former overflowing into the annular space, of about 3 feet surrounding the basin, which is filled with field stone ranging from 2 to 3 inches in diameter, and is there absorbed by the surrounding earth.

When adequate funds are available the design shown in Fig. 3 is more desirable. The partially clarified sewage passes from the receiving basin into an adjoining chamber, where the operation of purification is continued, with the further elimination of solids and overflow into the disposal basin, where it is absorbed by the surrounding earth. The effluent by this method is mainly free of suspended matter. The cost of this installation is moderate, being largely governed by the price of per diem labor in the locality.

The most advanced method of sewage disposal and one of highest scientific attainment is shown in Fig. 4. The receiving basin is built much larger than that in Fig. 3, in order to facilitate more thorough sedimentation. The settling basin is omitted, and in its place is provided a chamber containing a siphon which acts automatically when the sewage has reached a predetermined height and discharges the entire contents at point of disposal in one operation. The siphon is manufactured in one piece, is most simple in construction, has no moving parts and can be readily installed. The retention of the settling basin in this installation, as shown in Fig. 3, with the addition of the siphon chamber, would add to the efficiency of the equipment and its use is always to be recommended. From the siphon chamber the effluent is discharged into disposal fields, primary and secondary, one of which is always in use, generally for a period of two weeks, while the other is at rest, recuperating, as demanded by good practice. The valve shown on the siphon discharge directs flow to either field as desired.

The disposal fields are most rudimentary in theory, elementary in construction, of standard available material and may be readily built with available labor. These fields consist of lateral lines of drainage tile laid a short distance below the surface of the ground. The laterals, a section of which is shown in Fig. 4, consist of 3-inch tile laid with open joints, protected against falling material by caps, laid 10 or 12 inches below the surface of the ground and surrounded on top and sides with a 4-inch layer of 1-inch broken stone or furnace slag which is protected by a thick layer of salt hay against the filling entering the interstices. These lines are taken from 4-inch sanitary right and left Y's with 3-inch branches, are spaced 3 to 4 feet apart, as shown in Fig. 4, are laid very flat, with a fall of but 6 inches in their entire length, and are approximately 80 feet long, which has been scientifically determined as correct, so that each siphon discharge completely fills all lines, allowing the contents slowly to seep into the surrounding media through the open joints.

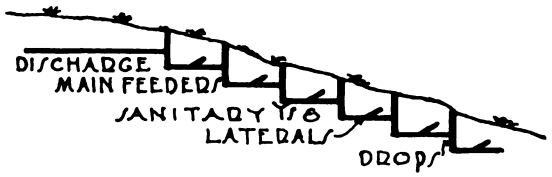

FIG. 5

It often develops that a hillside is the only available space upon which to locate the disposal field, which necessitates special forms for the main feeders, so that the onrush at each siphon discharge may not burst through to the surface at the end, and not completely fill each lateral. To obviate this and reduce the velocity of flow to a normal rate, the main feeders are installed in a series of steps, as shown in Fig. 5, with the horizontal space between each step laid flat, so that the rate of flow is greatly reduced.

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The dimensions of each section of the disposal field must be such that it will retain 80 per cent. of the contents of each siphon discharge, through the capacity of its lateral lines, the 20 per cent being forced through the open joints at the first onrush.

The theory of sewage disposal by the above method is similar in operation to that of the human lungs. The effluent is absorbed by the surrounding media of stone, the interstices of which contain oxygen which attacks each discharge, liberating hydrogen which escapes to the outer air, and nitrogen which is most greedily absorbed by the root tendrils of the growing grasses at the surface of the ground.

This method of disposal, if scientifically installed, may be placed in close proximity to living quarters. The writer has in mind an installation in which a fine turf tennis court was built directly over the lateral lines and the disposal basins placed within 100 feet of the house.

Heating Equipment for the Building of Moderate Cost

By CHARLES L. HUBBARD

I.—Introduction

Editor's Note—This is the first of a series of articles which will thoroughly cover all phases of heating the building of moderate cost. The author, Charles L. Hubbard, is a heating engineer of many years' experience, and an authority on the subject.

IT is proposed in the present article, and those which are to follow, to take up in a concise and simple manner some of the problems with which the architect and building contractor are frequently confronted regarding the matter of heating and ventilation. These articles will also give valuable information to the prospective home builder. Details of design and construction pertaining especially to the work of the heating engineer and contractor will either be omitted entirely or touched upon very lightly, and emphasis given to matters of more vital interest to the architect, builder and home owner.

These include more particularly the selection of a system for a given set of conditions, a comparison of the cost of installation and operation for different arrangements and matters relating to the space required for heating equipment and details of building construction which have an important bearing upon the convenience and successful operation of the heating plant.

The ordinary custom of practically completing the building plans before seriously considering the matter of heating often results in costly and difficult changes or in sacrificing the efficiency of the heating system. Conditions of this kind may easily be avoided by selecting the type of heating system while the building plans are in a preliminary stage and working up the final details with the heating requirements formulated in some detail, so far as the building construction is concerned.

The importance of solving, in a satisfactory manner, the heating problem becomes evident when we consider that, with the exception of the extreme southern territory, all houses erected in the United States require the employment of artificial heat to maintain bodily comfort during approximately six months of the year.

Statistics show that some 80,000,000 tons of coal are consumed annually for residence heating. Add to this the wood and oil also used for this purpose, and it is safe to say that the fuel bill for house heating runs well over the billion dollar mark every year.

While the open fireplace, so endeared to the heart of the Englishman, and the coal stove reminiscent of the country store of early New England days have not been entirely superseded, yet more and more is the demand for a more comprehensive type of heating system being made. Various types have been developed, such as the hot air furnace, the hot water and various types of steam heating systems, for all of which their proponents claim much. Which is most suitable for the house *you* are going to build? Do you know? If not, this series of articles will be of aid to you in answering such questions.

The individual articles of the series, while following one another in logical order and forming a connected discussion of the various matters, will each

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be complete, so far as the special subject treated is concerned, although it may be necessary to refer back to certain fundamental data in some cases to avoid repetition.

The classes of construction to be considered will include dwelling houses of moderate cost, say up to $20,000, and industrial buildings below $50,000 or $60,000.

The method to be employed, after presenting some general data, will be to take a typical building, make the necessary computations and then work up the plans for the different systems of heating which may be adapted to it, afterwards making a comparison of costs of installation and operation. It is felt that in this way the reader will obtain clearer understanding of the various phases of the subject.

The next article, to appear in the May issue of BUILDING AGE, will deal with the selection of the heating system and will include a description of all types in general use, their merits and disadvantages.

Constructing a Winding Stairway*

By RICHARD M. VAN GAASBEEK

School of Science and Technology, Pratt Institute, Brooklyn, N. Y.

IN planning and laying out a stairway there are many important points to consider, such as the width to accommodate probable travel, the weight likely to come upon it, careful arrangement of the winders to secure easy travel, allowance for headroom ascending and descending, etc. The design and finish of a stairway may be the means of selling or having a house rejected. It is the first thing that generally greets the eye and claims attention. An ugly stairway may condemn a house and although the building may have many pleasing features it is difficult to overcome first impressions.

A series of articles devoted to stairway constructing and forming a practical course in stairbuilding explains in a simple and easily comprehended manner the laying-out, building and assembling of a typical winding stairway. The problem, illustrating the text, was built *one-third full size* to give an opportunity for individual study that would not be possible in constructing a full size stair.

The various measurements given in the illustrations are those used in building this particular model, and it requires the application on the part of the student or mechanic to utilize the information here given when required on the job. The problem has been developed in the carpenter shop at Pratt Institute, Brooklyn, N. Y., where mechanics learn how to do, by doing. If the reader wishes to acquire a practical knowledge of the art of stairbuilding, he also must lay out the work, construct and assemble, and to aid him in so doing the following text has been prepared.

However, before proceeding with the study of stairway construction, it will be necessary for the student to make himself familiar with some of the terms used in stairbuilding and thoroughly to understand their meaning before beginning to lay out his work.

RUN—Length over the floor which the stairs will occupy—the horizontal distance from the face of one riser to the face of the next. Figures 1 and 2.

RISE—Total height from the top of lower floor to the top of upper floor—height from the top of one step to the top of the next. Figures 1 and 2.

PITCH—Line of nosings, showing the angle of inclination of the stairs. Figure 1.

TREAD—Horizontal upper surface of the step, upon which the foot is placed. In dwelling houses they are generally 1⅛ in. thick. Figure 2.

RISER—Vertical height of the step. In dwelling houses they are generally ⅞ in. thick. Figure 2.

STRING, also called STRINGER—Board forming the side of the stairs. In dwelling houses it is generally 1⅛ in. thick. Figure 1. Strings are designated as wall string, outside string, housed string and open string.

WALL STRING—Finished board or string placed against the wall. Figure 3.

OUTSIDE STRING—Finished board or string on the outside edge of the stairs. Figure 3.

HOUSED STRING—Where steps are grooved into the strings.

OPEN STRING—Where string is cut through for step to rest upon and is mitered to the risers.

NOSING—The projection of the tread beyond the riser. Figure 2.

NOSING LINE—Line formed by the intersection of the rise and run (riser and tread). Figure 1.

WELL HOLE—Opening through the floor occupied by the stairs.

*First of a series of articles describing and illustrating stairway construction from the practical standpoint.

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FLIERS—Risers parallel to each other, forming straight steps.

WINDERS—Risers radiating on plan, forming triangular treads.

FLIGHT—A succession of steps between one starting place and the one next above it.

LANDINGS—The spaces wider than steps, which constitute resting places between flights.

balusters are fixed to the string instead of to the treads, a grooved molding called a shoe being prepared to receive them.

LINE OF TRAVEL—That part of the stairs usually traveled over. It is important to make the treads as nearly as possible of the same width on the line of travel. The line of travel should be located a convenient distance from the hand rail to make it

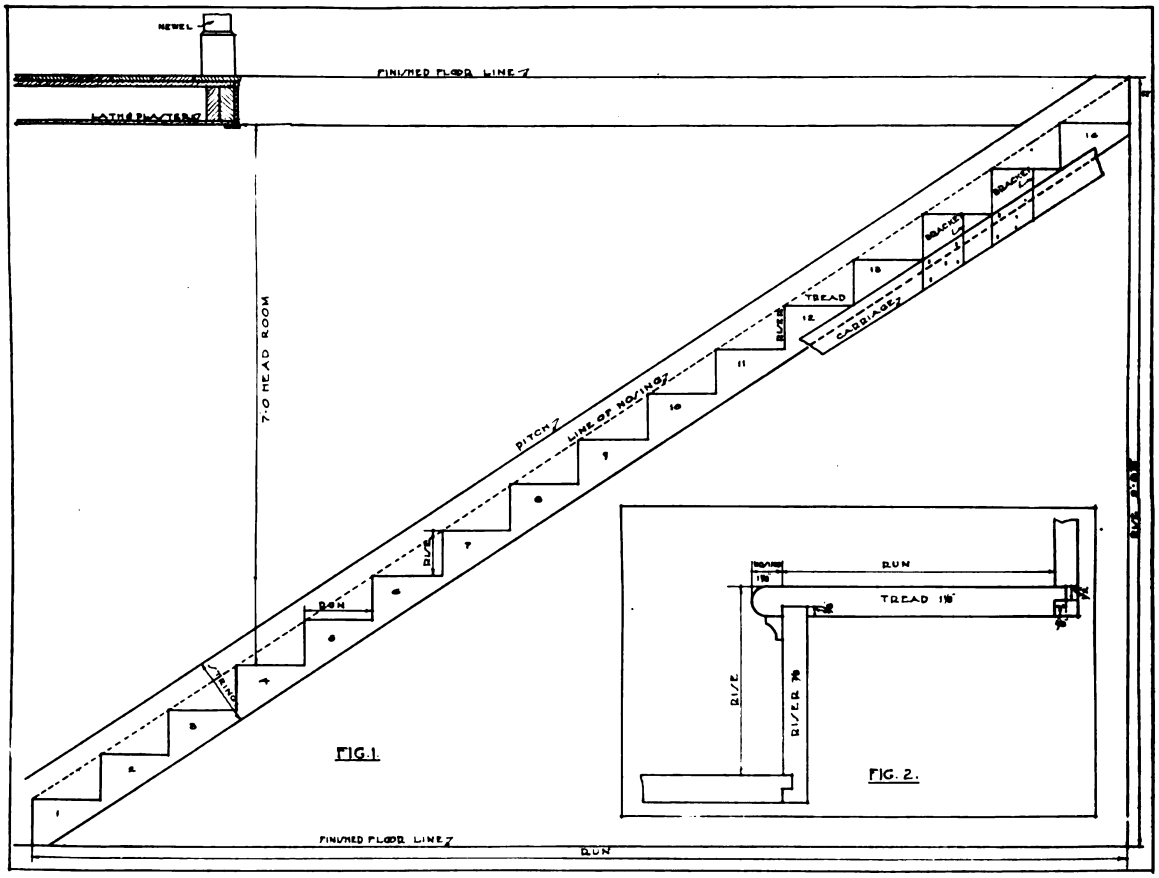

FIG. 1. ESSENTIAL PARTS OF THE STAIR. THE HEADER WHICH DETERMINES THE HEADROOM SHOULD BE PLACED SO AS TO SECURE AT LEAST SEVEN FEET HEADROOM IN THE CLEAR FROM THE TREAD VERTICALLY BENEATH IT

FIG. 2. (INSERT) ILLUSTRATES METHOD OF CONSTRUCTING THE STEPS.

BULL-NOSE STEP—The lower step rounded to a semi-circle. Figure 3.

SWELLED STEPS—Steps having an outward curve. Figure 3.

NEWEL—The main post where the stairs begin. It is generally larger and more highly ornamental than the other posts. Figure 3. Post No. 1.

ANGLE POSTS—The posts used at the angles of a staircase or well.

CAP or SHOE—When the string is closed, the

possible to grip the hand rail easily, ascending and descending. Experience has shown that a line of travel about 14 in. from the face of the outside string will afford an easy and convenient distance from the hand rail.

BALUSTERS—Columns forming an ornamental guard and at the same time supporting the hand rail.

CARRIAGES—Rough timbers placed under the stairs of sufficient strength to support them and

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their probable load. Rough brackets are nailed to the sides of these scantlings, fitting tightly under each tread. Figure 1.

HEADROOM—The two cross timbers which are called headers should be so placed as to allow suffi-

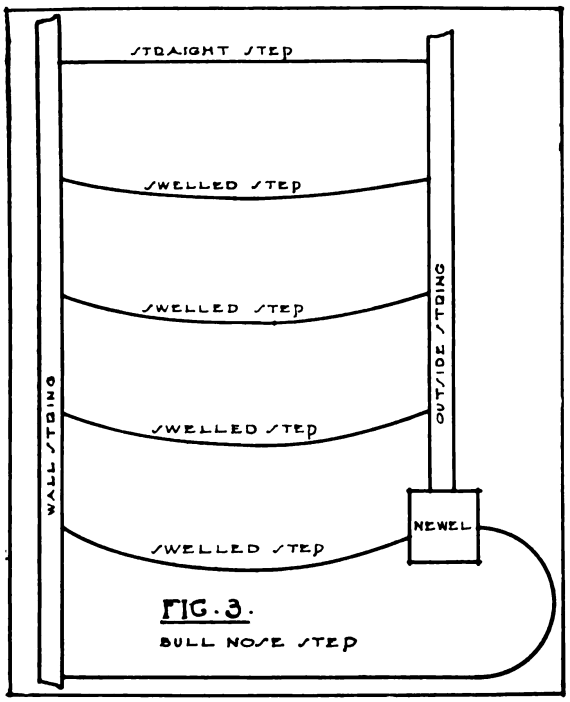

FIG. 3. METHOD OF LAYING OUT SWELL AND BULL NOSE STEPS

cient headroom to meet all probable requirements of the stairway. The header which determines the headroom should be placed so as to secure 7 feet of headroom from the tread vertically beneath it. Figure 1.

PROPORTIONING OF TREADS AND RISERS—Experience teaches that between 6 in. and 7 in. is the limit of easy stepping. The wider the step the lower the rise should be. A good rule for determining the proportion that should exist between treads and risers for dwelling houses, considering an easy line of travel as well as the appearance of the stairs, is to have the sum of the rise and run equal as near as possible 17. In Figure 1, the total rise from the top of one floor to the top of the next is given as 9 ft. 8⅞ in. or 116⅞ in. To find the proper width for the riser, first find out how many risers are required by dividing 116⅞ in. by 7 in. which gives 17 risers. Now divide 116⅞ in. by 17 will give the exact width of the riser, which will be found to be 6⅞ in. Subtract 6⅞ in. from 17, which will give the width of tread as 10⅛ in. This will afford easy traveling. If the run of the stairs is limited as in the case of a doorway at the foot of the stairs, it would be necessary to divide the run by 16 as there is one less tread than risers. This would be a harder flight to travel but could not be avoided owing to the doorway limiting the run. The rise should never be greater than 8 in. and that only on inferior jobs.

PITCH BOARD—A thin piece of stock used in laying out the strings, generally made of pine, with the grain of the wood parallel to the hypotenuse, so that the effects of shrinkage will be the least possible. One side is made the exact width of the tread or run, and at right angles to this line the exact height of the riser or rise is measured off. The stock is cut along the hypotenuse of the right-angled triangle thus formed. Figure 4.

TEMPLATES—Patterns made of thin stock used in laying out the treads and risers. A template for locating the nosing line. The piece A, Figure 5, is made an exact width equal to the distance between the nosing line and the face edge of the string. Ordinarily the nosing line should be a line 3 in. from the face edge of the string and parallel

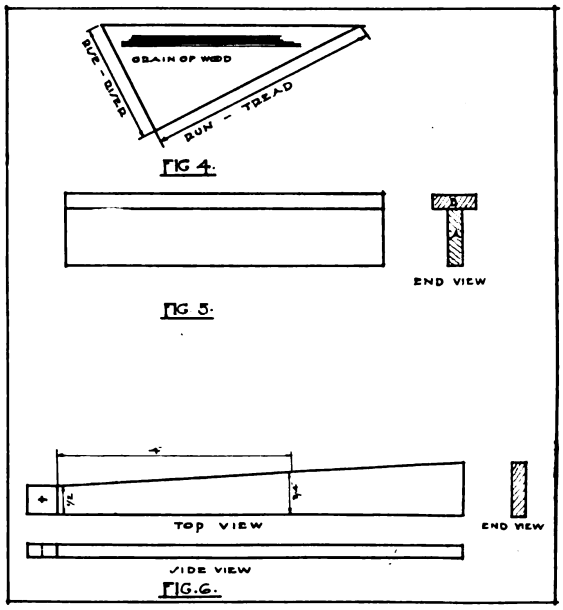

FIG. 4. PITCH BOARD. THE RUN AND RISE OF THE STEPS SHOULD BE LAID OUT ACCURATELY; THE GRAIN OF THE WOOD SHOULD BE PARALLEL TO THE HYPOTENUSE OF THE TRIANGLE

FIG. 5. TEMPLATE USED FOR LOCATING THE NOSING LINE. IT SHOULD BE APPLIED TO THE FACE EDGE OF THE STRING

FIG. 6. TEMPLATE USED FOR LAYING OUT THE WEDGES. THE TAPER SHOULD BE ABOUT ¼ IN. IN ONE FOOT

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to it. The piece B is a thin piece of stock fastened on the template as a guide to rest against the top edge of the string. A template for laying out the wedges is shown in Figure 6. The projection of the nosing is laid out as shown with the center located, into which a nail is to be driven for centering a centre bit. Starting with the thickness of the tread, the template is tapered ¾ inch in one foot. In applying the template one edge is placed on the tread line and the other edge is used for lining out and providing place for the insertion of wedges that are to hold the treads and risers in position when assembled.

(To be continued)

House Heating by Gas

The cost of house heating with gas instead of coal in connection with steam, hot water, vapor vacuum or warm air systems is treated in a special number of The Gas Age recently issued. Various systems by which gas is sold in the United States such as block rates, secondary rates, special rates and regular rates are described, and house heating experience with each kind is featured by means of typical installations. The Gas Age is advocating a more general adoption of secondary rates for house heating with gas which will bring the price of artificial gas below that of coal.

The Auto Truck *vs.* the Locomotive

AS a real adjunct to the railroad, not only in inter-city haulage but actually to handle materials of the railroad for short hauls, has come the motor truck, according to M. L. Pulcher, vice-president of the Federal Motor Truck Company, Detroit, Mich.

Mr. Pulcher, who has had many years' experience in the traffic department of one of the leading railroads of the country, believes that the motor truck, used as an adjunct in the terminal switching service of railroads, will help offset the inadequate terminal switching facilities throughout the country.

"It is the present practice of the railroads to handle company material and stores at division points in switching service," he declared. "Where trucks have been employed by the railroads a great operating service has been accomplished, and this has also released their own motive power, tracks and equipment for the handling of carload traffic which must, of course, be handled by the present methods.

"Trucks could also be very properly used where trap car service is given. There is a very large amount of less than carload merchandise switched between substations and transfer houses which could be handled to much better advantage by trucks.

"The present operating cost of a locomotive in switching service is probably in the neighborhood of from $75 to $100 a day. The daily operating cost of a truck is from $12 to $20 a day, including maintenance and all other items entering into operating costs."

Water Waste Warnings

A bulletin issued by the Department of Water Supply in New York contains the following warning with reference to conserving its water supply. These things are of wide application. In effect the admonition is as follows:

1. Don't let the water run longer than absolutely necessary.
2. Don't try to keep milk cold by running water over it. Put it in a pail of cold water.
3. Don't turn the faucet on and forget it. Turn it off as soon as you are through.
4. Don't turn the faucet on so as to give you a larger stream than you need.
5. Don't have leaking fixtures. If you hear a continuous noise from the water pipe, water is wasting somewhere. Find the leak if you can and fix it.
6. Don't let the water run in the winter time to prevent it from freezing, unless absolutely necessary on very cold nights and then only run a small stream. Protect the water pipes from frost.

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THE QUIET, NEUTRAL TONES OF THE FLOOR AND WALL COVERINGS, AND THE REFINED TASTE OF THE DRAPERIES SERVE TO PRODUCE A ROOM OF DIGNIFIED SIMPLICITY THAT IS ADMIRABLE

Decorating and Furnishing the Low-Cost House

II.—THE DINING ROOM—PART II

IT very often happens in the low cost house that the opening between the living room and the dining room is provided neither with single nor sliding doors and that there is just an opening for the purpose of communication. It therefore will be well to give consideration to a drapery for this opening, so that during the process of clearing away a meal and while the guests are in the living room the drapery may be drawn. In selecting this drapery, it should harmonize with the tone values of the rug on the floor and should be as expensive as the purse will allow. With reference to the question of rugs and draperies, undoubtedly one of the most artistic and easily obtained is the well made rag carpet rug, woven from an accumulation of sewn rags. These are not only very pleasing when properly done, but they have a certain intimacy, as they very often represent in their fabric the dresses and neckties of generations of every member of the family. If these are used in the dining room they should be dark in tone and the component parts selected with a view to harmony and coherence. Parquetry inlaid linoleum may be used effectively and with moderate expenditure.

For the window curtains, the plain white shade or the double-faced Holland shade presents a good decorative treatment, as one may select the color to match the interior decoration of the room and also one that will blend well with the exterior of the house when viewed from the outside.

Frequently it occurs on occasions where the dining room is used as a place for light refreshment for a much larger number of people than can be accommodated at the table, that window seats or window boxes well placed not only afford a place for many dining room accessories, but comfortably accommodate the overflow of assembled guests. Such window boxes lend themselves to decorative treatment. If they are covered with cretonne the

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draperies in the room should be of the same material.

One of the things that should never appear in the dining room is the heavy red table cover or the plaid terra cotta colored "damask". Between meals there should be only a small center piece of dainty white linen or of some light tone consistent with the color of the draperies. A fern dish or a bowl of flowers make for a pleasant effect, but any flowers will not do. The color should be in harmony with the dominating note in the surroundings, or else the flowers are an isolated, irrelevant element in the room, with no decorative purpose. For light luncheons there are now on the market, in a large variety of good designs, stencilled doilies of a mottled oil-cloth,—a large one for the center of the table and smaller sizes to put under plates at the individual places. These lend a freshness and daintiness to a simple repast. They can be washed and are absolutely practical for ease in handling and grace of result. They should of course be chosen properly with regard to the colors of the room and will be found economical and pleasant to use. For heavy meals where hot dishes appear, it is not considered good form to have crocheted mats to protect the table. A large asbestos cover the size of the table should be placed under the table cloth, or, if that is not possible, a heavy flannel cover serves the same purpose. Table linens should be absolutely white. Red fringes and borders are altogether out of taste. Simple dishes should be used. China is not the place for elaborate pictures. They serve the same purpose as the stuffed deer's head previously referred to. A conventional colored border on the china is all that is permissible by way of decoration. Flower and fruit and poultry designs are only a parody on nature and display very poor artistic taste.

A certain symmetry is pleasant in the dining room. Things in pairs give a restful harmony. The windows balancing the doors; the sideboard balancing



DINING ROOM IN HOUSE OF HENRY A. MORRIS, MARBLEHEAD, MASS.
COOLIDGE & CARLSON, *ARCHITECTS*

The balanced lighting facilities, the practical and substantial furniture, the simplicity of walls and floor, are as they should be. The proximity of the serving table to the kitchen door makes for efficiency, while the screen is a decorative feature. The mahogany Chippendale furniture contrasts well with the Georgian interior.

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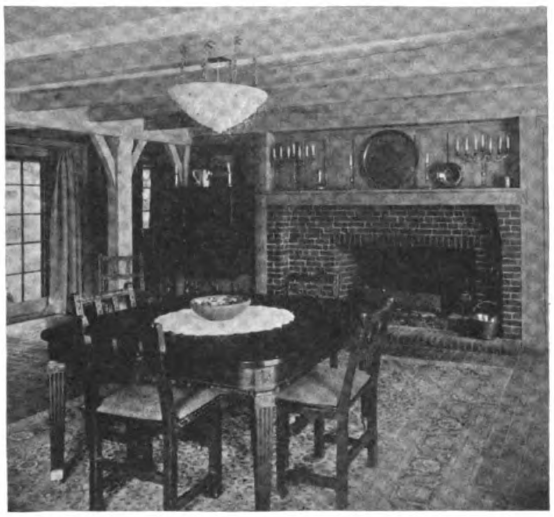
the fireplace; a chair on either side of a large piece of furniture; pictures, one balancing another.

If there are pictures, they should be of the same character. There should not be a mixture of etchings and oils and water colors. A couple of good bright water colors are appropriate, and give a snap of liveliness to the formal aspect of the room. Of course, if the walls are paneled, pictures are not



THE PIECES ON THE MANTEL ARE EXACTLY RIGHT. THEY HAVE UTILITY, ARE WELL PLACED, AND, LIKE THE FINE HIGH-BOY AT THE LEFT, ARE PROBABLY HEIRLOOMS OF A PARTICULARLY GOOD TYPE

wanted. If there is a narrow shelving to top off the paneling, it may have a few old pieces of copper or rare bits of china. A promiscuous lot of ornament here is not to be desired. It is quite good form to leave these shelves quite bare and inconspicuous. Good practice also resents the placing of tall ornaments on the top of tall pieces of furniture. The serving table should have nothing superfluous upon it to interfere with the placing of dishes or cutlery. Only such objects of actual use that facilitate service should occupy it. A simple white cover is demanded, something dainty but not perishable. It should be easily laundered and always immaculately clean. The serving table should be placed as near as possible to the door connecting with the kitchen, for it is inefficient to carry a tray full of dishes half way around the room before being able to deposit it. This door should be a swinging one that closes automatically.

One of the particularly obnoxious elements in a dining room is the huge red or green electric light globe bearing down over the dining table. It seems that the smaller the room the larger are these globes, and the matter of replacing them with something more reasonable looking, or of better color and size; is so easily accomplished that if one is confronted with them in a ready-made house, they should immediately be disposed of or modified. There should, of course, be light enough to see to eat by. Women are apt to light a table insufficiently, with just a soft, becoming glow from shaded candles. Men care more for the cheer of the table. It is well, therefore, to have side wall fixtures, which, with the candles, will amplify the light. If the side lights are not feasible, and the center drop light must be resorted to, a shade of soft-toned silk, bound with heavy fringe, toned with the color of the walls or draperies has been suggested. The light should be hung high enough so that the diner may see the person opposite, but low enough to prevent electric bulbs from glaring into his eyes. Indirect lighting has much to commend it, but also the great disadvantage of lighting just the part of the room of least interest or artistic importance. If much attention is attracted to the ceiling by reason of excessive light, it is by just so much distracted from the



A DINING ROOM WITH DIGNIFIED AND TASTEFUL APPOINTMENTS. NOTE THAT THE AMOUNT OF ORNAMENT HAS BEEN REDUCED TO A MINIMUM, AND THAT MINIMUM IS OF THE UTMOST SIMPLICITY

points of interest in the lower portion of the room, where the activities of living go forward. It is a patent case of misplaced emphasis. Floor lamps may be used with good decorative effect if they are kept away from the middle of the floor and close to the walls. Otherwise they are in constant danger of being thrown over. Candle light is perhaps the pleasantest for sheer beauty and decorative interest, but there is the constant danger of fire to consider. If reasonable precautions are taken, and enough

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candles are used to see by, a further caution may be mentioned in connection with candle shades. These are from every point of view absurd and have no cause for existence. They are inflammable; they conceal the most interesting part of the candle, its



A CHEERFUL ROOM WHOSE BUILT-IN CHINA CLOSET IS OF INTEREST. THE LAMBREQUIN UNDER THE SHELF IS POOR. IT IS OVERDECORATION AND ALSO TROUBLESOME TO KEEP CLEAN. THE OLD SILVER AND COPPER PIECES ARE NOVEL

flickering flame; they distort the play of shadows. At best they look like a ballet dancer half dressed in frilly attire, but they quickly lose their original freshness and introduce an idea of shabby millinery wherever they are. Shades for lamps are a different problem. These are a necessary part of the lamp and may be obtained in the most tasteful decorative effects.

In wiring the dining room it is well to remember that a silent foot signal should be put in the floor where it may be easily reached by the woman of the house to enable her to signal the kitchen with the least disturbance. Inasmuch as it is usually found expedient for the hostess to sit opposite the door leading to the kitchen in order to exchange "s.o.s" calls with that department in the most unobtrusive way without the knowledge of the guests, this floor signal should be placed with regard to this point.

Since the administration of the dining room is so interwoven with that of the kitchen, this important room will be discussed in our next issue.

Lincoln on Labor and Property

The following words were spoken by Abraham Lincoln in 1864 in an address to the Workmen's Association. They are being widely circulated and we are glad to assist in bringing them before the people. The thought expressed in these words was never more timely than at present:

"Property is the fruit of labor; property is desirable; it is a positive good in the world. That some should be rich shows that others may become rich and hence it is just encouragement to industry and enterprise.

"Let not him who is houseless pull down the home of another, but let him work diligently and build one for himself, thus by example assuring that his own shall be safe from violence when built."

New Organization Will Encourage Inventors

The National Laboratory Foundation for the Development of American Inventions and American Industries has been founded by leading inventors, engineers, financiers and manufacturers of the country. The purposes are to have an institution that will be "philanthropic in character, to foster, aid and develop the idea and perfect the invention regardless of whether the inventor be rich or poor." It is proposed to found an endowed institution, with a complete modern research laboratory, machine shop and research and patent library, with a suitable corps of engineers, chemists and mechanics in charge.

Chicago Architects and Builders to Have New Headquarters

D. H. Burnham, of Chicago, is at the head of a committee appointed by President Hammond, of the Illinois Society of Architects, at the regular January meeting to lay out plans for the erection of a building to house the Engineering and Art Societies as well as afford office space for architects, engineers, contractors and material men. It is expected that the building will be financed by the issue of bonds.

St. Louis Housing Plans

Plans have been completed for the construction of the initial block of houses to be built by the Home and Housing Association, and to be for sale on liberal payment plans to wage earners in St. Louis. Work on the buildings will start March 1.

The houses will be fireproof and cost from $4,000 to $6,000. Payments will be spread over a period of from five to eighteen years, with monthly payments ranging from $5 to $15 on each $1,000 of valuation. It is proposed to erect 2,000 homes at a total expenditure of $10,000,000. In addition, a number of model tenements are planned.

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Editorial

A Plea for the Farmer

THE isolation of the farmer no longer exists. The day is past when he was far removed from everybody, and entirely dependent upon his own resources for mental stimulation and relaxation. With the development of rapid transit, with the extended use of the motor car, with the ever-ready telephone, the farmer to-day is in close contact with urban life and his neighbors are of the city.

He is, then, fully able to make comparisons between the relative advantages of his rural brethren and those in town, and the result of his reflections more and more frequently is causing him and large numbers of his co-farmers to leave their present homesteads and try their fortunes in the city.

What the ultimate result for the rest of the country will be if this condition continues at the present rate need hardly be set forth. If the farmers diminish production, prices will rise still higher, and we may be driven either to importing our foodstuffs, or importing foreign labor to attend to our agricultural needs. On the other hand, increased production means lower prices; lower prices mean a general stabilization of industry, and that stabilization of industry means a resumption of the sane way of living that left us with the outbreak of the war. These results, of course, everybody is eager to see accomplished, and the one and only way of accomplishing them is to make farm life equally attractive with that in the larger communities.

WHAT, then, are the differences that lure the farmer, and particularly the rising generation of young farmers, to give up the free out-of-doors for a cramped, stilted, superficial life where the interdependence upon others is so conspicuous.

There are, of course, a number of reasons why young people leave the farms, but perhaps the one that overrides all others is the aspect of the farm home and the conditions under which farm labor is performed. Young girls refuse to look forward to the sordid lives of drudgery that their mothers lead. They are no longer willing to brave the biting winter air in an effort to pump frozen water and carry it into the house one bucketful at a time. They are no longer willing to live in a small wooden house with the wind whistling through the cracks, the rain leaking through the roof, sharing their privacy with the whole family, the nearest neighbor perhaps half a mile away, and entirely dependent upon out-houses for their sanitary conveniences. The growing boy tires, too, of his own thoughts, unstimulated by the varied experiences afforded by city life. The evenings of entertainment, the life of, to him, physical ease and convenience, the decoration of the city with all its adornments, the social and educational advantages, all tend to make him dissatisfied with the sameness of farm life and the contact with creatures lower than himself.

THE subtle influence of environment is difficult to estimate, but it is not to be denied as one of the governing elements in our lives. There is no good reason why a love of the beautiful should not be cultivated among the people of the farms, and it is believed that no group of people can do more to make farm life attractive than can readers of BUILDING AGE. There is nothing inherent in the ground where now farms are which would prevent the installation of such comfort-giving things as are to be found in larger communities. The usual group of farm buildings can as readily be made of sturdy, durable material as of perishable wood. The utilities which the progressive farmer installs for the good of his cattle he will be willing to extend to the use of his family. The money he spends to send his children to a distant school, in order to evade the unsatisfactory local one, he can spend to make that local one nearer a model of its kind. All the elements of typical drudgery that his women folk are always confronted with, can be superseded by modern contrivances to facilitate their work and give them leisure to engage in matters of greater interest and more progressive in their nature.

In the beginning, there was no zoning law that dictated that certain groups of Americans should be given "life, liberty and the pursuit of happiness." The Declaration distinctly says, *all* men are created equal. Why, then, should there be the obloquy attaching to the farmer and his work that really exists? Why not co-operate with him to the end that he may be endowed with those legitimate and essential comforts that will make him a happier man, and, if possible, a better farmer?

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Attractive Design for a Country House

JAVIER II. ADRIANZEN, *Architect*

INCREASING production through standardization is an admirable object, but it will never apply in any large degree to house design. True, many individual features of construction may be standardized, but that desire for something unique or different will continue to create a demand for new designs to meet special requirements.



SKETCH DESIGN FOR A COUNTRY HOUSE

JAVIER II. ADRIANZEN, *ARCHITECT*

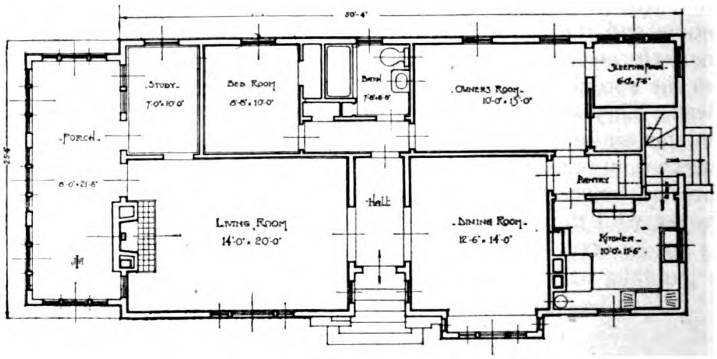
(Owner desired only first floor to be finished, but wished provision to be made for stairs to be built in at a later date.)

In the design here illustrated, the owner had some very definite ideas which have been worked out in a satisfactory manner.

While there is space for rooms in the second story, the owner's present needs do not require more space than is provided in the first story. However, in order to meet any future needs for additional space, should such develop, provision is made for running a stairway to the second floor at a later date, if desired. This upper space could then be subdivided and finished to suit the requirements at such a time.

Besides a commodious living room, dining room, kitchen, two bed chambers, bath and a study, there is also a small sleeping porch and a large glass-enclosed porch or sun parlor. A chimney is provided at each end of the house, one for the heating boiler and kitchen range, and the other for the open fireplace of the living room. Provision is made for a built-in window seat in the dining room. Altogether a most pleasant yet simple exterior has been designed.

While individuality will assert itself in small house design, the statement in the opening paragraph is not intended in any way to reflect on increased house production by means of a reasonable degree of standardization. Blocks of houses, every one as alike as two peas, however, will never appeal strongly to the home lover.



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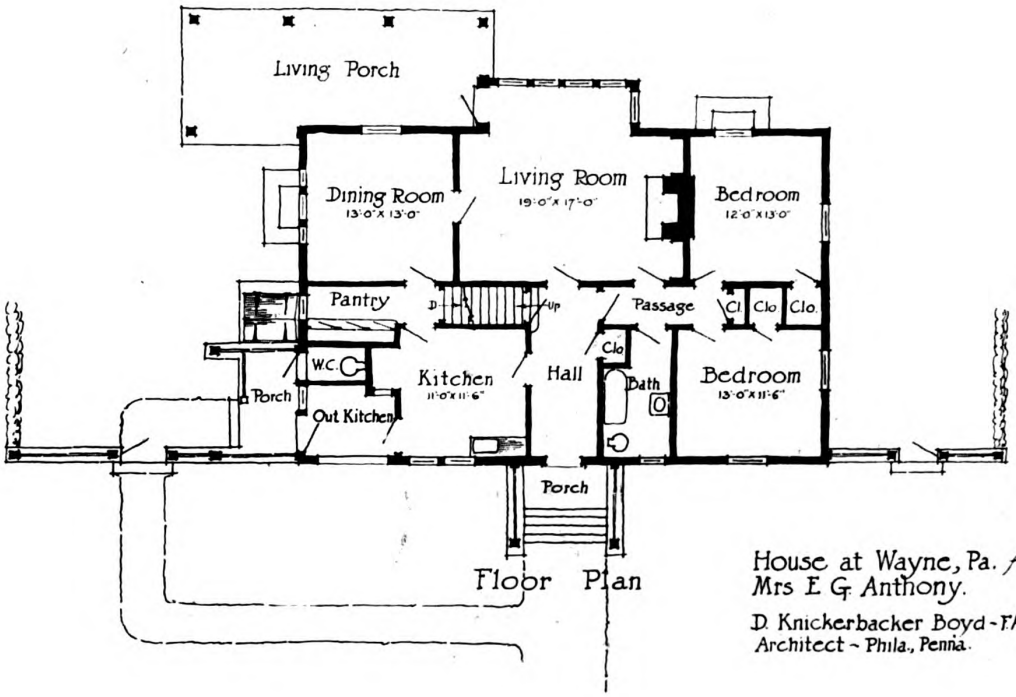

Floor Plan

House at Wayne, Pa. for Mrs E. G. Anthony.

D. Knickerbacker Boyd - FAIA
Architect - Phila., Penna.

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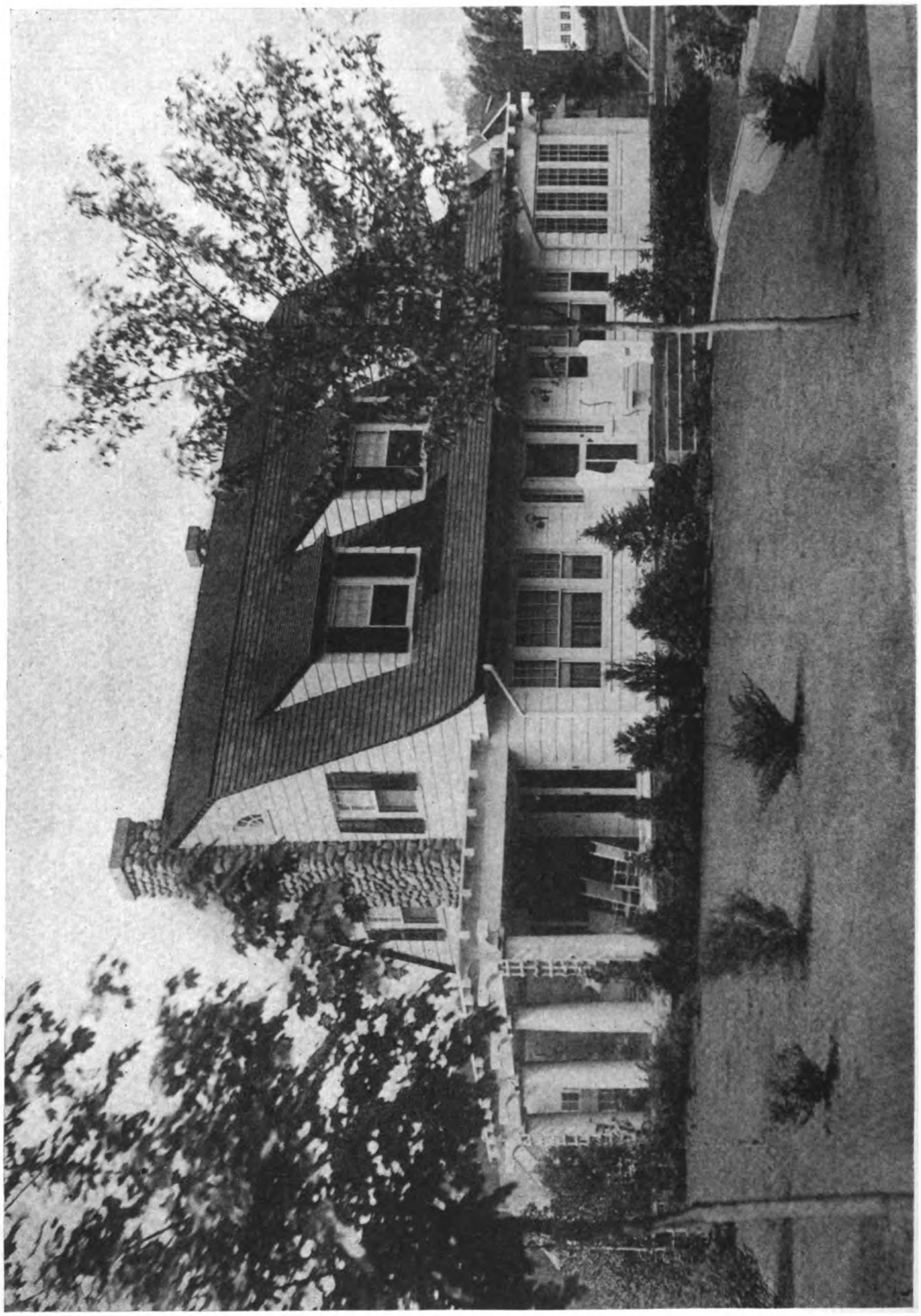

HOUSE AT RIDGEWOOD, N. J.
R. HOLBROOK LEWIS, *ARCHITECT*

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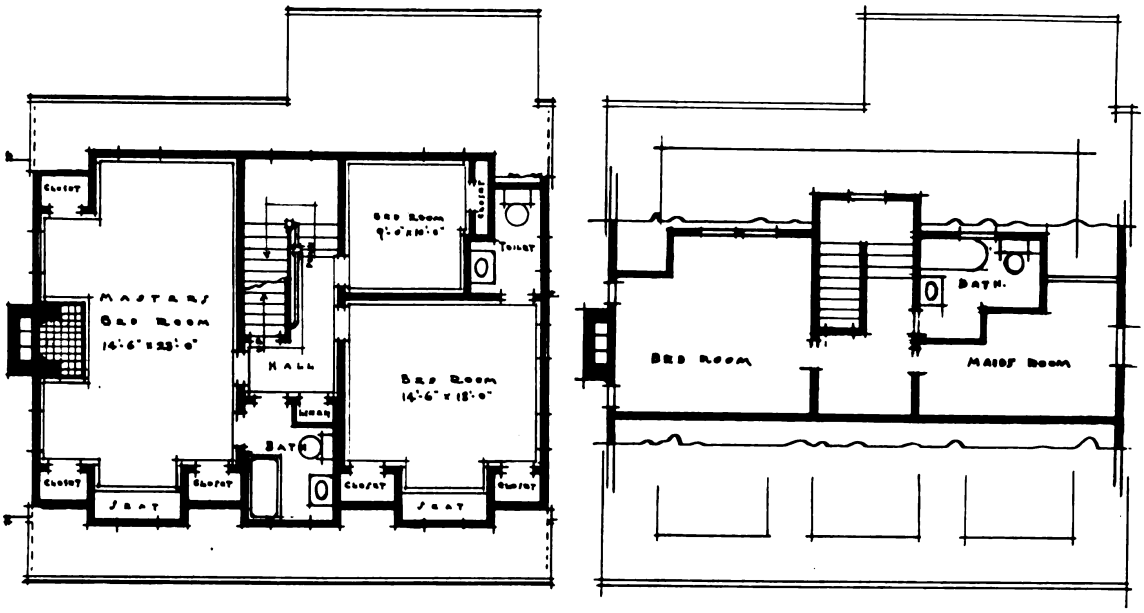

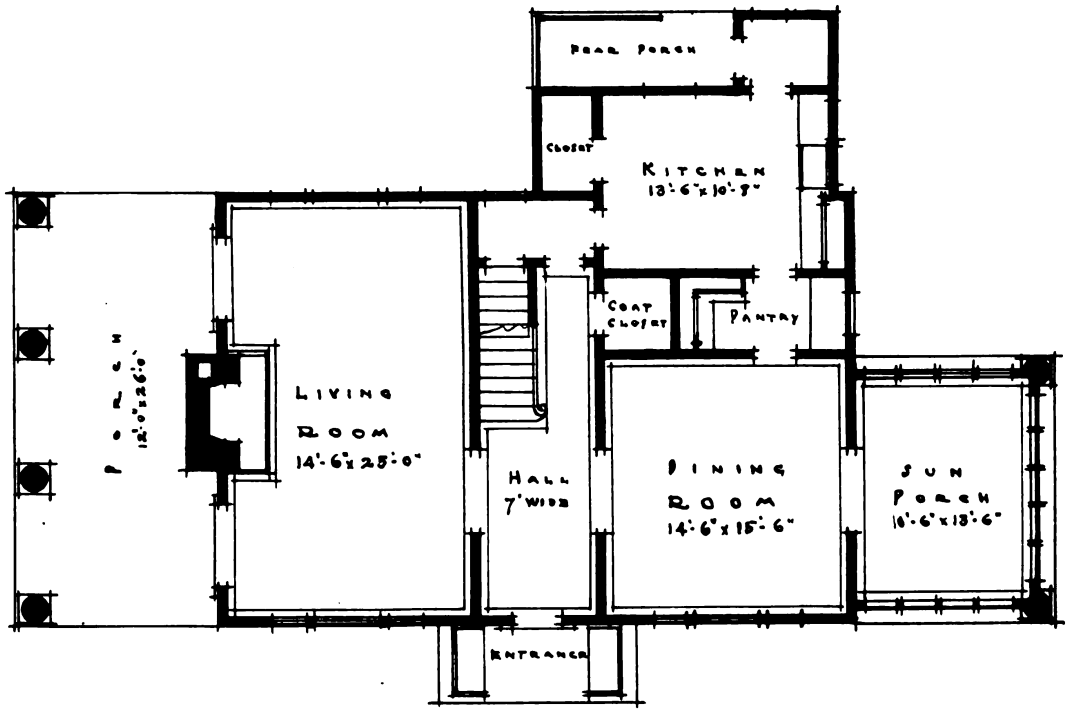

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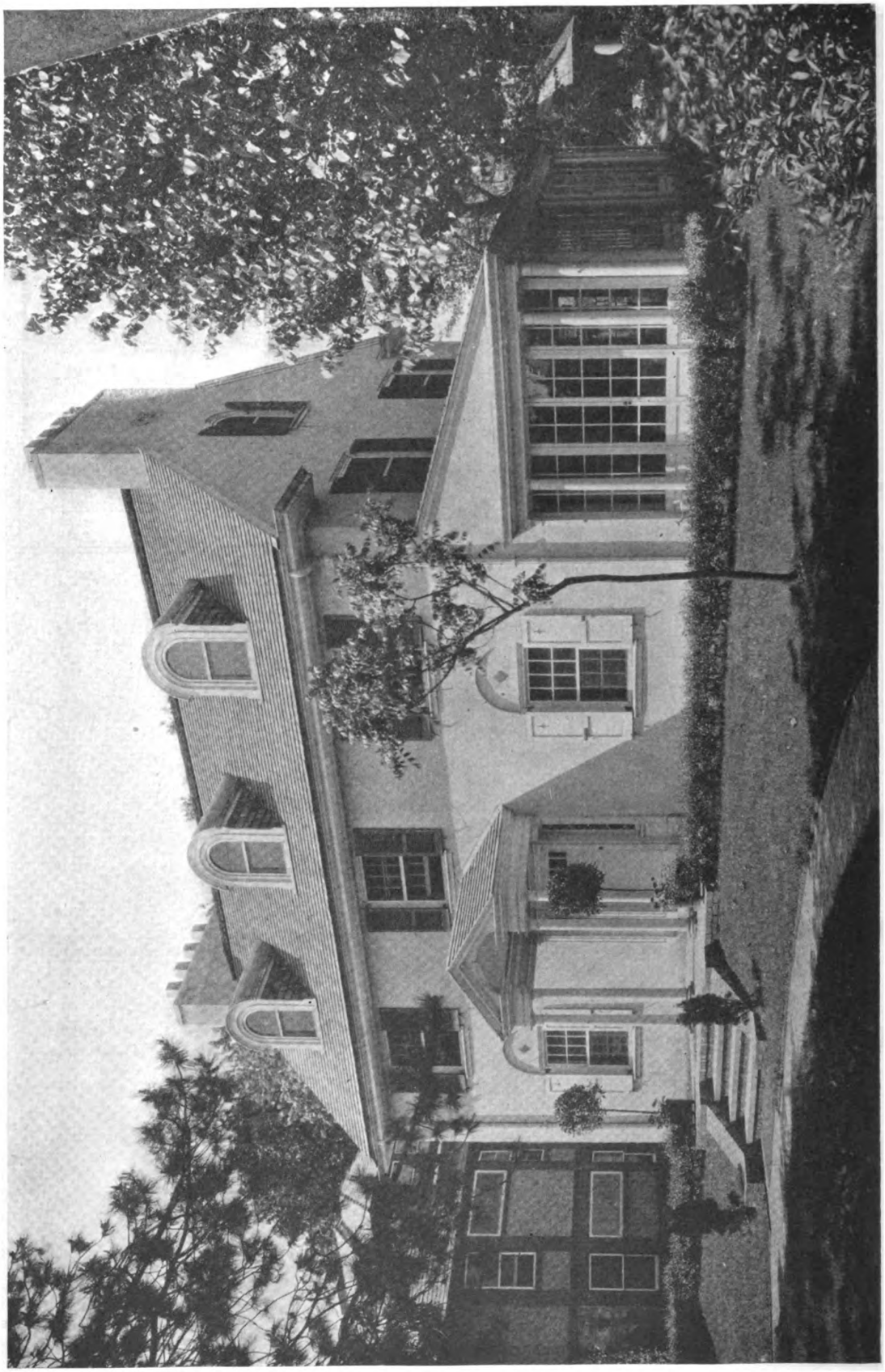

HOUSE AT RIDLEY PARK, PA.
HEACOCK & HOKANSON, *ARCHITECTS*

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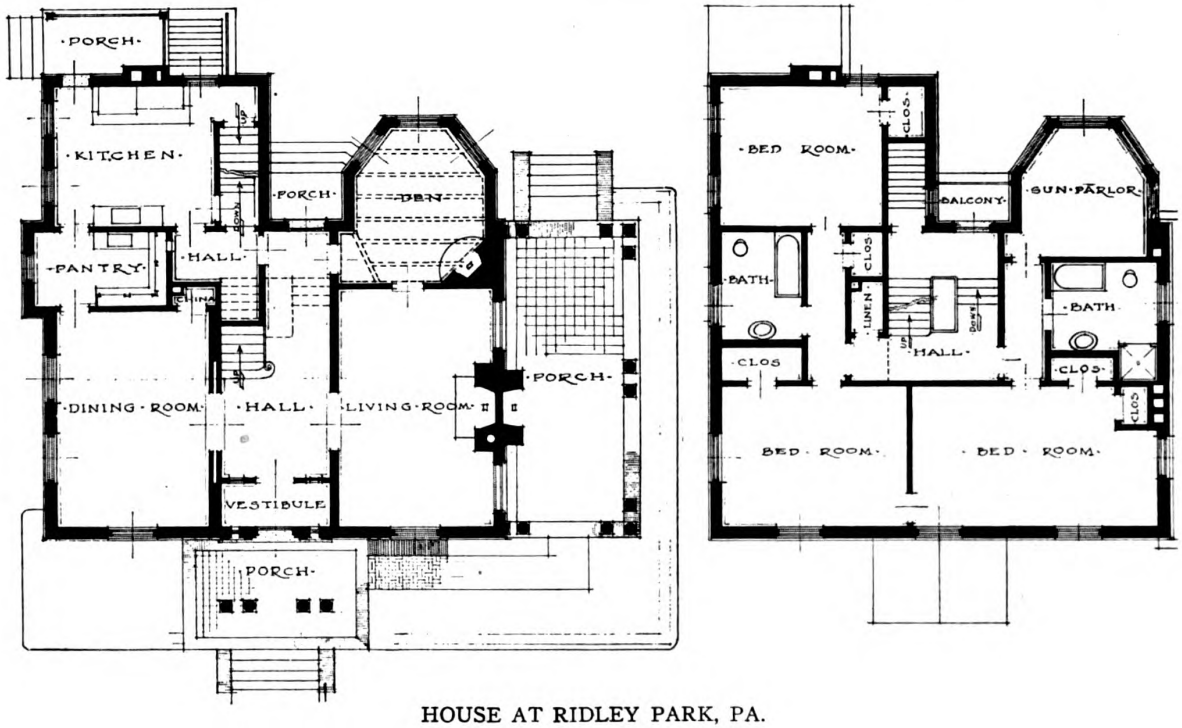

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Waterproofing Cement Stucco

A Review of the Possibilities of a New Process

KNOWLEDGE rightly applied is a public asset. Scientists are constantly adding to the sum total of human knowledge, but such acquisitions must often be put to practical application by others. The field of concrete has been a fertile one for investigation. During the past few years many new facts relating to this material have been revealed through laboratory research work,

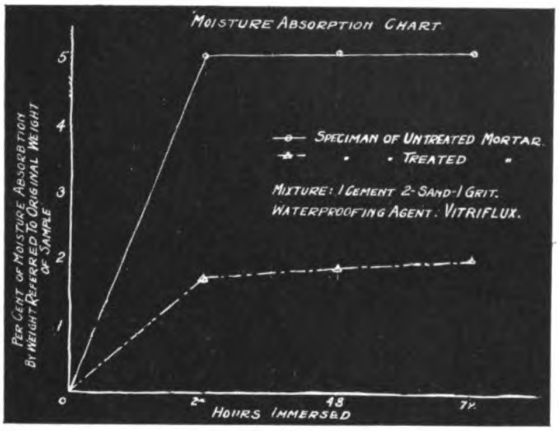
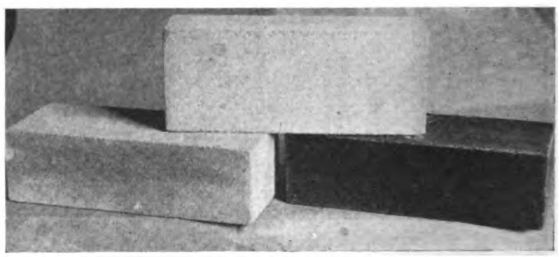


FIG. 1. RESULTS OF ABSORPTION TEST MADE BY THE NEW YORK EDISON COMPANY. TREATED SPECIMEN ABSORBED 2 PER CENT OF MOISTURE AFTER IMMERSION OF 72 HOURS, COMPARED WITH 5¼ PER CENT FOR UNTREATED SPECIMEN

the most salient being the possibility of increasing the strength of concrete by reducing the quantity of mixing water. This is now commonly termed "Abram's Water Ratio Theory," and was fully discussed at the 1919 annual meeting of the American Concrete Institute.

Much valuable information is brought out at the Institute's annual conventions, and this is true of the meeting brought to a close at Chicago last February. Information thus released, and of practical value will be discussed in succeeding issues of BUILDING AGE. In this article the important subject of waterproofing cement and concrete will be briefly discussed. Unfortunately, due to the short time in which the committee dealing with this subject had to work, a report was not presented, but the matter was quite fully discussed by the members of the Institute present at the session when this topic came up. At this session various commercial methods of hardening floor surfaces, notably those which have calcium chloride as the base, were presented. Westinghouse, Church, Kerr & Company (one of the large construction companies) had, according to Mr. Paul Chapman, their engineer, been experimenting for years with the subject of waterproofing concrete. Mr. Chapman stated that they had achieved notable success by the use of a recently developed product, manufactured in liquid form and added to the mixing water. The results had been so satisfactory that a widespread interest was naturally aroused by such an encouraging report. Since this waterproofing method has been developed and experimented with over a considerable period of time before having been made available, data from numerous tests of an experimental nature are on record. It is interesting to note, according to these tests, that concrete so treated increases in strength as well as hardness, and since the absorption is decreased the waterproofing qualities are greatly improved.

Other tests were made by the New York Public Service Commission, Westinghouse, Church, Kerr & Company, the Electric Testing Laboratory and the New York Edison Company. These commercial tests are now being supplemented by tests conducted at Columbia University, the Massachusetts Institute of Technology, Lewis Institute and the Pittsburgh Testing Laboratory. The results will be of general interest. A graph made by plotting the results of one of the tests of the New York Edison Company to determine the absorption of concrete thus treated is given in Fig. 1.



CONCRETE BRICK—STANDARD FACE BRICK SIZE. BRICK AT RIGHT IS DARK RED, OTHERS ARE NATURAL CEMENT COLOR

THERE is another phase of waterproofing cement of particular interest to the home builder. In the last few years the construction of stucco houses has been greatly on the increase. The

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EASY-WORKING GARAGE DOOR SETS

Unless garage doors are hung on practical, easy-working fittings, they are an unending source of annoyance and dissatisfaction to the owner. With National garage door sets, Nos. 805 or 806, you are sure that the doors will always work freely and easily.

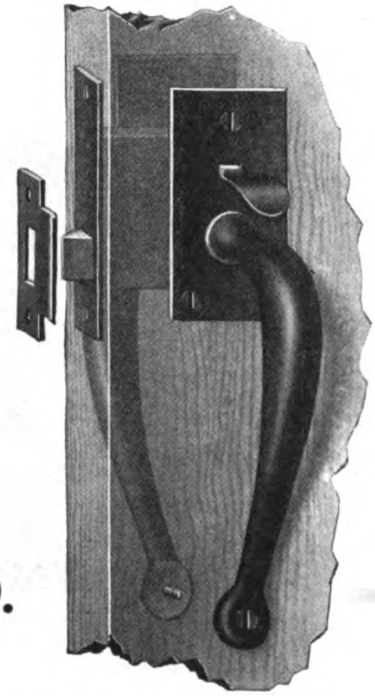
With National sets on the doors, a gentle push opens them and a slight pull is all that is needed to close them. There is absolutely no friction or binding.

Doors fitted with these sets are perfectly weathertight and snow and ice cannot interfere with their operation. The doors swing into the jams against stop, hugging the inside walls of the garage when open, thus giving maximum room inside the building.



Entrance to the garage is facilitated by the fact that one door is hung so that it will open without disturbing the other two doors. Adjustment is provided for varying floor levels.

Write for our latest catalog of Builders' Hardware, which will give you an idea of the wide scope of the National line.



NATIONAL MFG. CO.
STERLING, ILLINOIS

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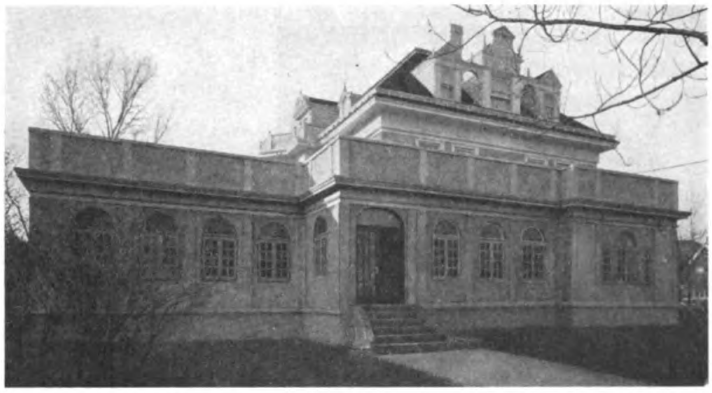
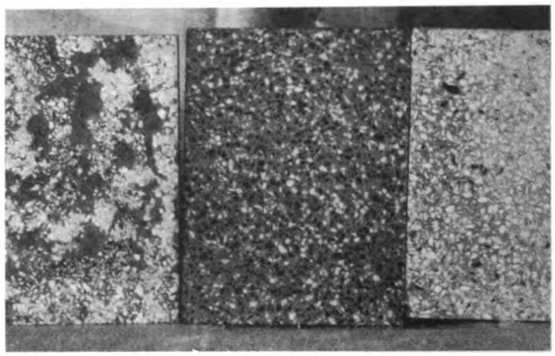


CLUBHOUSE AT BROOKLYN, N. Y. STUCCO FOR ALL EXTERIOR WALLS TREATED WITH WATERPROOFING PROCESS

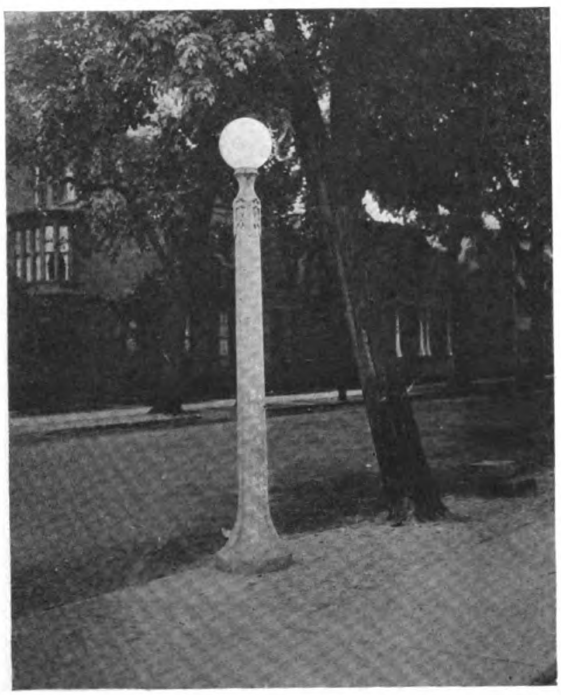
durability of stucco depends to a large extent on its waterproof qualities. In Winter constant absorption of moisture and subsequent freezing will do more to disintegrate cement stucco than all other causes combined, except perhaps uneven settlement, and where cracks open up from such settlement, or wood shrinkage, they form the opening wedge for this destructive force.

While there are many constructional features necessary to good stucco work, some of which will be described and illustrated in the May issue of BUILDING AGE, yet if stucco could be made impervious to moisture, and at the same time enjoy increased tensile strength, the cracked stucco problem would be largely solved.

To try out the claims made for this waterproofing process, it was used in the stucco of an alteration job, the majority of the stucco work having been completed last Fall. These walls were thus exposed to the weather during the past severe Winter. The stucco is two-coat on metal lath with a pebble dash finish. The pebbles are quite smooth and well rounded. A careful examination revealed no cracks. After a severe rain, the absorption appeared exceedingly slight; in fact, negligible. The surface of the stucco between pebbles is extremely hard, almost like flint, so that a sharp penknife blade does little more than scratch the surface. The pebbles are held in place so tightly that it was found most difficult to remove them except with considerable effort and by using a sharp tool. The waterproofing material (Vitraflux) was used in the proportion of one part to ten parts of water for the first coat and one part to five parts of water for the finish coat. While a much longer period of exposure will be required to prove beyond a doubt that a solution of the cement stucco problem has been found, the results thus far recorded are most encouraging.



CONCRETE SLABS FOR DECORATIVE WORK. THESE ARE COMPOSED OF CEMENT AND FLORIDA BEACH SAND CONTAINING SHELLS, THE TOPPING BEING A 1:2 MIX, AND HIGHLY POLISHED



CONCRETE USED TO ADVANTAGE FOR STREET LIGHTING STANDARD

This process also opens up a tremendously large field. At the present time, concrete bricks thus treated are being manufactured, and it is estimated that in the near future this plant (located in Brooklyn, N. Y.) will turn out half a million such bricks daily at a price below that of common clay bricks.

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In the House that George built –

The name is fictitious. The instance real—and typical.

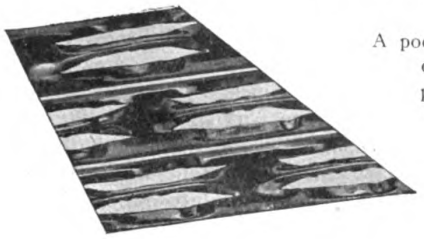
"George Brown" was building six houses to sell. The choice of plaster backing depended solely on his own decision.

An "old-timer" in the building game—the habit of using wood lath was strong in him, but high prices and scarcity led him to investigate Truss-Loop.

After a little urging, he decided—the difference in price being practically negligible—to use it in "just the first house."

Once the Truss-Loop was up and plastered, Brown found—a typical discovery—that Truss-Loop gave him an entirely new selling argument to use on the home-buyer. The extra facts that Truss-Loop was more rigid and gave faster erection, was self-furring and permitted faster trowelling, was all velvet—free profit to him.

Result? Brown "took off the limit" *and expanded his original order to include Truss-Loop for all six houses.*



A pocket sample of Truss-Loop (gladly mailed you on request) will reveal to *you* the whys and wherefores of its profit-making advantages. Complete data and specifications will accompany the sample.

The Bostwick Steel Lath Company
Niles, Ohio

Bostwick TRUSS LOOP

"Makes plaster permanent"

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Several brick of this type are shown. Many other cement products such as blocks, etc., can be improved by such a process, and cement mixed with marble chips or similar aggregate can also be used for ornamental work, since the treated cement takes a high polish.

Building Operations in February

IT is encouraging to find that the industrial building still maintains its lead over other classes of construction. This is attacking the immense building program from the right angle, for it means an increase in the capacity for the production of manufactures.

The total amount of contracts awarded during the month in the territory east of the Missouri and north of the Ohio River was $216,663,000 against $236,000,000 for January. Although this shows a distinct falling off it is still about $3,000,000 over the monthly average for the year 1919.

An analysis of the February figures shows that $70,000,000, or 32 per cent was for industrial building; $43,900,000, or 20 per cent, was for business buildings; $43,543,000, or 20 per cent was for public works and utilities; and $37,464,000, or 17 per cent was for residential buildings.

It was natural that the industrial building should be of greater proportionate volume in New England, where it was 47 per cent; in New York, New Jersey and Pennsylvania, where it was 36 per cent, and in the Middle West 37 per cent. In the neighborhood of New York City business buildings showed the largest volume of business, or 53 per cent; and in Minnesota, North and South Dakota, the type of building which has the most contracts is residential.

There was a reduction of almost half in the quantity of building near New York, which accounts for the falling off of February against the figures of January. Other sections of the country show an increase to some extent, though less pronounced than shown by the January figures.

The chief deterrents in the building trade are the shortages of materials and the uncertainty of reasonable stability in costs both of basic materials and labor. The shortages have to some extent been caused by the disorganization of the country's transportation system which has proceeded since the armistice steadily but gradually upon its habilitation; so complicated are its difficulties, however, that there is no immediate hope for adequate service. It was feared that with the transfer of the railroads from government control to the administration of the railroad officials a temporary disadvantage might be suffered, but this seems now not to be the case and a continuance of the improvement is more likely. The only cause for uncertainty seems to be the question of what is to be the attitude of labor. It is also upon labor that the production of the factories depends. If there is to be a continuance or rather a recurrence of unrest the output will be hampered; at present, however, labor seems contented and approaching optimism.

In recognition of the need for housing there has been a gradual strengthening of the policy of holding prices at their present levels; a policy first announced by the United States Steel Corporation, but which has since been adopted by lumber companies near Chicago and will undoubtedly be accepted as the part of wisdom by all of the basic materials trade. A truce with the building trades to continue the present wages is likely to be acceptable as essential to relieving the shortage of housing. A start toward such a truce has already been made in New York City.

Following is a recapitulation of building operations, the figures for which are according to the statistics of the F. W. Dodge Co.

	Contracts Let Feb. 1920	Contracts Let Jan. 1920	Projected Work. Feb. 1920
Minnesota, North and South Dakota	$6,017,000	$7,246,000	$14,360,000
Middle West	78,082,000	61,423,000	214,834,000
Ohio, West Virginia, Western Pennsylvania	42,520,000	43,556,000	37,775,000
Eastern Pennsylvania, Southern New Jersey, District of Columbia, Delaware and Maryland	31,854,000	226,191,000	78,969,000
New York and Northern New Jersey.....	36,375,000	79,570,000	112,209,000
New England	21,814,000	17,862,000	55,005,000

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Everlastic Roofings Ride the High Wave of Building Prosperity

Barrett Everlastic Roofings

BUILDING construction for 1920 will excel the Four billion dollar mark, says one of the most eminent Architectural authorities. He is backed up by figures—$50,000,000 for November, $60,000,000 for December and $90,000,000 for January.

In off building years, the demand for Barrett Everlastic Roofings is vigorous. Prospective home-owners know that these sterling roofings afford durability as well as unusual beauty. Builders also recognize that Everlastic Roofings help them to keep the cost down, to make a substantial profit, and at the same time produce a finished job that proves an effective advertisement.

In this year of building prosperity, Everlastic Roofings ride the high wave, and we must urge you to anticipate your roofing needs as far ahead as possible.

For free illustrated booklet, giving full information, address our nearest office, stating which style of Everlastic you are interested in.

EVERLASTIC MULTI SHINGLES

Everlastic Multi Shingles come in strips of four, saving time, labor and nails. They are beautifully surfaced with real crushed slate in soft, natural art-shades of red or green and make a fitting roof for the finest residence.

EVERLASTIC TYLIKE SHINGLES!

Everlastic Tylike Shingles are individual shingles (8x12¾ inches) made of the same materials as Multi-Shingles, with red or green crushed slate surface. With Everlastic Shingles you have fewer shingles to handle and can cover more squares per day. Being pliable they readily fit around projections.

EVERLASTIC SLATE-SURFACED ROOFING

Everlastic Slate-Surfaced Roofing is an unusually artistic and durable roll roofing for use on buildings of the better class. It is surfaced with crushed slate in red or green. Also used in valleys or flat-roofed dormers, etc., where Everlastic Shingles are used for the main roof. Nails and cement in each roll.

EVERLASTIC "RUBBER" ROOFING

Everlastic "Rubber" Roofing—The most popular roofing of this type, now in use on thousands of buildings in all parts of the world. It is tough, pliable, elastic, durable and very low in price. The greatest value in "Rubber" roofing. Comes in rolls 36 inches wide with nails and cement.

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National Conference on Concrete House Construction

SOME time ago a number of manufacturers and other organizations interested in concrete construction came to the conclusion that not only could concrete be advantageously used in the construction of the small house, but that the co-ordination of all the various interests involved was essential to make possible the building of these houses in as artistic and economical way as possible.

With this end in view, arrangements were made for what later developed into the National Conference on Concrete House Construction held at Chicago, February 17th, 18th and 19th, 1920. These men realized that the demand for houses was far greater than could be readily met by the use of any one type of construction, or, for that matter by employing all the types commonly used in home building. They were familiar with the several housing developments in which concrete has been successfully used. An attempt was made to interest all industries and professions and all organizations which were in any way related to house construction, either in the design, construction or financing. It is not possible in a report such as this to cover with any degree of completeness the data presented. Much of the information which is of value to builders and architects will be presented in subsequent issues.

In one of the rooms, photographs, etc., of a number of the developments previously referred to were shown. This exhibition, the most complete of its kind, was of great interest.

At the opening session, February 17, three papers were read as follows:

Housing Needs from the Viewpoint of Industry, by John Glass, Manufacturers' Record, Baltimore.

This was an excellent paper bringing out the correlation between industrial production and proper housing.

Moral Aspects of the Housing Problem, by John M. Vander Muelen, D. D., Oak Park, Ill.

Mr. Vander Muelen emphasized the fact that the *Home Owner* becomes a national asset. There is no better way to calm industrial unrest and prevent the spread of Bolshevism than to induce employees to invest their savings in homes. Another point which received emphasis was the desirability of building *individual* houses instead of the multi-family type. This is an essential feature of a successful industrial housing scheme.

"The Status of the Concrete House as Regards Building Codes," by Fred W. Lumis, Building Commissioner, Springfield, Mass.

The salient feature of this paper was its emphasis on the *lack* of building codes covering concrete house construction, and the need of formulating a standard code which might be adopted by all municipalities.

In the evening an informal joint dinner was held with the following organizations: The Building Officials' Conference, The American Concrete Institute, Associated General Contractors of America, Concrete Products Association, Concrete Block Machinery Association. The speakers were John J. Murphy, ex-Tenement House Commissioner, New York; Hon. James P. Goodrich, Governor of Indiana; James J. Davis, Pittsburgh, Director-General, Loyal Order of Moose.

At the second session, February 18 (afternoon) papers were presented by Irving K. Pond, architect, and Henry Holsman, architect.

Reports were submitted by various committees at the evening session. The various methods of financing home building were presented by James F. Basiger. Among the other things he mentioned the Calder Bill now pending in Congress, which proposes to establish governmental aid to the home builder in a manner somewhat similar to that now given the farmer by the Home Loan Banks. Walter A. Hull reported on fire prevention.

An interesting paper entitled "New Developments in Surface-Treated Concrete and Stucco," by J. C. Pearson, U. S. Bureau of Standards, and J. J. Earley, sculptor, Washington, D. C., was also read.

On February 19 (morning) a joint session with the Concrete Products Association was held.

The subject of farm housing was presented by K. J. T. Ekblaw.

An interesting paper on "Concrete and Cement Roofings," by D. Helmuth, indicated that considerable progress is being made in the manufacture of a satisfactory cement roofing tile.

"Insulation and Damp-Proofing of Concrete Walls" was presented by Noland D. Mitchell, Structural Engineer, Supervising Architect's Office, U. S. Treasury Department. This is an important phase of house construction.

During the afternoon session the following reports were made: Committee on Monolithic Houses, Leslie H. Allen, chairman; Committee on Unit Constructed Houses, J. J. Boyd, Jr., chairman, and the committee on Plastic and Gunite Concrete Houses, Emil G. Perrot, chairman.

The many subjects presented merely illustrated the necessity for further investigation and study to bring to light the most improved methods and the proper solution of the many problems.

To the end that such information might be forthcoming at a later date, the following committees were appointed: committee on Architecture and Design; committee on Monolithic Houses; committee on Unit Construction Houses; committee on Concrete Block Houses; committee on Plastic and Gunite Houses; committee on Concrete and Cement Roofing; committee on Fire Protection; committee on Financing Homes and committee on Farm Housing.

There is no doubt that considerable stimulus was given to home building in concrete as a result of the conference. Those who attended fully realize that concrete construction is not the complete solution of the small house problem, but that it presents great possibilities and its extended use can be employed to help solve that problem. It has rightful and legitimate place in the building industry and although it may not always be suitable to construct the entire structural part of a building of concrete, it may readily be combined with other materials to produce a suitable structure. Neither the cement block or monolithic concrete walled house with timber joists has been built to advantage. In places where both sand and gravel are readily procurable and other building materials must be brought from a distance, there is no doubt that concrete would have an economical advantage over these other products.

While in the larger developments a considerable degree of standardization was worked out, this is not always necessary to produce economy.

It was felt that one of the problems needing further study is the design of buildings presenting a truly artistic appearance as well as being economical and substantial. No house can be truly a home unless it possesses a charm of design, and to a large extent, this remains to be developed in the concrete house.

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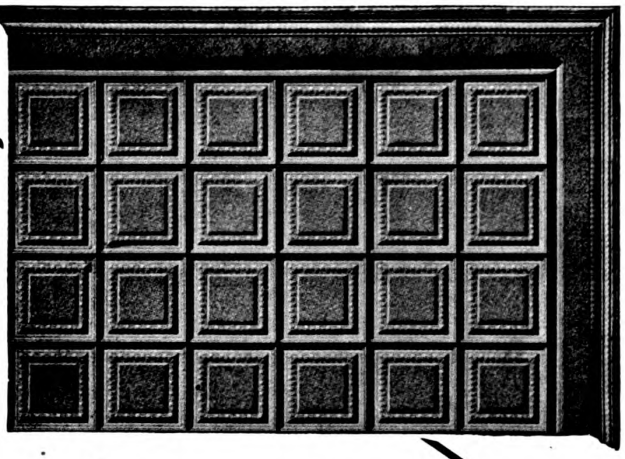
When the job is finished and the owner comes to look it over he doesn't want to see any unsightly joints in the ceiling. It's the kind of a job you give him that establishes your reputation as the "man he wants the next time." Repressed beads and die-cut nail holes make INVISIBLE JOINT ceilings easy to erect.



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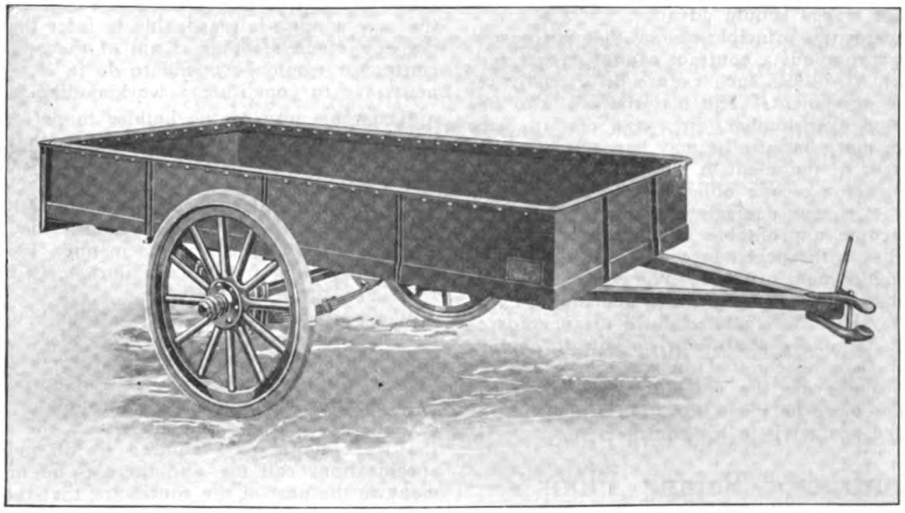

Capacity—2,000 pounds. Body—8 feet long, 46 inches wide, 12 inches high. Body and under frame built of open hearth steel. Axles—1½ inch square bed, special high carbon steel. Springs—Semi-elliptic, oil tempered and double heat treated. Bearings—Roller. Wheels—1½ inch spoke, artillery type, second growth hickory. Tires—32-2, solid rubber. Weight—534 lbs. Other models with gates at front; also extension tongue which permits carrying lumber, poles, ladders, etc., 30 feet long.

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Legal Department



If you are bothered by any point of building law, write to our Legal Adviser, A. L. H. Street, LL. B., who is retained for the benefit of subscribers to Building Age, and is at your service.

Is a Contractor Entitled to Extra Pay to Cover Increased Wages?

From G. A. N., New Jersey—I have a contract for a lump sum to complete the masonry work on a house and garage. The jobs are about one-third done, and payments have been made accordingly. Wages have advanced about 15 per cent since I started the job. Can I claim this extra cost from the owner? Can I legally quit this job if the owner refuses to pay the extra cost, over which I have no control?

Answer—I regret to be compelled to advise you that both these questions must be answered in the negative, if, as I assume, there was no provision in your contract with the owner for an increase in allowance to you in case wages should advance.

It is a fundamental principle of law that unforeseen expense in carrying out a contract cannot excuse failure to perform it, unless such excuse be specially reserved in the agreement. The materialman who has contracted to deliver lumber, etc., at a certain price cannot charge more because he may have made a mistake or an error of judgment in fixing the price. Nor may the contractor escape obligation to either carry out his contract or pay damages, because performance may have become unprofitable or burdensome. And this rule applies with special force to contracts which involve the employment of labor. The contractor must foresee the possibility of his workmen demanding extra pay unless they have been pinned down to an enforceable contract. Should a contractor be able to employ cheaper labor than he counted on when he made his contract with the owner he is entitled to the benefit. If it costs him more he must bear the burden, unless he has guarded against it in his contract.

Must Contractor Scrape Floor?—Right to Discharge Sub-Contractor

From N. W. S., South Dakota—I am a contractor and builder. Is a contractor supposed to scrape a floor, if it is not in the contract or specifications? I am building a schoolhouse and hired a man to do the concrete work and plastering. This man was unknown to me at the time, but was recommended to me. He put in the chimney and foundation, and proved to be no good. I wanted a bond from him before he started plastering and he could not furnish any. He would not give me a contract so the work could be passed on. So I paid him for what he had done and hired another man to finish the job. There was no written contract for this job—a mistake on my part. Can this man come back for the full amount, including plastering which he did not do? He says that he can get the whole amount by law.

Answer—An answer to your first question—as to whether a contractor is bound to scrape a floor—depends upon undisclosed facts concerning the nature and extent of the contract and specifications. If specifications were drawn and purported to give detailed directions as to how the work should be done, specifying how parts of the work were to be finished, but saying nothing about scraping of the floor, I am of the opinion that the contractor is not required to do it. In such case it could reasonably be inferred that the parties did not contemplate scraping as part of the contract work. But unless there is some circumstance in the case making is reasonable to infer that the parties did not intend scraping, I am of the opinion that the contractor would be bound to do it, if that should be necessary to constitute a workmanlike job.

"It is the duty of the builder to perform his work in a proper and workmanlike manner; that is, the work should be done as a skilled workman would do it, the law exacting from a builder ordinary care and skill only, and not requiring him to do something not contemplated by the contract. Where the builder fails to perform in a workmanlike manner, he is liable for defects resulting from that failure." (9 Corpus Juris, 749, 750.)

"Where the contractor agrees to build a structure to be used for a particular purpose, there is an implied agreement on his part that the structure when completed will be serviceable for the purpose intended. * * * But where he agrees to build according to certain specifications and guarantees the sufficiency of the work he is not required to do more than the specifications call for, and there is no implied agreement on the part of the contractor that the work when completed, according to plans and specifications, will be safe and fit for the purposes intended." (9 Corpus Juris, 745, 746.)

What a contractor is required to do depends, first, upon what the parties have expressly agreed to, and,

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Fifty Designs *for* Small Face Brick Homes



Interesting Detail of Brick Design in Porch

PROSPECTIVE home builders are chiefly interested in beauty, permanence, fire-safety, and interior arrangement—all at the most economical expenditure.

A country-wide competition, approved by the Competition Committee of the American Institute of Architects, was conducted recently by the *Architectural Forum* of Boston, with the purpose of raising the artistic standard for small home construction. Nearly four hundred experienced and competent designers submitted an exceptionally fine collection of plans for medium sized face brick houses suitable for small town and suburban residences.

Fifty of the most original, artistic, and practical of these designs have been reproduced in "The Home of Beauty" for the convenience of contractors and architects who appreciate the wonderful opportunity face brick offer, in their wide variety of color tones and textures, for the construction of permanent, beautiful and economical houses.

The price of this book is fifty cents to the general public, but it will be sent free to any contractor, architect or material dealer who will send for it on his printed stationery if addressed to Department B-4.

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second, when there is no express agreement, upon what it may be fairly inferred that they understood. So, I believe that if a builder contracts to do work, including laying of a floor of a kind that is usually scraped to constitute it a finished job, it must be presumed that the parties intended scraping to be done, unless some circumstance points to the contrary. A contract to "lay" a floor may not specify that the builder is to nail it down, but certainly the law would imply duty to do that in the absence of a showing of mutual understanding to the contrary. So, I do not believe that laying of a floor is completed until it is put in such shape as to be usable. It is not to be supposed that the owner contemplated necessity for hiring another builder or other person to scrape the floor after it had been laid.

But, as already noted, if the contract and specifications be so worded as to show that they were intended to go thoroughly into detail in specifying how the work should be done, and they are silent on the point of scraping, the contractor is not obligated to do it, and especially if scraping is not necessary to put the particular floor in usable condition. The only way the owner could get around this conclusion would be by showing that it was actually understood between the parties that the contractor would scrape, but that the understanding was inadvertently left out of the specifications.

As to your second question, you were thoroughly justified in discharging the man referred to if he failed to do his work in a good and proper manner. No one is bound to retain an employee who has demonstrated his unfitness to do the work he has been employed to do. His failure to give a bond or written contract justified you in discharging him, provided that it was understood when you employed him that he would give it. But if you definitely hired him to do the work, without insisting that a bond or written contract be given, you could not afterwards discharge him merely because he refused or was unable to give one. If it should appear that you had no good excuse for discharging him before he had done the work it was agreed he would do, he would be entitled to damages. These damages would be measured by what he would have made had he been permitted to carry out the contract, less what he was able to earn elsewhere after being discharged. But if he was able to get work elsewhere at as good pay he suffered no actual loss and would not be entitled to actual damages, although you may have inexcusably discharged him.

Must This Architect Obtain a License?

From J. A. M., Virginia—Can an architect who has an office in Virginia, where he practices architecture, design in his Virginia office a building which is to be constructed in North Carolina, unless he has a license to practice architecture in the State of North Carolina? Under the same conditions could he design a building to be constructed in the District of Columbia?

Answer—For two reasons we are of the opinion that such license is not required: (1) Because we find no statute requiring it. (2) Because we believe that such transactions would constitute interstate commerce, within the well-settled rule of law that the individual States are powerless to place burdens on interstate commerce.

An examination of the index to the 1919 Code of Laws for the District of Columbia fails to disclose any statute requiring an architect's license. But such a law is in force in North Carolina, limited to actual practice of architecture within that State.

The North Carolina statute (Laws 1915, chapter 270, sec. 4) seems to expressly recognize lack of power in the State to interfere with the preparation of plans, etc., in another State, although to be used in the State, for the law says:

"Nothing in this act shall prevent the procuring of plans and specifications from an architect residing outside of this State."

But when an architect leaves his office in another State and goes into North Carolina he becomes subject to the following provisions of the same law:

"That non-resident architects who come within the State to do business shall be subject to the same examination and upon the same terms and conditions as resident applicants, unless such non-resident architects are permitted to engage in business in this State under the terms of section 3 of this act."

Section 3 provides:

"Any person who shall by affidavit show that he has made the practice of architecture his sole business or principal means of livelihood previous to the passage of this act, or who shall present a certificate from a similarly constituted board of another State, or any person who is a member of the American Institute of Architects may, upon payment of $10, be granted a certificate and admitted by said board to practice architecture in the State without examination."

(Incidentally, it is to be noted that by Laws of 1919, chap. 336, architects holding North Carolina licenses are required to renew them annually at a fee of $5. In default of payment, licenses are revoked, subject to right to renewal within one year by paying $10.)

According to the manifest meaning of the North Carolina law, plans and specifications may be prepared and delivered by a non-resident architect without necessity for a license. But it is equally clear that if he undertakes to practice his profession by some independent act committed in the State he becomes amenable to the license law.

As bearing on the general subject of regulations affecting non-resident architects, we refer to an interesting decision of the South Carolina courts holding that where an architect residing in one city obtains contracts in another city, he becomes subject to a license tax under an ordinance of the latter city, although he prepares his plans in the city of his residence. It is to be noted that it was a mere local occupation tax involved in that case, and that, apparently, the architect actually practiced his profession in the taxing city.

Substantial Performance of Building Contracts

The following is a summary of an important rule of law laid down by the Maryland Court of Appeals in the case of Barry vs. J. L. Robinson Construction Co., 108 Atlantic Reporter, 688. It may be regarded as a correct statement of a legal principle applying generally throughout the country, inasmuch as it does not depend upon any special statutory provisions:

Where a building contractor has in good faith performed a contract, but not in the manner prescribed by the contract, and the owner has sanctioned or accepted the work, the contractor is entitled to recover the reasonable value of the work so done and accepted, subject to the owner's right to counterclaim for damages due to the contractor's deviation from the contract without authority from the owner.

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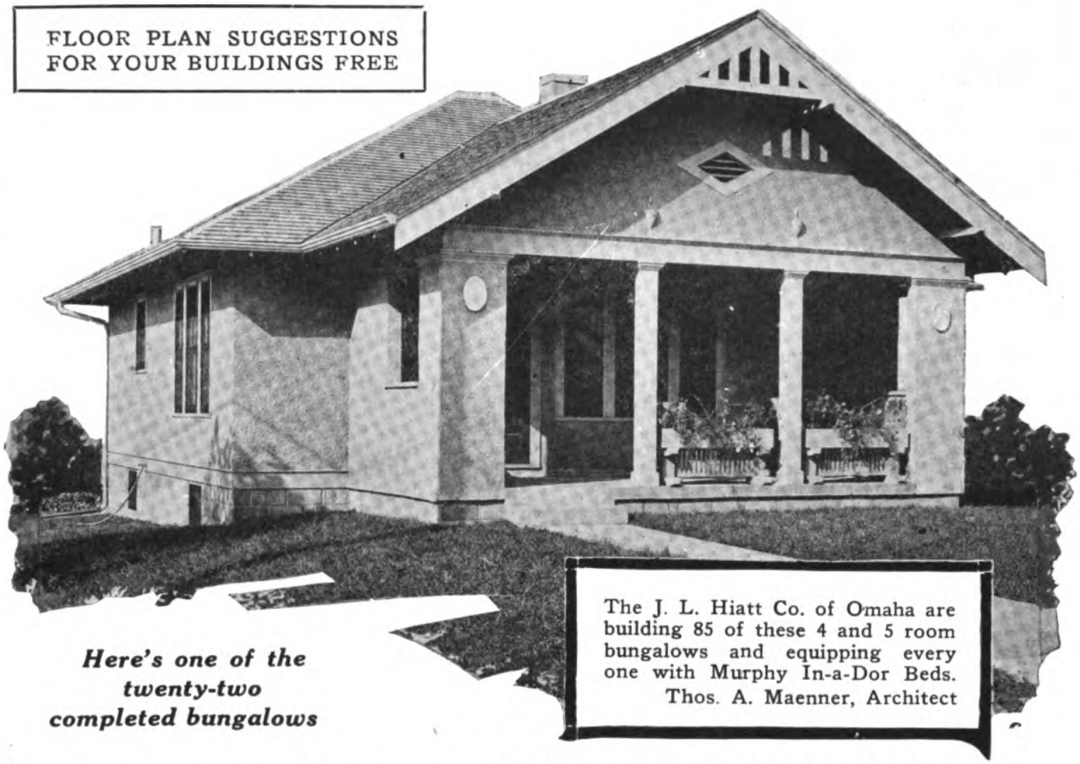

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New Catalogs of Interest to the Trade

These catalogs may be secured direct from the manufacturer. If you prefer, write the date of this issue and the numbers, of any catalogs on a postal and mail it to "Building Age," 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.

68. **Dutch Boy Flat Paint.** National Lead Company, 111 Broadway, New York City.—Booklet describing this paint, which is Dutch Boy white lead, ready for use for interior work. This is washable. Uses on concrete floors, metal ceilings, old wood work, plastered ceilings and walls are described.

69. **Roofing Facts and Figures.** Wm. L. Barrell Company, New York City.—Booklet illustrating and explaining the many uses and advantages of Consertex Canvas Roofing.

70. **Rex Strip Shingles.** The Flintkote Company, Boston, Mass.—Literature describing the merits and application of these shingles. Samples given.

71. **Ambler Asbestos Building Products.** Keasbey & Mattison Company, Ambler, Pa.—Literature showing reproductions of installations where Ambler asbestos shingles, asbestos building lumber, asbestos corrugated roofing and siding and linabestos wallboard are used.

72. **Builders' Hardware.** The H. B. Ives Company, New Haven, Conn.—Illustrated folder describing this hardware.

73. **Barrett Everlastic Roofings.** The Barrett Company, New York City.—Literature describing these roofings, which are made in four styles to meet different steep-roof requirements.

74. **"Ready Reading" Tapes.** Keuffel & Esser Company, Hoboken, N. J.—Catalog issued by this company describing these K. & E. measuring tapes.

75. **Mineral Wool.** U. S. Mineral Wool Company, New York City.—Literature describing advantages of using mineral wool for building purposes.

76. **Alpha Blueprint Service Sheets and Special Bulletins.** Alpha Portland Cement Company, Easton, Pa. —Give information covering concrete improvements, such as workingmen's homes, roads, septic tanks, inclosure walls, porch, cellar and stable floors, etc.

77. **Asbestos Shingles.** H. W. Johns-Manville Company, New York City.—Literature describing these shingles, and explaining methods of application.

78. **Niagara Wallboard.** Niagara Wallboard Company, Buffalo, N. Y.—Literature giving advantages of Niagara Wallboard which should be of interest to builders and contractors. Samples given.

79. **Catalog No. 21 "P."** The L. S. Starrett Company, Athol, Mass.—Catalog describing Starrett tools.

80. **Decorative Concrete.** Art Stone Company, Waynesboro, Pa.—Literature giving process and formulas whereby a builder can make high-grade decorative concrete with his present equipment. Reproductions of marble, granite, onyx, etc., also feasible.

81. **Bay State Brick and Cement Coating. Book No. 19.** Wadsworth, Howland & Company, Inc., Boston, Mass.—Describes this waterproof coating. Samples given.

82. **Chesley Stock Fire Proof Doors.** A. C. Chesley Company, Inc., New York Gity.—Booklet illustrating and describing these doors, standard sizes of which are carried in stock.

83. **Yankee Tool Book.** North Bros. Mfg. Company, Philadelphia, Pa.—Describes tools manufactured by this company, laying special stress on the "Yankee" ratchet driver, No. 10.

84. **Dumbwaiters and Hand Elevators.** The Storm Mfg. Co., Newark, N. J.—Catalog describing and illustrating these dumbwaiters and elevators made by this concern.

85. **Catalog No. 0.** New York Blue Print Paper Co., New York City.—Catalog describing and illustrating drawing tables and boards, squares, curves, etc., a full line of which is carried in stock by this company.

86. **Hydrex Dampproofing Paint.** Hydrex Felt & Engineering Company, New York City.—Literature describing this dampproofing paint, which is a heavy bodied black paint applied cold with a brush.

87. **Pullman Unit Sash Balance.** Pullman Mfg. Company, Rochester, N. Y.—Illustrated catalog with blue prints showing method of installation of the Pullman Unit Sash Balance.

88. **Specialties for Builders.** Niagara Falls Metal Stamping Works, Niagara Falls, N. Y.—Folder No. 67 describes and illustrates wall plugs, galvanized veneer ties, sash pulleys, sash chain, sash fixtures, etc. Free samples given.

89. **C. E. Jennings' Arrow Head Tool Chests and Tool Cases.** C. E. Jennings & Company, New York City.—Catalog describing and illustrating these tool chests and tool cases.

90. **Dumbwaiters and Hand Power Elevators.** Sedgwick Machine Works, New York City.—Catalog illustrating and describing these dumbwaiters and elevators. Blue prints and full directions for erecting given with each outfit.

91. **Tockolith and "R. I. W." Steel Preservative Paints.** Toch Brothers, 320 Fifth Ave., New York City.—Attractively illustrated booklet describing these paints. This company also issues various other folders and booklets giving the different uses to which these paints could be applied; specifications for damp-proofing, water-proofing, enameling, technical painting are also furnished.

92. **Ventilation.** Royal Ventilator Company, Philadelphia, Pa.—Illustrated booklet describing the "Royal" ventilator. Pricelist is also given.

93. **General Fireproofing.** The General Fireproofing Company, Youngstown, Ohio.—February, 1920, issue. Contains several articles descriptive of GF products. Also contains article by commissioner of Associated Metal Lath Manufacturers, Mr. Wharton Clay, and from Mr. C. O. Powell, assistant commissioner.

94. **Concrete in Architecture and Engineering.** February-March issue. Portland Cement Association, 111 West Washington St., Chicago, Ill.—Contains many interesting articles on the subject of concrete. Extensively illustrated.

95. **Save the Surface and You Save All.** Educational Committee, Save the Surface Campaign, The Bourse, Philadelphia, Pa.—Illustrated booklet dealing with the protective coating which should be applied to surfaces.

96. **Doorways.** Richards-Wilcox Company, Aurora, Ill.—Illustrated circular describing the various types of door equipment furnished by this company.

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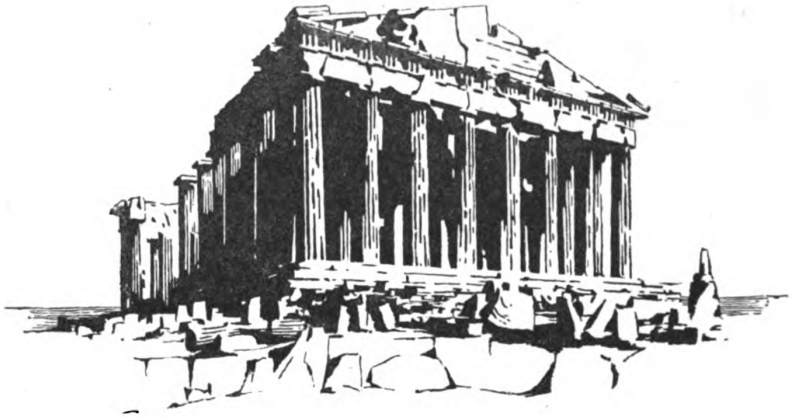
The Worth of STANDARDS



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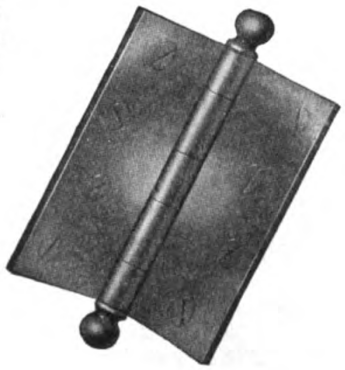

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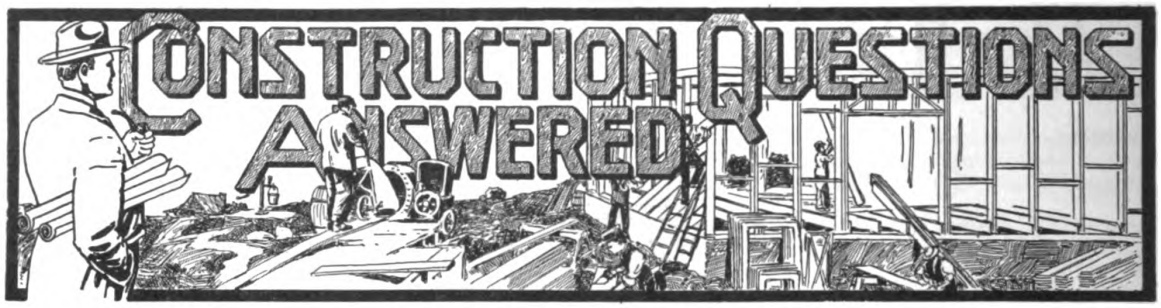

Planning to Meet Special Conditions

From G. F. F., West Reading, Pa.—Under your offer of free information, I should be pleased to have you send me any ideas or plans to use in erecting homes on the pair plan; that is, building two homes on a plot 50 ft. x 150 ft. The houses I have in mind are to be 18 ft. wide x 45 ft. or 50 ft. deep with 20 ft. lawn in front and 7 ft. on side. What I am most interested in is a first and second floor layout for such a home. Whatever you have in this style of home-building would be very much appreciated.

[Editor's Note: While BUILDING AGE does not usually originate designs to fit such specific cases, yet since a number of similar inquiries have been received, two suggested schemes have been worked out for the case in point and may be modified to fit similar but not identical conditions.]

Answer—Your problem has been attacked from two different angles. The solution which is best suited to the peculiar conditions obtaining in the locality in which you propose to erect these double houses you yourself must decide. All we can do is to point out the advantages and disadvantages of each scheme.

In both studies the plan of only one building is shown, that of the adjoining building being an exact replica of the one illustrated.

In Fig. 1 the front porch is situated at one end and extends around the side of the house. In Fig. 2 there is one large common porch for both houses. In Fig. 1 the stair-hall extends along the entire width of the building, while in Fig. 2 it is placed at one side, along the party wall. In the first case, a light, spacious reception hall is obtained; while in the second case, by reducing the width of the hall and concentrating it into as small an area as possible consistent with comfort and convenience, we are able to insert an additional room, namely, a library, between the parlor and dining room. Furthermore, much larger rooms result from the second arrangement than from the first, as a casual study of both plans will reveal. Offsetting this advantage is the possibility of introducing in scheme No. 1 a back stairway, a most desirable feature in a house where domestic help is employed.

In Fig. 2 the three principal rooms, parlor, library and dining room, are separated by wide sliding doors On special occasions, when all these doors are thrown wide open, practically the entire first floor area could be utilized for entertainment purposes. Although a similar arrangement may be effected with the parlor, hall and dining room in Fig. 1, the result is not so satisfactory, as there is a narrow door between the parlor and the hall, and the latter is, moreover, encumbered with a wide staircase and closets.

The kitchen layout also merits our consideration. In both schemes, the kitchen is placed in back of the house, each being provided with a porch and closet space. In scheme No. 1 the closet is placed in the private hall, while in No. 2 it opens up directly into the kitchen. In the latter a water closet compartment is conveniently placed on the back porch, while in the former it is placed in the front of the house, within easy access of the main hall—an equally convenient location. The pantry in scheme No. 1, although comparatively small, is well lighted and ventilated, whereas in scheme No. 2 no window could be provided. In Fig. 2 four chimneys are required for both houses; in

(Concluded on page 70)

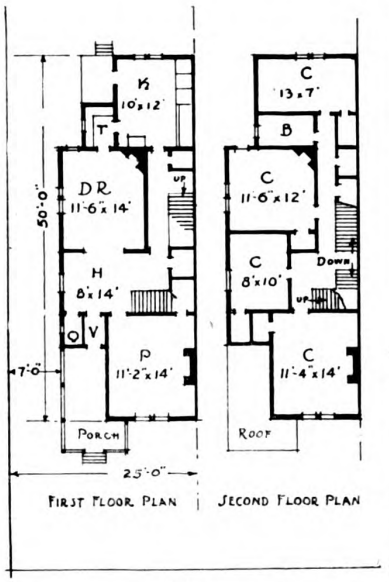

FIG. 1.

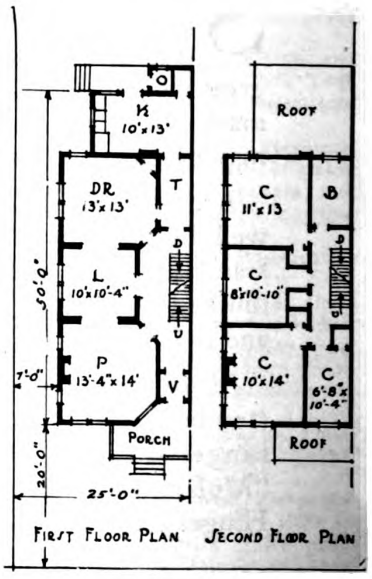

FIG. 2.

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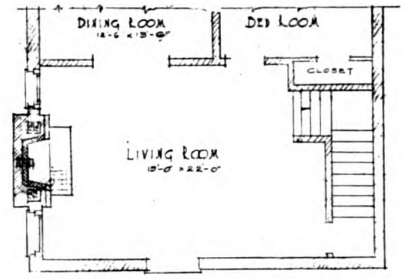
Information on Chimney and Fireplace Construction Desired

From J. D. B., Mich.—I would be glad to have your help with respect to the construction of chimney and fireplaces in a two-story apartment building of Colonial design. Would it be proper to use cobblestone effect in building the fireplaces? I am sending sketch showing location of fireplace in living room.

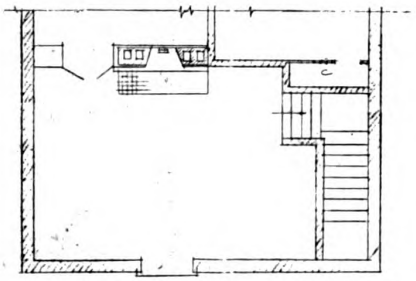
Answer—The accompanying drawings showing plans, sections and elevations of a fireplace suitable for the building mentioned illustrate the various features of construction. It is recommended that the Colonial fireplace with its white enameled mantel be used in preference to one without the mantel. Note the change in location of chimney from that shown on the sketch submitted to an outside wall position with casement windows on each side, and with the seat or bookcases below. Both are very practical. The fireplace placed on the outside wall would be much more satisfactory than inside, as originally laid out. A good view can be had from the dining room, bedrooms and living room. By placing the fireplace in the outside wall, part of the wall can be utliized for part of the fireplace, assuming that it is going to be built of brick or tile.

Regarding the cobblestone fireplace, it is seldom found that a typical Colonial fireplace is built of cobblestone, because it presents a rustic appearance and belongs to the mountain cabin or a certain type of bungalow. Besides, it would be pretty hard to fit a mantel up snug around cobblestones, as they usually are laid up very irregularly.

Note in sectional view a provision for an ash dump for the fireplace on the second floor. If this is omitted, the outside wall of the fireplace can be reduced four inches. The fireplace opening is 27 in. x 42 in., requiring a flue 12 in. x 12 in. It was made this size to suit the dimensions of the rooms and to carry off the dead air from the rooms. Fireplaces generally make excellent ventilators for small residences. The building code of Detroit, Michigan, will require a flue lining in all flues. The bricks used should be smooth in texture and of a very good grade. All fire brick around side walls of fire box should be laid flat with an occasional heading course to tie them in with the other brickwork. This insures a permanent job. Fire brick in the floor of the fire box should be laid on edge to eliminate any cracking and splitting from the heat.



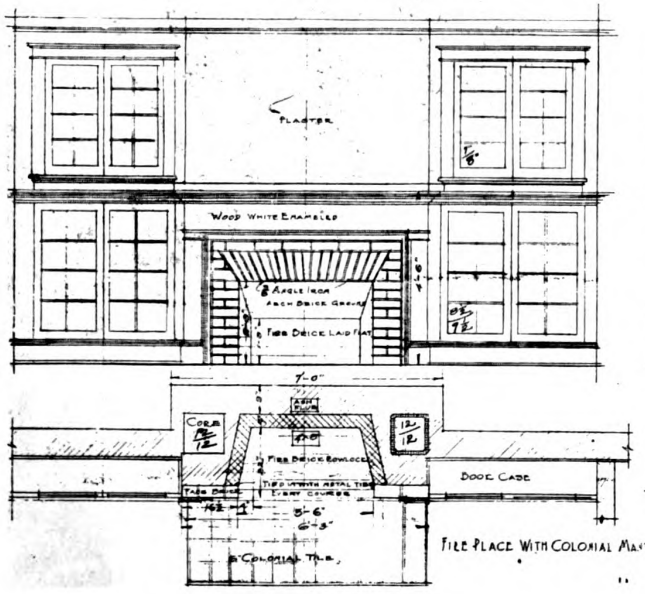
PROPOSED LOCATION OF FIREPLACE.


SKETCH SUBMITTED SHOWING LOCATION OF FIREPLACE

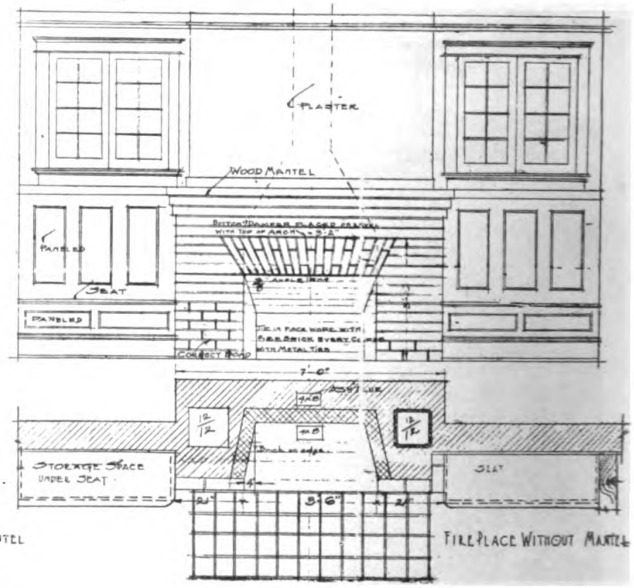
Place all dampers *one foot* above the top of the opening. A "Jack" arch is shown in both details, one 9 in. deep and the other 13 in. deep. A full-sized detail should be drawn and the brick ground to the proper size. This insures a perfect "Jack" arch.

The arch should be supported by a stiff angle iron from ⅜ in. to ½ in. thick, with a bearing of from 4 in. to 8 in. on both jambs. This gives the arch a good support, and insures it against settling and cracking.

The hearth is supported by a trimmer arch, laid in cement mortar. The brick are laid rowlock



FIRE PLACE WITH COLONIAL MANTEL



FIRE PLACE WITHOUT MANTEL

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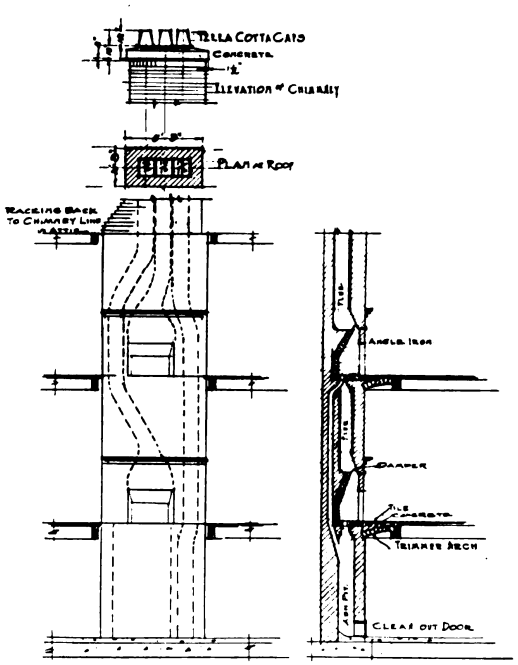
and bonded. Tile should be set in cement mortar, flush with the top of finished floor. Allow ⅛ in. for settlement. Do not use a glazed tile for the hearth. Six inch square tile are generally used. The interior brickwork should be laid with considerable care to insure a perfect work, which means all courses to be level, bond plumb, uni-



form cross-joints and bed-joints, and all face work to be plumb square and level. All striking to be carefully done, and try to get bricks uniform in size and color.

Planning to Meet Special Conditions

(*Continued from page 66*)

Fig. 1, only three are needed, since the chimney in the parlor can be made to serve for both houses.

Let us now direct our attention to the second floor plans. In both plans, ample closet space is furnished for each chamber. Linen closets in the hall have also been provided. Special attention is called to the compact arrangement of the closets shown in Fig. 2.

Although the front porch in each study is carried up but one story, there is absolutely no reason why, if funds are available, another porch could not be built on the second floor. Similarly with the roof over the kitchen extension, in scheme No. 2. By reserving part of the roof to obtain direct light and ventilation for the bathroom, a sleeping porch could be built on the remaining area.

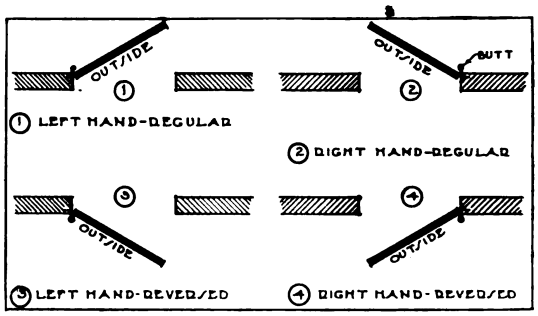
Determining Hand of Doors

From F. McG., Detroit.—I would thank you to advise me through your correspondence columns of the rule governing the hand of doors.

Answer.—To order door hardware intelligently, it is absolutely essential that the hand and bevel of doors for which it is to be used be known.

Rules to determine the hand and standard bevel of doors have been established by the various manufacturers of hardware and are all of a uniform basis, as follows:

(a.) The hand of a door is always determined from the outside.



(b.) The outside of an entrance door is the street side. The outside of a closet door is the room side and the outside of a communicating door the side from which the butts are not visible.

(c.) A right hand door is one which when looking at it from the outside has the butts on the right hand side, and a left hand door one which has the butts on the left.

(d.) If when looking at a door from the outside it swings in, it is a "regular" right or left hand door, depending upon the side on which the butts are; if it were to swing out, it would be a "reversed" right or left hand door, dependent upon the location of the butts as hereinbefore explained.

(e.) The standard bevel of doors is one-eighth of an inch in 2 ft., 4 in.

—W. A. G.

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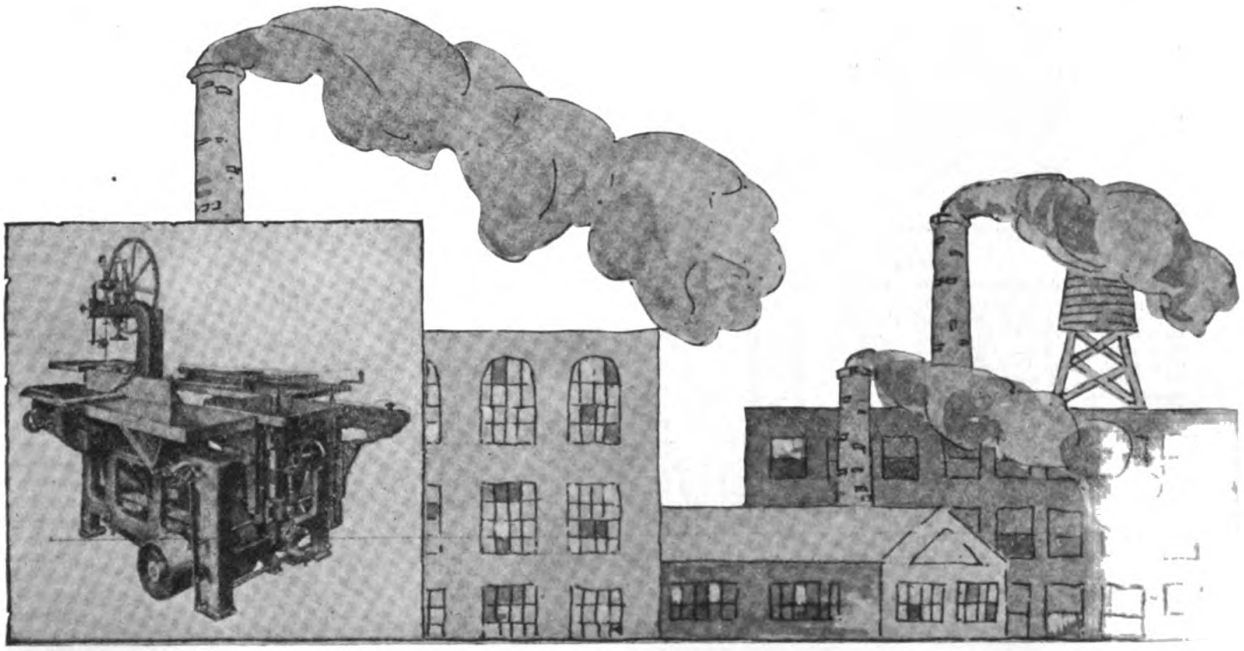
The Sidney Machine Tool Co.

Sidney, Ohio



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Late Quotations in Building Material Markets

Price quotations now current on building materials and supplies as quoted by dealers and jobbers for delivery in New York City, Chicago, San Francisco, Seattle and Birmingham follow. The quotations set forth are placed before readers of BUILDING AGE *to afford an accurate review of market conditions, rather than for use as a basis for actual purchase. They will not only provide knowledge of the exact state of the market as to items quoted but will also present a basis to judge conditions as affecting correlating materials.)*

	New York	Chicago	San Francisco	Seattle	Birmingham
BRICK					
Common	$30.45	$14.00	$16.00	$20.00	$28.00
Face brick	55.00 to 60.00	30.00 to 40.00	50.00 to 55.00	65.00	45.00
BURNED CLAY (Delivered on Job)					
Block partition:					
3 in., per sq. ft.	0.13	0.10	.....	0.10½	.....
4 in., per sq. ft.	0.15	0.11	.....	0.10	.....
Wall coping (single slant):					
8 in., per lin. ft.	0.16	0.22	.....	.....	0.22
12 in., per ft.	0.26½	0.33	.....	.....	0.32
18 in., per ft.	0.54	0.66	.....	.....	0.52
(Corners and angles four times the price of one foot of coping the same size.)					
CEMENT					
Per bbl. in 15-cent bags (rebate 60 cents per bbl. for bags)	3.40	3.25	3.63	4.25	4.50
FINISHED IRON AND STEEL (Mill Shipments)					
Bar iron, refined grade	.....	.....	.....	.....	.....
Bar iron, double refined	.....	.....	.....	.....	.....
Soft Steel bars	2.62 to 4.52	.....	.....	.....	4.00
Shapes	2.72 to 4.27	.....	.....	.....	.....
GLASS (Discounts from Manufacturer's Price Lists)					
Single strength, A quality, first three brackets	75%	77%	.....	.....	.....
Single strength, B quality	75%	77%	.....	83%	.....
Double strength, A quality	77%	79%	.....	83%	.....
Double strength, B quality	79%	79%	.....	.....	.....
GYPSUM					
Plaster Board:					
27x28x1	.....	.....	.....	.....	.....
27x48x ½	0.45	.....	.....	.....	.....
32x36x ¼	0.28	0.24	.....	.....	0.40
32x36x ⅜	0.29	0.26	.....	0.36	.....
32x36x ½	0.35	.....	.....	.....	.....
Plaster blocks:					
2 in. solid, 12x30, per sq. ft.	0.13	0.12	.....	.....	.....
3 in. hollow, 12x30, per sq. ft.	0.13	0.12	.....	.....	.....
4 in. hollow, 12x30, per sq. ft.	0.14	0.13½	.....	.....	.....
6 in. hollow, 12x30, per sq. ft.	0.21¼	0.20	.....	.....	.....
HOLLOW TILE					
2x 8x12 partitions, per 1,000 sq. ft	$98.80-$111.10	.....	80.00	.....	.....
3x12x12 partitions, per 1,000 sq. ft	148.20-165.10	110.00	108.00	105.00	112.00
4x12x12 partitions, per 1,000 sq. ft	166.70-185.70	118.00	125.00	120.00	126.00
6x12x12 partitions, per 1,000 sq. ft	222.30-247.60	162.20	154.50	170.00	168.00
8x12x12 partitions, per 1,000 sq. ft	.....	221.10	222.50	230.00	224.00
10x12x12 partitions, per 1,000 sq. ft	.....	272.70	276.00	.....	.....
12x12x12 partitions, per 1,000 sq. ft	.....	316.90	.....	.....	.....
2x12x12 split furring, per 1,000 sq. ft	92.60-103.20	73.80	108.00	.....	.....
LATH					
Eastern spruce, per thousand	18.00 to 20.00	17.00 to 18.00	20.00	11.00	.....
No. 1 white pine, per thousand	15.00 to 18.00	.....	20.00	.....	.....
No. 1 hemlock, per thousand	15.00 to 18.00	17.00 to 18.00	20.00	15.00	.....
No. 1 yellow pine, per thousand	15.00 to 18.00	16.00 to 18.00	20.00	.....	20.00
LIME					
Common, 200 lb. bbls., per bbl.	3.80	1.75	.....	2.85	2.50
Finishing, 300 lb. bbls., per bbl.	19.50	.....	.....	3.00	2.50
Hydrated, in paper bags, per ton	.....	20.00	.....	25.00	2.50
LUMBER (Retail Prices per Thousand Delivered)					
Yellow pine, No. 1 boards, 1x6	80.00	95.00	.....	.....	125.00
Yellow pine, B, and better flooring (plain)	130.00	135.00	.....	.....	135.00
Douglas fir, 6x6 to 12x12	80.00	77.00	50.00 to 60.00	36.00	.....
Oak, quartered, 1 in., F. A. S.	325.00	370.00	500.00	.....	.....
Oak, plain, 1 in., F. A. S.	225.00	260.00	320.00	.....	200.70
Oak flooring, ⅬⅬ quartered, white	220.00	370.00	470.00	.....	.....
Maple, 1 in., F. A. S.	180.00	185.00	270.00	.....	.....
Maple flooring, ⅬⅬ clear	175.00	225.00	260.00	.....	.....
Mahogany, 1 in., F. A. S.	.....	400.00	500.00	.....	.....
Spruce, 10 in.	85.00	80.00 to 140.00	96.00	.....	.....
Cypress, 1 in., F. A. S.	150.00	150.00	.....	.....	.....
METAL LATH					
Under 100 sq. yd., per sq. yd.	0.40	0.35	.....	0.42	0.42

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How to get Workmen's Compensation Insurance that Reduces your Costs on Jobs

ARE you getting a return each year of 30 per cent of your annual premium?

Are you getting a reduction in the number of accidents—or a reduction in your insurance rates?

If not—you are losing a considerable portion of every dollar you pay in compensation premium.

You can buy, at actual cost, protection which includes such service.

You can obtain it in the Liberty Mutual—a mutual, co-operative organization of over 4,000 of the biggest and highest-rated contracting and commercial concerns in the United States.

The Liberty Mutual has paid back to its policyholders more than $3,000,000—30 *per cent of the yearly premiums.*

And it maintains an accident-prevention and educational service which has reduced premiums of its policyholders from 20 to 50 per cent. Here is what one prominent contractor has saved:

NEW ENGLAND CONTRACTOR
RATE REDUCED 33.2 PER CENT.

1916—accidents on jobs reduced 22%
1917—accidents on jobs reduced 54%
1918—accidents on jobs reduced 66%

In addition to this 33.2 per cent rate-reduction, this contractor received a *cash dividend* of 30 per cent of his premium. His insurance cost is now less than half what many other contractors are paying to stock companies that have stockholders' profits and agents' commissions to pay.

This accident-prevention service effects reduction of time-losses, which often saves in dollars and cents more than the total cost of the insurance.

It is needless to point out what such a saving in this labor-cost item means in competitive bidding—*vastly lower figures without a cent cut from profits.*

Get the *facts* about Liberty Mutual protection. Ask us about the concerns in this mutual organization—such concerns as Fred T. Ley & Company, Inc.; Norcross Brothers; Roydhouse Arey Company; Hugh Nawn Contracting Company; McClintock-Marshall Company. Ask us how our *reinsurance* gives strongest known protection; and other features of this better form of compensation protection.

Write or phone to our nearest district office. Not the slightest obligation is thus incurred.



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WORKMEN'S COMPENSATION, PUBLIC LIABILITY, AND AUTOMOBILE INSURANCE

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Late Quotations in Building Materials Markets—*Continued*

	New York	Chicago	San Francisco	Seattle	Birmingham
PIPE					
Cast iron:					
6 in. and heavier	$67.30	$72.80	.....	.....	$66.00
4 in.	73.30	75.80	.....	.....	.....
3 in.	.....	82.80	.....	.....	.....
(And $2 additional for Class A and gas pipe)					
(Discounts to jobbers for carload lots on the Pittsburgh basing card; freight rates from Pittsburgh to New York, and also from Pittsburgh to Chicago, in carloads, per 100 lbs., are 27c. An additional 5 per cent discount is allowed to large jobbing interests over those listed below.)					
	F. O. B. Pittsburgh	F. O. B. Chicago			
Wrought: BUTT WELD					
Steel:					
Black, ⅛ to 3 in....	47 to 54 %	38 to 45%	.....	.....	.....
Galv., ⅛ to 3 in....	20½ to 41½%	10.1 to 30.1%	.....	.....	.....
Iron:					
Black, ⅛ to 1½ in..	29½ to 34½%	11.9 to 22.6%	.....	.....	.....
Galv., ⅛ to 1½ in..	2½ to 23½%	39.9 to 4.6%	.....	.....	.....
LAP WELD					
Steel:					
Black, 2½ to 6 in..	50 %	41.1%	.....	.....	.....
Galv., 2½ to 6 in..	37½%	27.1%	.....	.....	.....
Iron.					
Black, 2½ to 6 in..	34½%	18%	.....	.....	.....
Galv., 2½ to 6 in....	21½%	3.6%	.....	.....	.....
PLASTER					
Neat wall cement in 15-cent bags, per ton	23.50	20.00	$18.50 to 20.00	$24.50	24.00
Finishing plaster	25.00	20 50	19.50 to 21.00	26.00	24.00
Lath mortar, in cloth bags, per ton	16.50	.....	.....	.....	.....
RADIATION					
Discount from list on standard heights	45%	41 to 42%	.....	41%	44.45
REINFORCING BARS					
High carbon steel from mill	48.50	.....	3.00 to 4.50	45.00	.....
Medium steel from mill	48.50	.....	3.00 to 4.50	45.00	4.50
ROOFING MATERIAL					
Tarred felt paper:					
No. 1—25 lbs. to 100 sq. ft., per ton	92.00	90 00	.....	120.00	95.00
No. 2—16 lbs. to 100 sq. ft., per ton	81.25	90 00	.....	110 00	95.00
No. 3—12 lbs. to 100 sq. ft. per ton	81.63	90.00	.....	100.00	.....
Rosin sized sheathing, per ton	75.00	.....	.....	110.00	.....
Corrugated roofing, galvanized, 2½ in. corrugation, over flat sheets, per 100 lbs.	0.30	.....	.....	.....	.....
SHINGLES					
Red cedar, 5 to 2, clear, per thousand	15.00	10 00	16.00	7.25	12.00
White cedar, extra star, A star, per thousand	16.00	9.50	17.00	.....	.....
SLATE ROOFING					
	F. O. B. Cars Quarry Station				
Pennsylvania:					
Best Bangor	$7.75 to $9.00	.....	.....	.....	.....	9.00 to 18.00
No. 1 Bangor Ribbon	6.75 to 7.00	.....	.....	.....	.....	.....
Pen Argyl	6.50 to 7.25	.....	.....	.....	.....	.....
Peach Bottom	10.50 to 12.50	.....	.....	.....	.....	.....
No. 1 Chapman	6.25 to 7.25	.....	.....	.....	.....	.....
Vermont:					
No. 1 Sea Green	4.25 to 6.75	.....	.....	.....	.....	27.00
Unfading Green	9.00 to 10.50	.....	.....	.....	.....	27.00
Red	12.00 to 20.00	.....	.....	.....	.....	30.00
Maine:					
Brownsville, U'f'g Black, No. 1	12.00	.....	.....	.....	.....	.....
Slaters' felt, 30 lb. roll	0.92	.....	.....	.....	.....	3.00
Slaters' felt, 40 lb. roll	1.22	.....	.....	.....	.....	3.25
STRUCTURAL STEEL					
Beams and channel, 3 to 15 in. per lb	3.47	3.47	4.50 to 5.00	4.70 to 5.00	4.70
Beams and channel, over 15 in., per lb	3.57	3.57	4.50 to 5.00	.....	.....
Angles, 3 to 6 in	3.47	3.47	4.50 to 5.00	4.10	4.70
Zees and tees	3.57	3.47 to 3.52	.....	.....	.....
Steel bars, half extras, from mill	.....	.....	4.90	4.00	4.50
STUCCO					
In cloth, per ton (white, mixed)	22.50	20.50	.....	.....	.....
STUCCO BOARD					
Medium weight stucco board, plain, per thousand sq. ft.	42.50	65.00	.....	.....	60.00
Medium weight stucco board, creosoted, per thousand sq. ft.	50.00	70.00	.....	.....	.....
Heavy weight stucco board, plain, per thousand sq. ft.	55.00	75.00	.....	.....	.....
Heavy weight stucco board, creosoted, per thousand sq. ft.	60.00	80.00	.....	.....	.....
Medium weight stucco board, plain, narrow key, per thousand sq. ft.	50.00	75.00	.....	.....	.....
Medium weight stucco board, narrow key, creosoted, per thousand sq. ft.	55.00	70 00	.....	.....	.....
Insulating board, heavy felt background, per thousand sq. ft.	50.00	70.00	.....	.....	.....
SHEATHING BOARD					
Heavy weight sheathing board, per thousand sq. ft.	50.00	70.00	.....	.....	65.00
Medium weight sheathing board, per thousand sq. ft.	46.00	63.00	.....	.....	.....
Stucco or plaster board, sheathing board and insulating board are in rolls containing one sheet 25 ft. long and 4 ft. wide (100 sq. ft.)					
WALL BOARD					
Wall board, shipped any length, 4 ft. wide, per thousand	45.00	50.00	.....	65.00	53.00
Packed flat in cars if ordered in less than car lots. Add $5.00 per thousand ft. for crating.					

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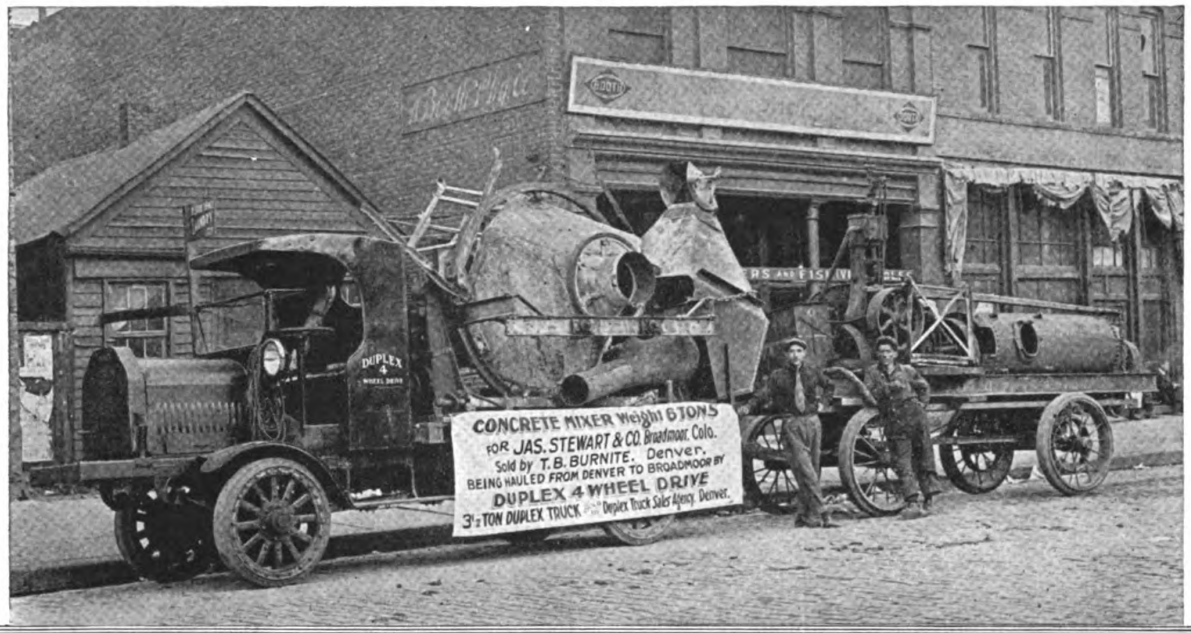
DUPLEX TRUCKS

BUILT FOR BUSINESS



Why The Duplex Limited Is Winning Enthusiastic Approval All Over America

WITHOUT question the remarkable success of the Duplex Limited is due to the confidence that truck users all over America have in the Duplex Truck Company as builders of trucks that a business man can consider an investment in practical trucking efficiency.

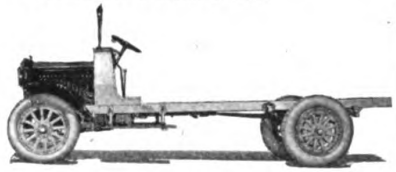
What does the steady, persistent growth of the Duplex Truck Company signify as regards this Duplex Limited?

For one thing it means that the Limited is designed and built by a company that is *known to be successful*—a company that is famous for building good trucks.

Medium Capacity—Two Wheel Drive—Complete Electrical Equipment—Pneumatic Tired—*High Speed*—it is a wonderful truck for general business hauling.

4-Cylinder, enclosed type motor—water cooled—cast enbloc—Bore 4". Stroke 5½". 3 Point Suspension. Pneumatic Cord tires. 145" Wheel Base. Electric Lighting and Starting. Equipped with Windshield; Ammeter; Boyce Motometer; Speedometer; Electric Horn; Tools; Jacks; Rim Wrench; Front Fenders; Alemite High Pressure Lubricating System; Driver's Seat without extra charge.

Talk to the Duplex dealer in your vicinity. Find out for yourself why the Duplex Limited already is known as a very safe investment for a business man.



DUPLEX FOR BUSINESS

Why the Building Industries Have Accepted the Duplex 4-Wheel Drive as a Better Investment

WHETHER in the transportation of supplies or the difficult hauling problems of excavation work, the Duplex 4-wheel Drive has proved its superiority in overcoming unusual conditions.

The Duplex not only makes good under spectacular conditions of heavy hauling, but it also does the everyday job of quick, dependable transportation quicker and cheaper.

It does these things first because the principles of the 4-wheel drive are sound and because they have been applied and consistently developed by one of the oldest and most successful truck companies in America.

The All-Wheel pull of the Duplex Principle, the fact that the front wheels as well as the rear wheels exert energy every foot of the way, means more power and greater dependability for every form of heavy, bulky hauling.

Talk to the Duplex dealer. He will show you by facts and example rather than by argument why the building industries everywhere are coming to look on Duplex as their standard of a better hauling investment.

Duplex Truck Company

Lansing · Michigan

One of the Oldest and Most Successful Truck Companies in America

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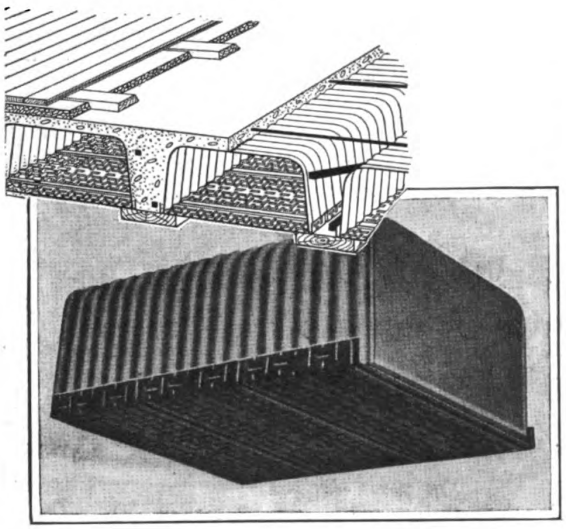
New Goods of Interest to the Trade

New Metal Tile System for Floors

A unit system of metal floor tile known as Shurebond is being manufactured by the Goldsmith Metal Lath Co., Cincinnati. It consists of a series of rows of the metal tile units, separated so as to form concrete ribs or joists, which are reinforced and then covered with a thin slab of concrete. These reinforced concrete joists carry the load to the supporting members, the metal tile acting as a filler to form the ribs and support the dead load of the concrete slab as it is being poured. The lath bottom unit is designed to prevent shifting of the rows of tile while concreting, and is explained as making the lath an integral part of the concrete construction. The bottom units are



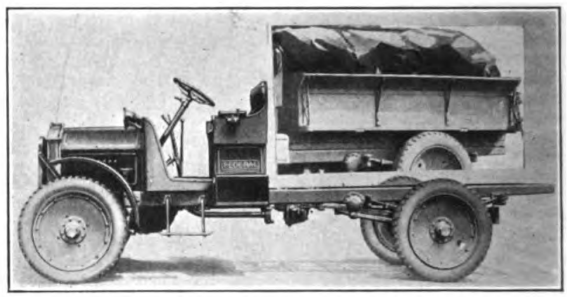
attached to the forms with tacks placed with a magnetic hammer, after which the tile is placed in the grooves provided in the bottom unit. When the temporary centering is removed, the bottom unit provides a flat and level ceiling to which the plaster is attached.

A metal reinforcement and lath similar in construction to the bottom unit shown is used for plaster partitions, fireproofing for iron beams and columns, cornices, coves, outside walls and stucco. It is pointed out that the lath is not expanded or stretched in any way, therefore the edges are not exposed to corrosion. This is emphasized as an important factor, especially for inside plastering where gypsum products are used, which are porous.

Federal Gets Out New One-Ton Truck

The one-ton auto truck field is probably the most overcrowded of any capacity truck today—overcrowded as to models and as to prices.

The new Federal one-ton truck, shown for the first time at the New York and Chicago National Truck Shows, is built strictly in accordance with Federal standards. The essential features worked out are: a governor control speed of 25 miles per hour; pneumatic cord tires, pressed steel frames, disc steel wheels, heavy support radius rods, electrical lighting equipment lamps on swivels which can be turned to point where light is needed most, special hard service battery and generator, power tire pump, steel seat and dash.



The new truck has all the sturdy lines of the larger Federals, with the additional feature of speed. It is a heavy duty truck for light loads, not a cut-down passenger-designed chassis with heavier members and springs. It is not a makeshift in any sense of the word, but it is backed by a thoughtful and careful design with the main purpose of giving successful and continuous service.

Diamond T Motor Car Company Announces New Model

A four-speed transmission, a special "Dri-gas" intake manifold and vacuum feed system for the fuel, designed to obtain best results from present low grade gasoline, forced lubrication for all spring shackles and bearing carriers for the propeller shafts, are among the features of the just announced Model U, 2-ton motor truck brought out by the Diamond T Motor Car Company. Like the other Diamond T trucks, the new vehicle is worm-driven.

The four speeds give unusual low reduction in the transmission; fourth speed, 1 to 1; third speed, 1.60 to 1; second speed, 2.69 to 1; first speed, 4.75 to 1; reverse, 5.95 to 1. The transmission was designed for heavy duty under severe operating conditions, and all gears are of nickel steel with wide tooth faces for carrying heavy loads.

A vacuum system has displaced the gravity feed for the fuel supply. The Stromberg carburetor is used and there is a dash adjustment to facilitate starting. Ignition is furnished by a Bosch high-tension D U-4 magneto. The unit power plant is a block casting of four cylinders, 4 inch bore and 5¼ inch stroke, with an S. A. E. rating of 25.6 horsepower and a maximum of 43 horsepower at 1800 revolutions a minute. All the valves are on one side and have removable heads. Three-point suspension, with a

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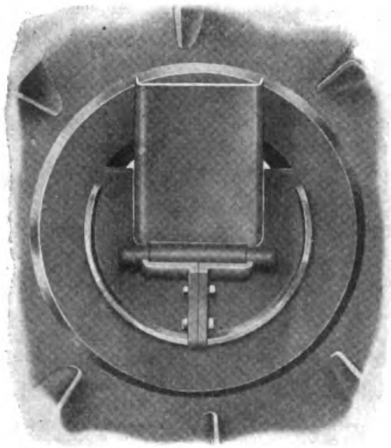
Getting 60 Minutes Out of Every Hour

Discharge Chute—Interior of Drum

The discharge chute is made from heavy sheet steel to withstand the abrasion from the constant flow of concrete. Sides are turned up high and straight so that concrete empties into wheelbarrow or car without splattering.



YOU don't have to subject your concrete work to long, disheartening delays. You don't need to hold up bricklayers, carpenters and plumbers, who can't go to work until you are through. Protect your word and your work in process with an

OSHKOSH STANDARD MIXER

Sturdily built, with added strength wherever it is needed, the Oshkosh Standard will stand up under the heaviest duty. Made in capacities of 14, 21 and 28 cubic feet of mixed concrete. Driven by steam or gasoline.

Oshkosh construction makes breakdowns rare. But if trouble occurs, Oshkosh Service makes it a question of hours and not days before everything is back in running order. Just telephone for a new part or an expert repairman and you will get immediate action.

Write today for catalogue and address of your Service Station.

OSHKOSH MFG. CO.
801 BUCK ST. OSHKOSH, WIS.

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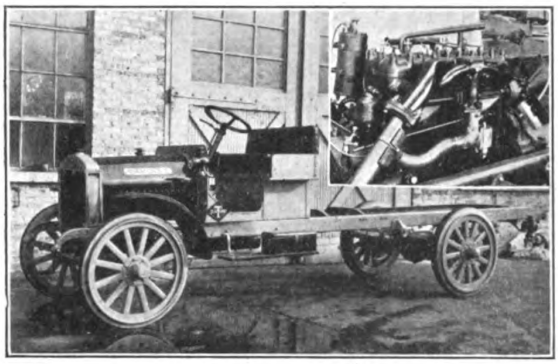
patent-applied-for ball and socket joint as the rear motor support, is used for the engine.

A long, whipping propeller shaft is eliminated by using a special Diamond T bearing carrier. Double universal joints are used between the transmission and rear axle, with slip joint to allow for spring action. Between the



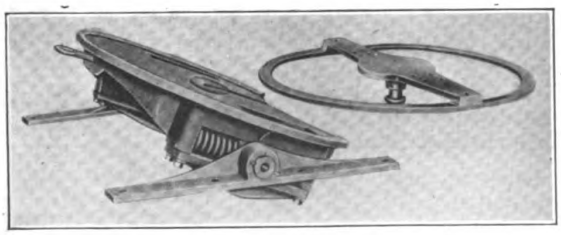
clutch and bearing carrier universal joints of the Thermoid-Hardy type are used, connected by heat-treated propeller shaft, welded to the joints by a patented process. The rear propeller shaft, between bearing carrier and rear axle, is equipped with the standard all-metal Spicer universal joints.

Like all other Diamond T trucks, perfected Hotchkiss drive is used and radius rods are eliminated. The semi-elliptic springs are made of chrome-vanadium steel and each leaf is tested separately. The front spring has 9 leaves, 2¼ inches wide and 40 inches long. The rear spring has 12 leaves, 2½ inches wide and 53 inches long.

The truck weighs 4,800 pounds. The tires are solid, 36x4 front and 36x7 rear. The fuel tank, with a capacity of eighteen gallons, is located under the seat. The equipment includes a Klaxon warning signal, a special governor built into the motor, hubodometer, front fenders of extra heavy steel, oil side and tail lights, complete set of tools, tool box and seat.

Automatic Fifth Wheel for Semi-Trailers

A new automatic fifth wheel, which renders unnecessary the use of jacks for lifting the front end of the semi-trailer in order to connect to and disconnect from the truck, and combines in one unit an automatic coupling device and cam whereby the front end of the semi-trailer may be automatically raised, has been invented by C. H. Martin, and will soon be placed on the market by the Martin Rocking Fifth Wheel Company, Springfield, Mass.



New Type of Window

A new type of window that combines many of the advantages of both casement and double-hung sash has been placed on the market by the Lunken Window Co., Cincinnati, Ohio. The main feature of this window is a box head or compartment above the window head, which allows both the sash and fly screens to be raised up into it. In the summer time the fly screens are lowered so as to cover the window and the sash are raised into the box head out of sight, so that the full area of the window is afforded for ventilation, just as with casement sash. At any time the sash may be lowered readily and the fly screens pushed up into the box head. This type of window is adapted for frame or brick walls and can be used with any type of construction. The illustration shows a perspective view which illustrates the construction. Box head, sash and exterior trim, etc., are furnished with the window. The fly screens are of copper cloth, with rustless metal frames. Sash are weather stripped on the stiles.



SECTIONAL VIEW, SHOWING WINDOW HEAD CONSTRUCTION

It will thus be seen that this complete window contains many advantages. While the price is more than that of the ordinary double hung window, yet if the price of screening and weather stripping is added to this it will be found that there is but little difference. Of course, the one big advantage is getting 100 per cent of clear opening, instead of 50 per cent, which is the case with the ordinary type of double hung window.

A New Departure in "Spot Grounds"

A new type of spot ground called Peds has been brought out by the General Fireproofing Company, Youngstown, Ohio. With this type of ground, which is shown in the illustration, it is merely necessary to put a dab of mortar on the wall or floor and press the ped on to it. The holes shown in the illustration permit a key to be obtained that secures the ground firmly. The grounds may be used in connection with metal lath, concrete, hollow tile, brick, etc., it being guaranteed by the manufacturer that they will adhere firmly to any surface when placed according to directions. Peds are made of a metal ring, which contains the holes, and a center core of wood which affords a base for nailing.



In using this type of spot ground it is important that the manufacturer's instructions be *strictly* adhered to. Investigation of unsatisfactory results showed that such rules had been ignored.

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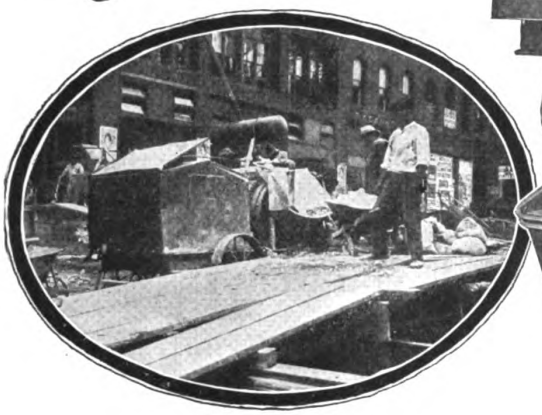
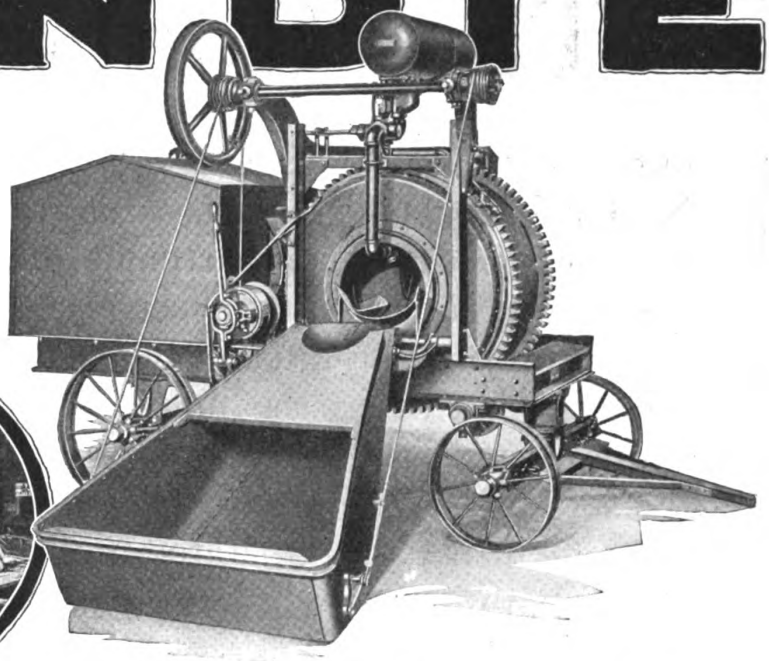
DANDIE

The Big Value
KOEHRING-BUILT
Light Mixer





Sizes 4 and 7 cubic feet mixed concrete. May be equipped with low charging platform, charging skip or ***batch hopper, automatic water measuring tank and light duty hoist.***

The Lowest Price You Can Afford to Pay

THERE are lighter mixers than the Dandie. There are cheaper mixers than the Dandie.

But the Dandie is as light as a ***good*** mixer should be built. And its price is the lowest for which such a mixer can be sold.

The Dandie is made by the largest makers of heavy duty mixers in America. Every economy of automatic machinery, standardized processes, and quantity production is reflected in its price.

In it is incorporated many of the features of the Koehring heavy duty mixers. It has the famous Koehring re-mixing action —the double gear drum drive—drum rollers keyed to shafts turning in big bearings.

Its cost is the ***lowest price you can afford to pay!*** It is not the cheapest mixer, but the reliable, money-making, long-service light mixer, at the extremely reasonable price which makes it the ***big value*** buy in the ***light mixer*** field.

KOEHRING MACHINE COMPANY

MILWAUKEE, WISCONSIN

MAIL COUPON TODAY

Send back the coupon for the Dandie catalog. You do not obligate yourself in any way—it brings you money-making information about the money-making light mixer.

KOEHRING MACHINE CO.
Milwaukee, Wisconsin

Please send me Dandie Catalog No. D-3

Name.....

Address.....

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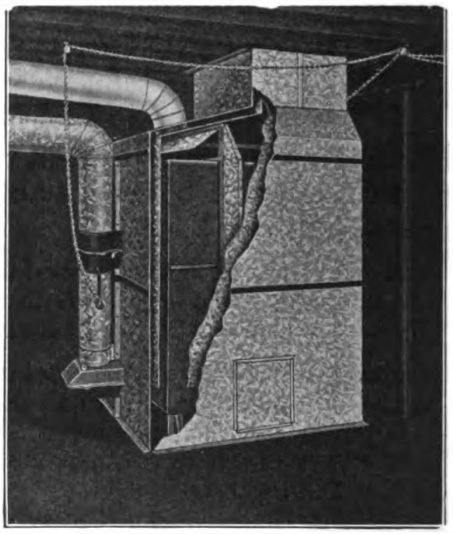
That Robber Pipe

puts the HESS WELDED STEEL PIPELESS FURNACE in a class by itself. This arrangement, (patented), provides an extra compartment in the pipeless furnace, which we connect with a separate or "robber" pipe, to your bathroom or kitchen, when they are shut off from the other rooms in the house. Other pipeless furnaces cannot supply this efficiently and the lack of it is one of the serious limitations of the pipeless method. The arrangement is easily operated and the heat can be divided or thrown into the one large register as you want it.

HESS PIPELESS FURNACES are wonderfully successful and frequently surprise our customers and ourselves with their efficiency. Send for our latest booklet describing this and also our pipe furnace; also our sixty-three page list of customers, some of them your neighbors, who use HESS FURNACES, and who will tell you of their complete satisfaction.



HERE IS A SUGGESTION: The supply of steel is very limited and early purchasers will secure the lowest prices of the season and will be sure of deliveries, which will be doubtful later on, even at advanced prices. THE BEST TIME IS RIGHT NOW.

Hess Warming & Ventilating Co.

1201-D Tacoma Building

CHICAGO

Special Rates to Contractors

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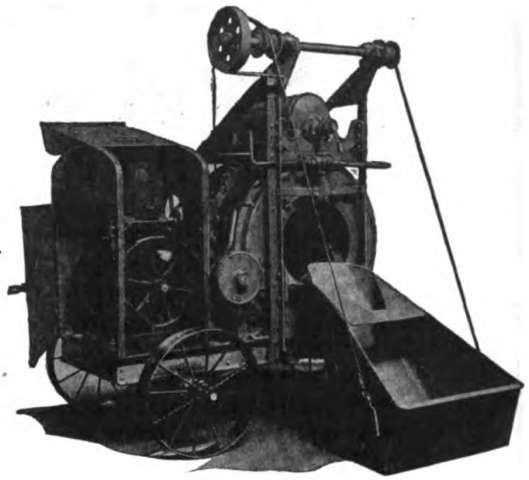
BOSS Labor Saving Construction Machinery

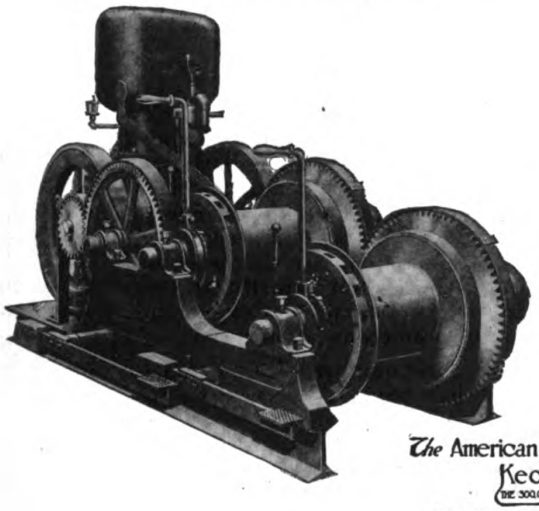
MIXERS

Fast Discharge

Boss Mixers are easily fed because the hopper doesn't clog and the drum opening is large. The mixed concrete is quickly discharged and the steel roller pinion drive, together with Hyatt Roller Bearings, makes the whole machine run smoothly, without break-downs, and with low power consumption. Investigate our famous *Low Charger* also.

Capacities—½, 1, 2, 3 and 4-bag batches.
Gasoline, steam or electric power.





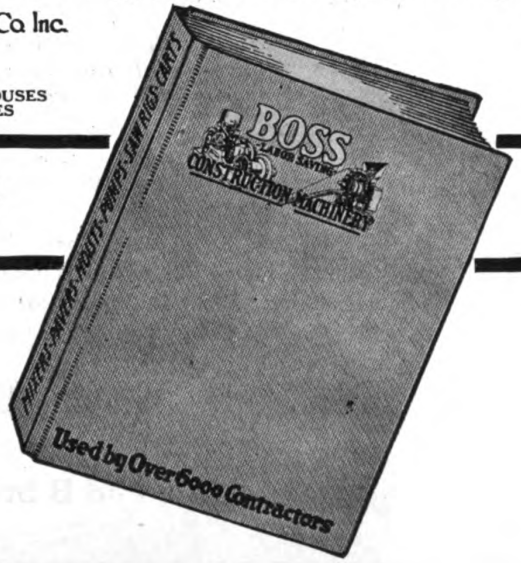
HOISTS

With Hyatt Roller Bearings

For hoisting concrete—for running material elevators—driving piles—excavating—back-filling—operating drag-line buckets, Boss gasoline and electric hoists are doing the trick with the least fuss and trouble. They have Hyatt Roller Bearings and S. K. F. Ball Bearings, and are built in seven sizes and three types. Look in the big Boss Catalog.

The American Cement Machine Co. Inc.
Keokuk Iowa
(DE 300,000 H.P. ELECTRIC CITY)

BRANCH OFFICES—WAREHOUSES
IN ALL PRINCIPAL CITIES



Get this Big Machinery Catalog and Keep It Handy!

$265.00 BUYS

our ½-bag, low charging, Boss mixer with Novo engine and that's just one of the bargains that you will find in the big Boss Catalog of labor-saving construction machinery—the kind that is used by over 6,000 contractors in America and abroad.

Get the Boss catalog today! Get it before you actually need your machinery. Go through it carefully and see how our prices compare with other manufacturers — quality for quality.

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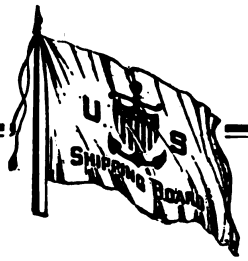

A Gigantic Sale Surplus War Material

Which Has Passed Government Inspection

The Shipbuilding program of the United States Government was so enormous in scope and stupendous in accomplishment that the ending of the war found us with surplus material of practically every description in stock, routed to be used, but for which there was no further Governmental use.

This Is Now For Sale and Must Be Disposed of

From individual houses to entire villages and housing operations, from ship buckets to complete ship equipment—the range of offerings runs.

There will also be found—Structural steel, fabricated in complete units for combination passenger and cargo 8000 tons D. W. capacity steel ship hulls, and several thousand tons structural steel both fabricated and unfabricated for other than steel hulls; Engines and Engine Auxiliaries, Boilers and Accessories, Condensers, Tanks and Evaporators, with their fittings, Ships and Deck Equipment, Electrical Appliances from Generating Outfits and Transformers to Wires, Cables and Batteries. Carpenters', Engineers', Machinists' and Firemen's tools. Blocks, Cranes, Derricks and Booms in enormous quantities and sizes, Refrigerating Outfits and Machinery, Life Boats and Rafts. Lathes, Boring Mills, Planers and Riveters. Bending and straightening Machinery, Foundry and Machine Tool Equipment, Air Compressors and Pneumatic Tools, Railroad Equipment and Pumps (horizontal, centrifugal, vertical), Pipes, Valves and Fittings, Nuts and Bolts, Seamless Tubing of Copper and Steel and a variety of other equipment and material too numerous to mention.

Everything has been inventoried, showing the articles, their number with a detailed description, as well as appraised value. All material has passed Government inspection and is now in warehouses at concentration yards.

Bulk offers for entire lots of material and equipment at any of the concentration points will receive first consideration and be subject to quantity discounts.

Inspection is invited and can be arranged for by addressing: Sales Section, Supply and Sales Division, United States Shipping Board, Emergency Fleet Corporation, 6th and B Sts., Washington, D. C., or any of the following district sales and sub-sales offices:

139 Center St., New York City	922 Edison Bldg., Chicago
Hibernia Bank Bldg., New Orleans, La.	140 N. Broad St., Philadelphia
Northwestern Bank Building, Portland, Oregon	Custom House, Boston, Mass.
369 Pine St., San Francisco, Calif.	Securities Bldg., Seattle, Washington

United States Shipping Board Emergency Fleet Corporation

Supply and Sales Division

Sixth and B Streets, Washington, D. C.

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Announcing a Green Shingle that Will *Stay* Green

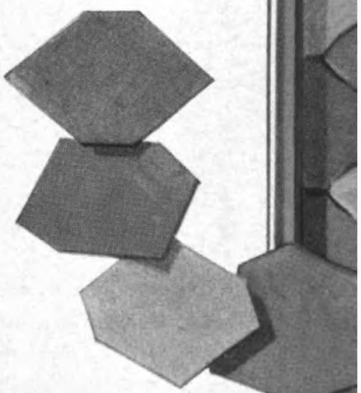
It has been the aim of every manufacturer of shingles or roofing material to produce a green shingle in which the green would be everlasting. After years of experiments we have developed such a shingle, to add to the family of

AMBLER ASBESTOS
BUILDING PRODUCTS

It is of a beautiful soft tone of green, and this green is *absolutely permanent.* The green will last as long as the shingle itself, and the life of Ambler Asbestos Century Shingles is well known—they are truly "last forever" shingles.

Ambler Asbestos Shingles are made from a scientifically accurate mixture of the best Portland cement obtainable and strong asbestos fiber. It is this combination of indestructible materials that gives to Ambler Asbestos Shingles their remarkable durability and fire resisting qualities.

So now at last we are able to offer the famous Ambler Asbestos Shingle (already in use on hundreds of thousands of homes) not only in the Newport gray, natural slate and red, but in this permanent, everlasting, beautiful shade of green.



Send for samples showing color and construction

Asbestos Shingle, Slate and Sheathing Company
Ambler, Pa

Factors: KEASBEY & MATTISON COMPANY, AMBLER, PA.
Branch Offices: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Minneapolis, New York, Philadelphia, Pittsburgh and Washington

Manufacturers of: Ambler Linabestos Wallboard, Ambler Asbestos Building Lumber, Ambler Asbestos (Century Brand) Shingles, Ambler Asbestos Corrugated Roofing and Siding, 85% Magnesia and Asbestos Pipe and Boiler Covering, Asbestos Textiles.

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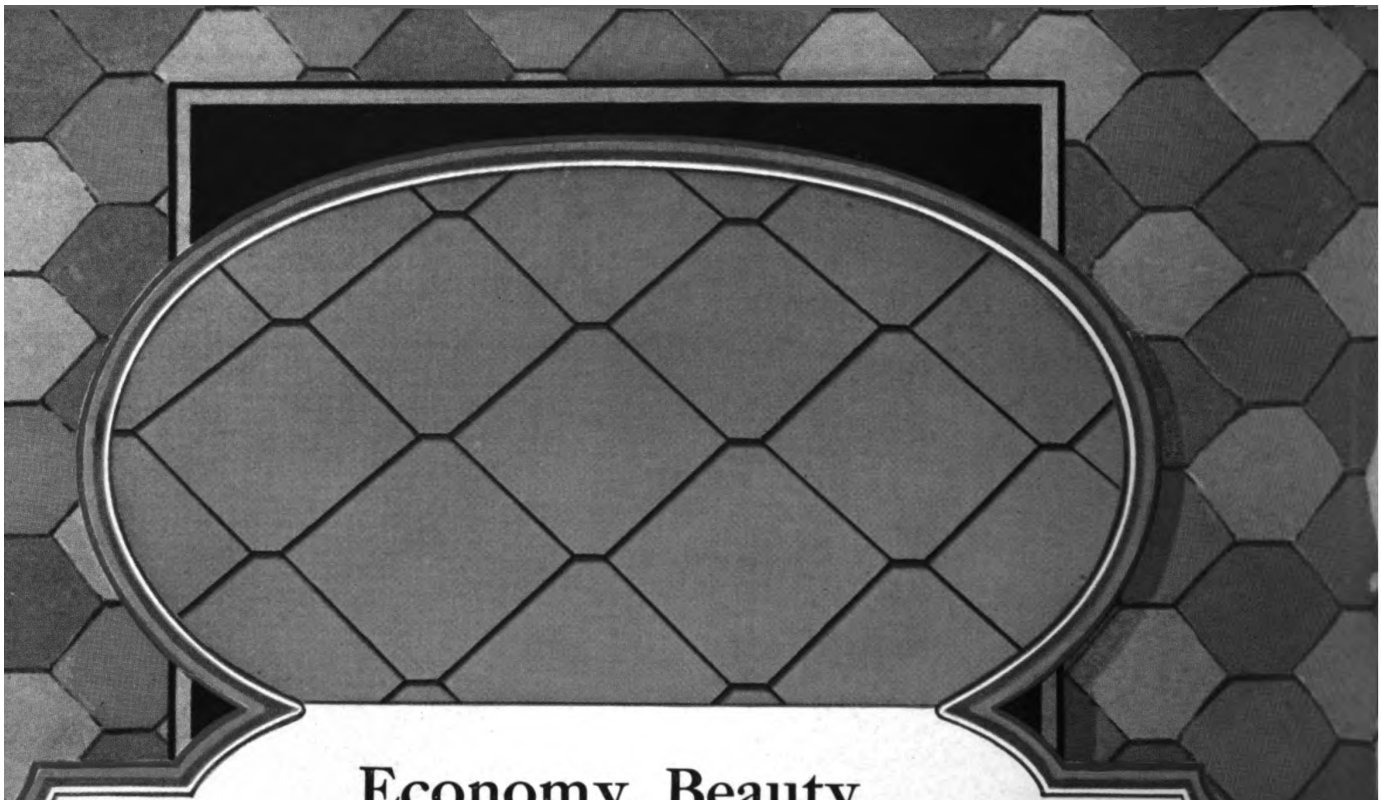


Economy, Beauty,
Permanency and Fire Protection

The illustration above is a half-tone of the new green Ambler Asbestos Century Shingles and, so, shows exactly their color and texture and just how they lie on the roof, in one of the three methods of application. Ambler Shingles are one of the

AMBLER ASBESTOS
BUILDING PRODUCTS

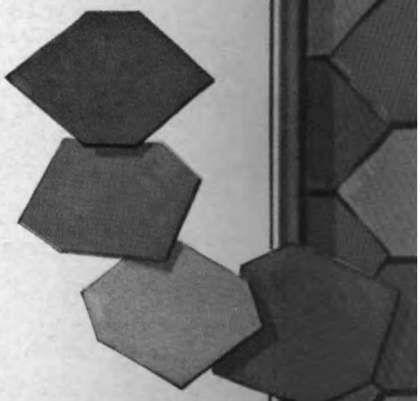
Ambler Asbestos Shingles (Century Brand). Made in 3 styles, 4 permanent colors—Newport gray, natural slate, red and green. Lie snug to the roof, forming water-tight and fire-tight covering.

Also, ¼-inch mixed color shingles in seven shades of reds, browns and grays.

Ambler Asbestos Building Lumber. For siding, partitions, fire doors and wherever fire resistance is essential.

Ambler Asbestos Corrugated Roofing and Siding. For industrial, railroad and farm buildings.

Ambler Linabestos Wallboard. Wherever a superior flame-proof, fire resisting wallboard is wanted.



Send for samples and literature showing reproductions of installations

Asbestos Shingle, Slate and Sheathing Company
Ambler, Pa.

Factors: **KEASBEY & MATTISON COMPANY, AMBLER, PA.**

Branch Offices: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Minneapolis, New York, Philadelphia, Pittsburgh and Washington

Manufacturers of: Ambler Linabestos Wallboard, Ambler Asbestos Building Lumber, Ambler Asbestos (Century Brand) Shingles, Ambler Asbestos Corrugated Roofing and Siding, 85% Magnesia and Asbestos Pipe and Boiler Covering, Asbestos Textiles.

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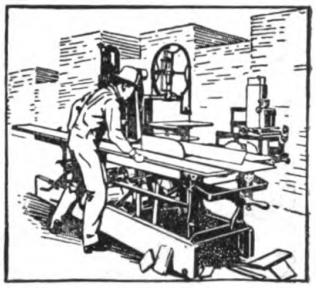
Prosperous Carpenters Have Their Own Equipment

THEY tackle the work as it comes and get it done! No waiting for anybody. They double the value of their own time and their men's time by having machinery which turns out the finished materials speedily.

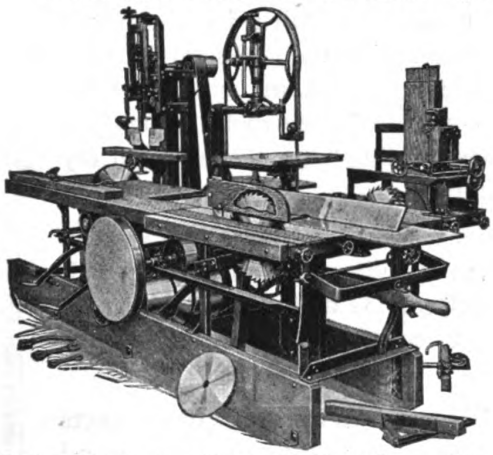


The Parks Planing Mill Special

is a prime favorite with carpenters everywhere. It is a complete woodworking outfit. Eight machines in one, it planes, saws, joints—performs almost every operation in the production of exterior, interior and dimension material. It saves hours of time on every job; converts timber ordinarily wasted into good, usable timber.

It's a hard, steady, efficient worker. No "waves" or planer marks on your trim—the machine is practically vibrationless. Light, but not too light, it can be moved from job to job and used winter and summer. The operating cost is next to nothing, and repairs won't worry you.

You can't lose on a Parks—you can't go wrong by buying one. They have been making good for 25 years. Made with stout angle steel frames, completely reinforced, and produced in quantity, their cost is surprisingly low.



Eight machines in one—a Double Table Rip and Cross-cut Saw, Swing Cut-Off Saw, 12-inch Jointer, Tenoner, Upright Hollow Chisel Mortiser and Borer, Reversible Spindle Shaper and Sanding Machine. 550 r. p. m. 4-5 h. p.

Every day you let pass without investigating Parks equipment is a day of profit lost forever. Get ready now for the spring boom! Handle more jobs and make more money!

Write for a Parks catalog.

The Parks Ball Bearing Machine Co.

Station A Cincinnati, Ohio



W. C. Niehaus operating a Parks Woodworker in his woodworking shop at Bogota, N. J. In 7 years, Mr. Niehaus has never paid out a penny for repairs.

WOODWORKING **PARKS** MACHINES

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U S G Sheetrock

The Contractor's Choice



FOR years you have been looking for this standard wall in unit form. You have wanted a unit material rigid, uniform and fire-resistive.

Here it is—Sheetrock.

A sheet of pure gypsum rock, Sheetrock won't warp, shrink or buckle. Sheetrock will not burn.

On all framework and in all moderate-priced construction, Sheetrock makes a job you can be proud of. It pleases the owner.

You can go over the work with him—point out how evenly the units of Sheetrock join in a flat surface—remind him it will not crack or warp or buckle or shrink—remind him it will resist fire—because it is a sheet of gypsum rock—Sheetrock.

And the longer he lives with it, the more that customer is going to value Sheetrock and respect your good judgment in using durable, good-looking, economical Sheetrock. Whenever he has any other building to do, he will naturally think of you first.

Look for chances to use Sheetrock on alteration and repair work. Sheetrock comes in broad, flat compact sections, 32 and 48 inch widths—ceiling high. It cuts, saws and nails like soft pine.

The U. S. G. Patented Reinforcement protects the edges, gives extra nailing strength, and makes a tight joint. Your dealer in lumber or in builder's supplies can furnish you with Sheetrock.

UNITED STATES GYPSUM CO.
General Offices, Chicago

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It Pays to Use

NEPONSET

The cost of Neponset Black Waterproof Building Paper is very little more than ordinary paper — but its SERVICE is entirely different.

Neponset Paper is waterproof. Wherever it is used, the walls are dry because the moisture of the outside is kept outside.

It is air-proof and eliminates draughty floors and walls when used under stucco, back of clapboards, between floors, and underneath the roofing.

The builder who uses Neponset constructs houses which are comfortable and easily kept warm — in fact, this building paper earns dividends in *coal saved the first winter.*

All Neponset Products are sold by hardware and lumber dealers. In case you cannot obtain stock locally, write to us direct.



Make your own test of NEPONSET'S waterproof qualities by immersing a sample in a pail of water.

BIRD & SON, inc., Dept. B., East Walpole, Mass.

(Established 1795)

CHICAGO NEW YORK

Canadian Office and Plant: Hamilton, Ont.

Makers of the NEPONSET Twin Shingles, NEPONSET Roll Roofings and NEPONSET Board

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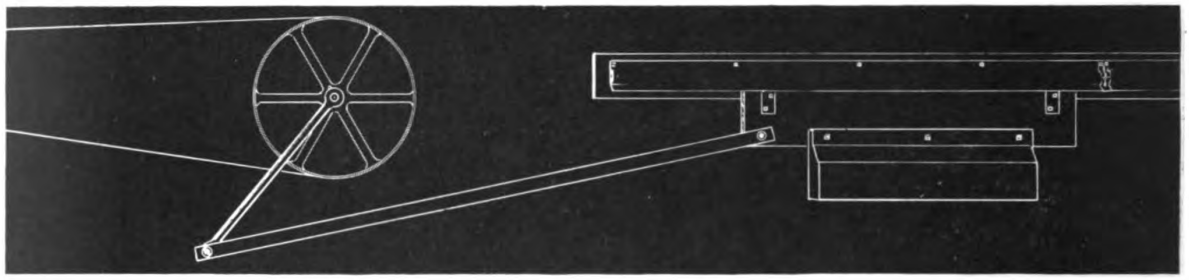

"Hummer" Door Hanger stands terrific test

PORTER

To satisfy ourselves we mounted in our plant an 800-pound barn door on a Porter "Hummer" Door Track and Hanger taken from regular stock. With a belt-and-wheel drive, as indicated above, we moved this door back and forth *continuously* a distance equivalent to 50 miles.

Then we removed one side of a hanger truck frame and photographed it. At the right we reproduce the *unretouched photograph.* It shows that after undergoing this severe strain the bearings give practically no evidence of wear.

We have performed this test many times since and are ready and willing to perform it again at any time. The apparatus is still standing in our plant.

The entire mechanism and the bearings used in this test were taken at random from stock. The mechanism and the bearings that we sell to thousands of barn-owners in "Hummer" Door Hangers are as exactly like those used in this test as standardized manufacture can make them.

A very light belt wheel and driving rod were used in this test. Although the door weighed nearly half a ton (800 pounds), the nice balance of the "Hummer" enabled us to use a pull of only a few pounds. What the practical barn-owner wants in his outfit is simplicity of design, ease of operation and strength. And these are the outstanding features of Porter equipment.

PORTER

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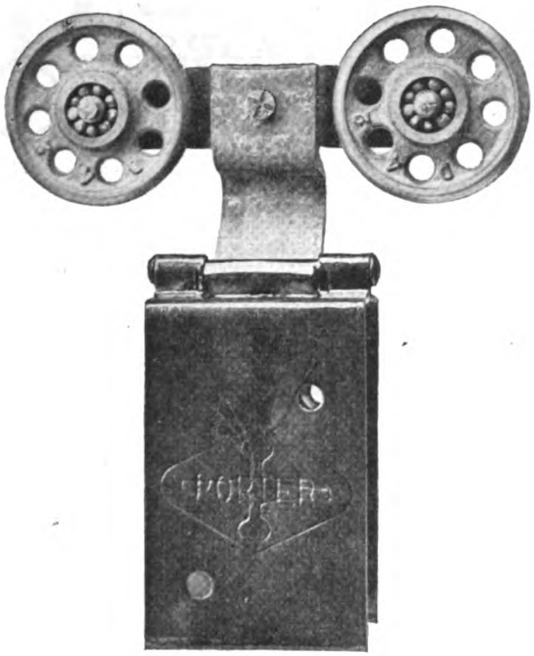
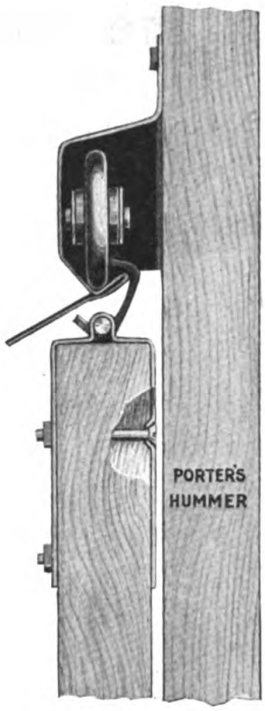


Unretouched photograph of Hanger Truck Frame after test

When you stop to consider that the strain placed upon the "Hummer" bearings in this test was *continuous*, we believe that you will agree with us that this is the most astonishing demonstration of durability ever made with door hanger equipment.

It would take many years of service in the average barn or other building to place this strain upon a door hanger, and then the strain would never be continuous. Figure it out for yourself.



Sectional view of the "Hummer" showing "V" construction

Look at the V-shaped track on which the roller-bearing tandem wheels run. Here is the principle of the most easily operated door hanger ever built. The track is made of a single piece of heavy gauge steel so formed as to have great strength and rigidity. The two-point contact reduces friction and makes the wheels self-centering. The track forms a bird-proof and storm-proof covering for the door.

Write for full information and catalogs describing our line of Barn Equipment, Door Hangers, Garage Equipment, and Hay Tools

J. E. PORTER COMPANY
849 Guion Street, Ottawa, Illinois

BARN EQUIPMENT

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The HUMPHREY Radiantfire



The Most Highly Efficient Gas Heating Appliance in the World



Solves the Problem of the Unused Fireplace

This wonderful new radiant gas heater for the Fireplace, sets back in the chimney and floods the room with Radiant Heat and Firelight.

Saves coal money. Saves you lighting the furnace for two months in the fall and spring. On cold nights, when winter howls outside, you can bank the furnace and keep the living room comfortable with its warmth.

No fire danger with this new fire. No sparks or bursting coal and children can safely play around it. Burns without watching. You turn it on when you want heat and you turn it off again or low when room is warm enough.

General Gas Light Company

New York **Kalamazoo**

San Francisco Chicago Cincinnati Pittsburgh
Philadelphia Atlantic City Buffalo

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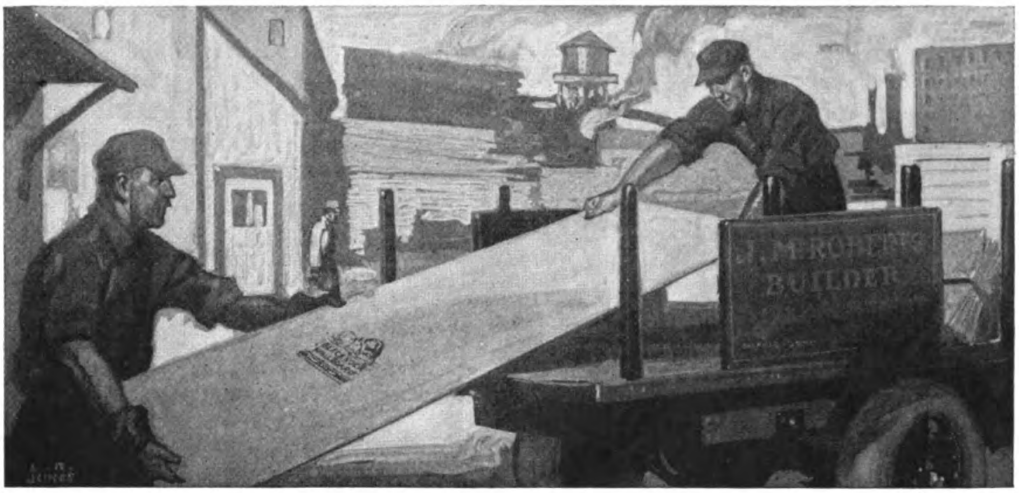

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For speedy construction use Black Rock Wallboard. For permanence, use it. For economy, use it. Black Rock is easy to put up and a skillful result is quickly obtained.

Black Rock makes beautiful rooms. Correct panelling lends great variety to completed jobs. It is remarkably adaptable to the building of new partitions. On new work or over the old cracked plaster or wall paper, Black Rock Wallboard pleases the owner every time.

Owners get to know Black Rock for the distinctive moisture-repellant black center attracts their favorable attention. Its good performance then makes owners want more of the same kind. Black Rock is a great good-will builder for the carpenter, contractor and builder.

It is surface-sealed and sized front and back. Made to resist climatic conditions to the extreme. Needs no priming coat. Presents an ideal surface for the finest painted decorations.

We'll gladly give you more information about Black Rock, and the name of our nearest dealer.

BLACK ROCK WALLBOARD
BLACK CENTER

The Black Rock Wallboard Company
103 Ontario Street, Buffalo, N. Y.

BLACK ROCK
BLACK CENTER
WALLBOARD

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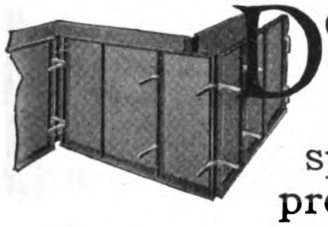
form

Equipment for Faster Construction and Lower Labor and Material Costs



DOWNRIGHT, common-sense simplicity—stripped-for-action form equipment that eats up the work on any job with a speed and ease that count big in the profit columns—that's the Metaform idea.

Notice the illustration of the single Metaform unit. It is self-contained—plate, clamps, and alignment studs—with no extra wedges, pins, or other separate parts to be misplaced or lost.

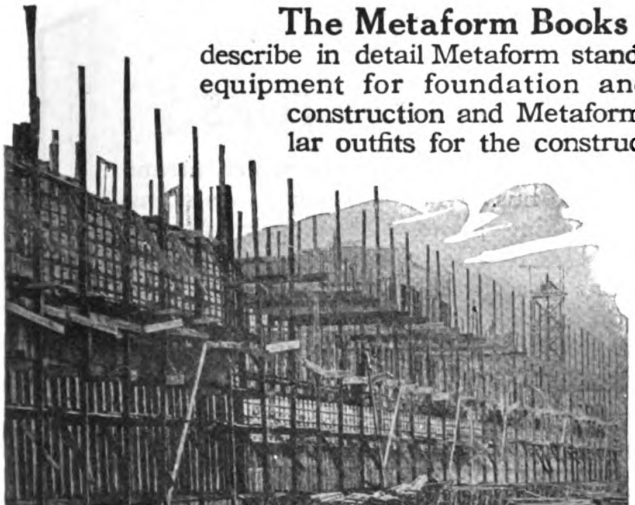
These standardized, everlasting units, together with a few fractional and adjustable units of similar design, comprise form equipment that cuts labor and lumber costs to the bone; that speeds up construction and turns out better finished work

SEND for the Metaform literature and study the possibilities of Metaform cost-saving methods as applied to your own form problems.



The Metaform Books

describe in detail Metaform standardized equipment for foundation and wall construction and Metaform circular outfits for the construction of grain elevators, chimneys, silos. Fill in the enquiry form or clip it to your letter head, and books will be mailed immediately.



Metaforms on Stillwater Prison Walls. Stillwater, Minn.

Metal Forms Corporation
Manufacturers of the Original Richert Metal Moulds
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Anonymous material does not assure him of full value of his dollars. Whitaker I. C. Old Style roofing plate does.

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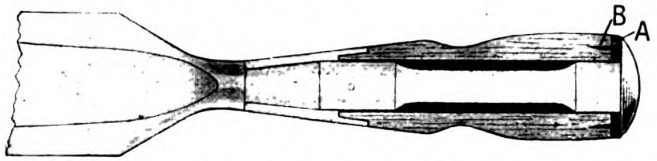
Stanley Tools



STANLEY "EVERLASTING" CHISELS
Blade, Shank and Head One Piece of Solid Steel

This not only insures great strength and durability but enables the full power of the blow struck by a hammer or mallet to be transferred directly from the head to the cutting edge.

The Blade is forged from one end of the steel rod, the other end being upset to form the Head.

A leather washer (A) is placed between the head and the handle. This acts as a cushion, relieving the handle from shock when a blow is struck, thus preventing same from splitting. A Brass Ring (B) is driven into the large end of the handle, providing an additional safeguard.

The illustration shows the general construction of all "Everlasting" Chisels.

Special circular upon request

STANLEY RULE & LEVEL CO.
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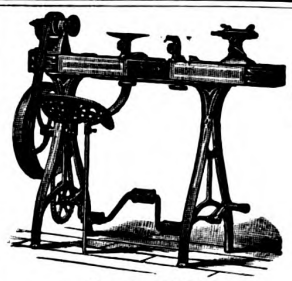
Hand-Power-Foot
Wood-Working Machinery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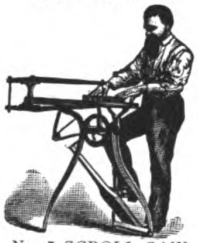
A Complete Line for a Carpenter and Builder


TENONER

Our Machines are so constructed that you can take them to the house you are building. Saves Time.


No. 2 SCROLL SAW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You can save a millman's profit.
You can make more money with less capital invested.
You can manufacture in as good style and finish, and at lower cost, than the mill.
You can work up stuff ahead in winter for the spring rush in building. 10,000 builders are using from one to eight of our different machines.
Any of our machines will pay for themselves in a year and often in a single job.
Our machines are not complicated, but simple, strong, practical and built for good hard work.

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What One Contractor Did With a Sheldon Concrete Mixer

"I never had a chance to give the mixer I bought of you last spring a thorough test until last November when my big machine broke down.

"We were just setting forms for Martin and Hadley's cement dam across Beaver Creek a half mile from Ackley. The men all laughed at me when I came with the Little Sheldon Mixer, a toy as they called it, but it surprised them all before we get through with it. We put through 106 yards of concrete in 21 hours, so I advertised the mixer in good shape.

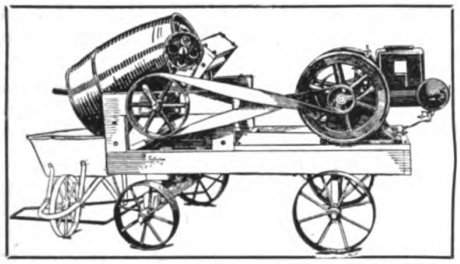
"They did not even want me to start at the dam with it, but I advised the inspector that I would guarantee the dam, which proved satisfactory to the owners, Martin and Hadley Creamery Co., Ackley, Iowa. The dam was in use 11 days after it was completed."—George Hanig, Ackley, Iowa. Jan. 12, 1920.

How's that! Over 40 yards of concrete in an eight-hour day, perfectly mixed in one of the lowest priced concrete mixers on the market today!

And this is only one case in thousands. Everywhere the Sheldon Concrete Mixer is delivering the goods. Although it is one of the lowest priced mixers on the market it has built its reputation entirely on its ability to turn out the work day in and day out. Its strength, speed, long life and perfect mixing have never been sacrificed to lower the price.

Nevertheless, its low price puts the Sheldon within reach of every contractor. Even if he has only an occasional concreting job to do the original cost is so low that he can operate it at a much larger profit than mixing by hand. It will pay for itself on the first job.

The big contractor who keeps his mixers busy all the time finds the Sheldon able to stand the heavy grind of constant use. The Sheldon is not a large capacity mixer; it depends on its speed to turn out a large volume of work. For any ordinary job the Sheldon gives complete satisfaction.



Model 8-X. A contractor's machine from the ground up; the last word in complete Sheldon Mixer outfits. Equipped with Stover 2-H. P. engine. Very easy to move from place to place. Dumps into wheelbarrow or directly into forms (all Sheldon models have this advantage). Costs *complete* less than some *hand* mixers.

Sheldon Mfg. Co.
Box 3032 Nehawka, Neb.

CATALOG COUPON

SHELDON MFG. CO.,
Box 3032, Nehawka, Nebr.

Please send me your 1920 Catalog and 30-day Free Trial Privilege Offer.

Name .....

Address .....

$5.00 BRINGS IT TO YOU

DO YOUR OWN LEVELING WITH YOUR OWN LEVEL



Sold On Easy Monthly Payments

Now you have the opportunity to own a strictly high-grade, accurate Convertible Level on Aloe's Easy Rental Purchase Plan—and without previous experience, or technical knowledge, you can put it to work so that it will make big money for you. Only $5.00 brings it to you—then put it to every possible test. If you are pleased with it, pay the small monthly installments and the level is yours.

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It is a combination transit and level, quickly converted to the use of either. It is absolutely accurate—satisfies the requirements of the most exacting contractors—yet is so simple that anyone, without technical education can use it. Sights above and below the horizontal can be taken. **You can use it for leveling up foundations, walls, piers, running boundary lines, fences—in fact, a thousand and one jobs you meet every day that require an accurate level.**

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No technical knowledge necessary. No previous experience is needed. With our simple and complete instruction book included free with every level, you can immediately put the instrument to work. It starts to pay for itself immediately and continues to be a permanent money-making investment.

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Ten Days' Free Trial

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.

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Without obligation, send me your free book, "Be A Bigger Builder". Also full particulars about the Aloe Convertible Level and details of your easy payment plan.

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Mr.
Po
De

and let me

My roofing is as beautiful today as when I bought it.

A friend of mine, Mr. Fred Jones, 216 Main St., tells me his house needs a new roof. Why not go around to see him?

Very truly yours,
Howe S. Oner

IT pays you to have customers talk like that. And that's just the way they do talk when you sell them roofing that *never* fades—roofing surfaced with Sta-so laminated slate.

Sta-so laminated slate roof surface protects you and promotes your business. It positively prevents complaints about color-fading—one of the bugbears of the roofing business. It enables you to give your customers full assurance that Sta-so's beautiful colors, of rich Indian red and cool sage green, will *never* fade; they are permanent as the building itself.

Sta-so's non-fading beauty and its favorable price recommend its use for home, church, garage, commercial or farm buildings. Protect yourself and your customers by insisting that your stock bears the Sta-so label. The following manufacturers made enough Sta-so surfaced roofing last year to roof more than 350,000 buildings.

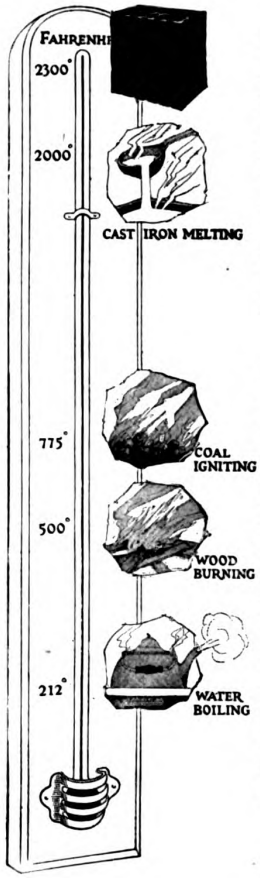
Amalgamated Roofing Co. Chicago
Barber Asphalt Paving Co. Phila., Pa.
Barrett Co. . New York, N. Y.
Beckman-Dawson Rfg. Co. Chicago
B. F. Belson Mfg. Co. . Minneapolis
Bird & Son, Ltd. . Hamilton, Ont.
Bird & Son, Inc. East Walpole, Mass.
Philip Carey Mfg. Co. . Cincinnati
Flintkote Co. . . Boston, Mass.
Ford Mfg. Co. . St. Louis, Mo.
The Heppes Rfg. Division
The Richardson Paper Co. Chicago
Keystone Roofing Mfg. Co. York, Pa.
McHenry Millhouse Mfg. Co. South Bend, Ind.
National Asbestos Mfg. Co. Jersey City, N. J.
National Rfg. Co. Tonawanda, N. Y.
Pioneer Paper Co. Los Angeles, Cal.
Reynolds Shingle Co. Grand Rapids, Mich.
H. H. Robertson Co. Pittsburg, Pa.
Richardson Paper Co. Cincinnati, Ohio
Safepack Paper Mills Boston, Mass.
Si Fo Products Co. St. Paul, Minn.
Standard Paint Co. New York, N. Y.

Usona Mfg. Co. Aurora, Ill.
H. F. Watson Co. Erie, Pa.
A. H. White Rfg. Co. New Orleans, La.
Wilberite Rfg. Co. . Cleveland



Photographic reproduction of Sta-so Surfaced Roofing. Sta-so's granular texture lends itself to every style of architectural treatment.

Firesafety



Any great conflagration, such as that in the Edison Plant, New Jersey, a few years ago, generates a heat so intense that inferior building materials crumble, and steel itself, unless protected by hollow tile, is warped and twisted into shapeless ruin. Even such a heat is less than the terrific kiln temperature used to produce NATCO HOLLOW TILE—2300°.

You take no chances that man can anticipate when you build throughout of NATCO HOLLOW TILE. NATCO is absolutely firesafe. It also defies all the other common forces of destruction. By itself, it incorporates into a building a most effective insulation against moisture, heat and cold. It is most economical of time, labor and upkeep expense. The use of NATCO HOLLOW TILE in any permanent building operation is the best insurance possible of satisfaction all around—to the architect, builder and all owners, present and future.

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NATCO

Made the skyscraper possible



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The co-operation of the engineering department is at all times available. Put your construction problems up to these men of specialized experience.

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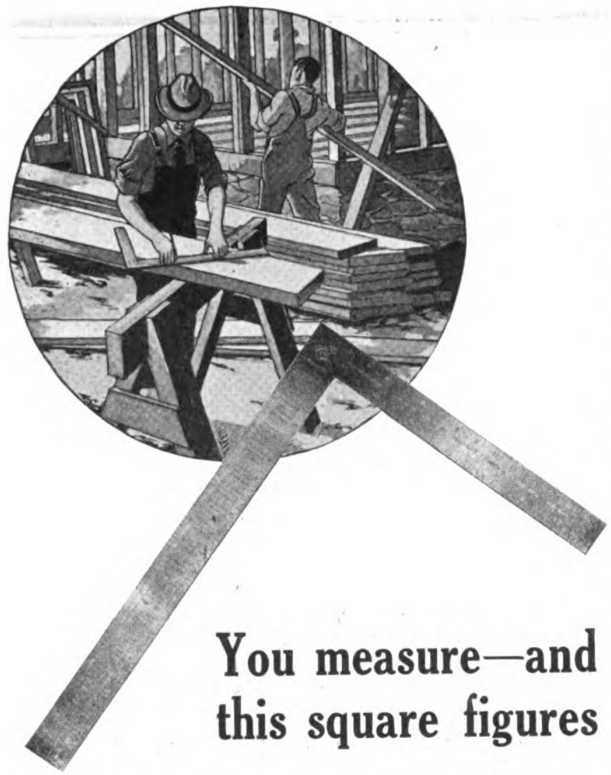

You measure—and this square figures

The carpenter who owns a Sargent Framing Square doesn't have to worry about lengths and cuts of rafters. He lets his square do all the figuring, thereby saving himself the trouble and at the same time eliminating all possibility of error.

The Sargent Framing Square is the only square made that calculates as it measures. It is made of the finest tool steel and carefully tested for trueness and accuracy in marking.

Ask to see a Sargent Framing Square, No. 500 series.

Sargent Auto-Set Bench Plane

The Sargent Auto-Set Plane is a light, fast-cutting plane with positive adjustments. Its special Auto-Set feature permits removing the cutter for sharpening and placing it again in exactly the same position without readjustment. The cutter works without chattering, being held firmly in place by the combined clamp and cap. Made in six sizes. Send for catalog.

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LOCKS AND HARDWARE



Hotel Pennsylvania, New York
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BUILD FOR PERMANENCE

PROTECTION is the price of permanence. Whether you design stately sky-scrapers, mammoth bridges, great industrial plants, or less imposing but equally important loft and office buildings, residences, garages and other structures, the problem of protection is greatly simplified by using

R.I.W. PROTECTIVE PRODUCTS
REMEMBER IT'S WATERPROOF
REG. U.S. PAT. OFF.

The owners of the Hotel Pennsylvania illustrated above have the satisfaction of knowing that this hotel, the largest in the world, is as permanent as it is beautiful. The following "R. I. W." products were used in its construction.

Concrete foundations were water-proofed with "R. I. W." Toxement. This integral waterproofing compound lubricates the mass, fills the voids and presents an impenetrable barrier to water, even under pressure.

Cut stone was backed with No. 110 "R. I. W." to prevent stain and exclude dampness.

Cement floors in roof cafe and elsewhere were decorated with "R. I. W." Cement Colors, which can be furnished in a wide variety of attractive colors.

Other "R. I. W." products were used for damp-proofing, enameling bathrooms and machinery, etc.

Ask Dept. E for descriptive literature.

TOCH BROTHERS
Technical and Scientific Paint Makers Since 1848
320 Fifth Avenue, New York
Works: Long Island City, N. Y., and London, England

R.I.W.
REMEMBER ITS WATERPROOF
STEEL NEED NOT RUST!
WOOD NEED NOT ROT!
NOR CONCRETE DUST!
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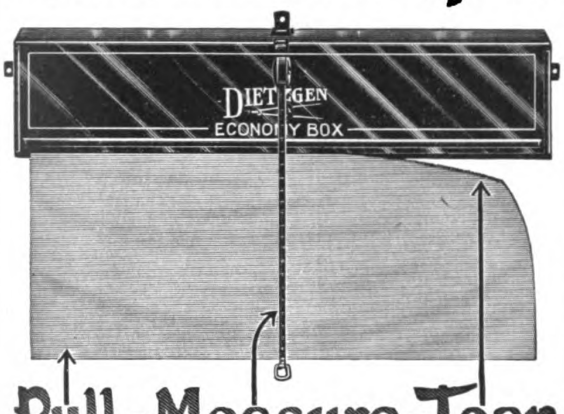
Stop Wasting Your Blue Print Paper



Pull-Measure-Tear

and a sheet of Blue Print Paper —*fresh, clean* and of the *desired length*—is ready for use from the

DIETZGEN Economy Box

At the present cost of sensitized papers, this unequaled container effects a direct saving for you. It not only protects the paper from light and moisture, but eliminates the waste that results from soiling and uneven tearing when the paper is cut from the roll.

Prevents Waste

as any length of paper can be drawn from the box, the desired length accurately measured by a spring tape attachment and quickly detached by means of a cutting edge.

Holds rolls of 50 yards or less, is substantially made of heavy sheet metal attractively finished with black lacquer, and can be fastened to wall or table.

Also adapted for Drawing and Tracing Papers, Tracing Cloth, Etc., in rolls not over 3¾ inches in diameter.

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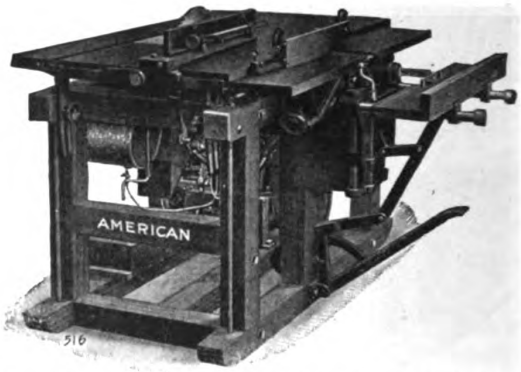

"American" Variety Woodworker—Furnished with Built-in Gasoline Engine, Self-Contained Electric Motor, or for Belt Drive

"AMERICAN" CONTRACTORS' MACHINERY

Today the big question is, "What will it do?"—not "What does it cost?" To be adequate to every emergency is the essential thing.

"American" Machines are built with the idea of doing more and better than others—not alone at the outset, but after months of service—not alone under average conditions but also under the spur of super-effort.

With machines built with such ideas in view, cost must be secondary to quality. To build a machine that can be depended upon under all conditions, costs more—but the results justify the higher cost, as hundreds of users of "American" Machines testify.

You are taking no chances with any "American" machine. They are built and sold on honor.

Send for Bulletins 10 *and* 77.

The "American" line is fully described in Catalog 18—*saw mills, edgers, bolters, trimmers, planers, matchers, moulders, shingle mills, lath mills, excelsior machines, woodworkers, saw benches, band saws, rip and cut-off saws, wood lathes, etc.*

American Saw Mill Machinery Co.

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NEW YORK CITY 1362 Hudson Terminal

Woodworkers Saw Benches
Rip and Cut-off Saws
Hoists.

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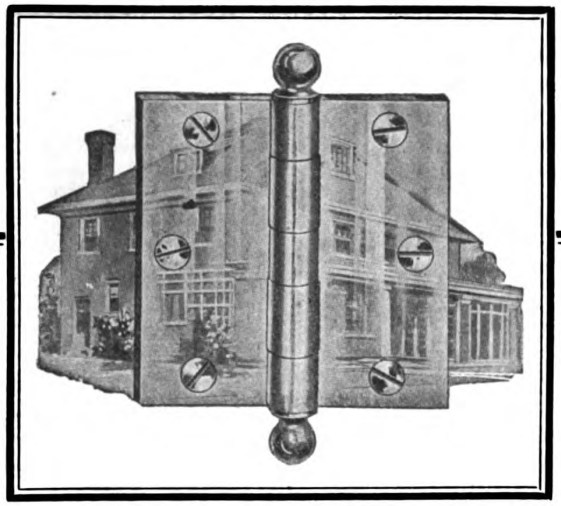

Your
ATTENTION!!

is called to the hinges on the door. To some people door hinges may seem rather small and unimportant—nevertheless, their mission in helping to make or mar the appearance of the rooms in a modern home is worthy of serious thought. The

GRIFFIN
"The Door Butt of America"

is designed along lines that insure both beauty to the home and *service* whenever the doors are opened and closed.

The Griffin operates freely and easily, it is amply strong for heavy doors and it is such a pleasing fixture that architects and home builders are glad to specify and use it.

Being finished in the various Griffin hardware finishes, it is in wide demand for the better class of houses and office buildings.

Send for illustrated catalog and circulars.

The Griffin Manufacturing Company
ERIE, PENNA.

45 Warren Street
New York

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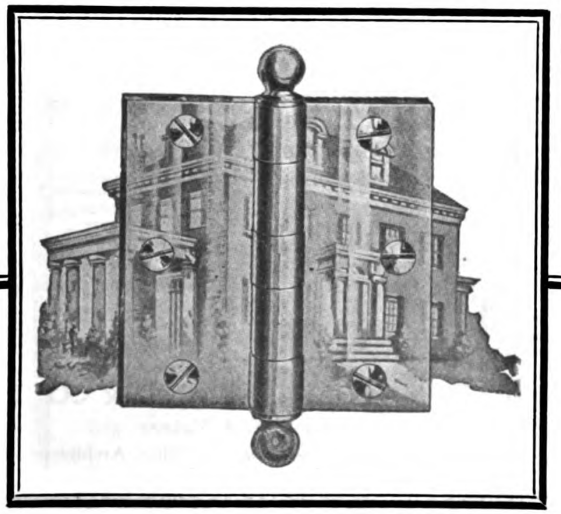

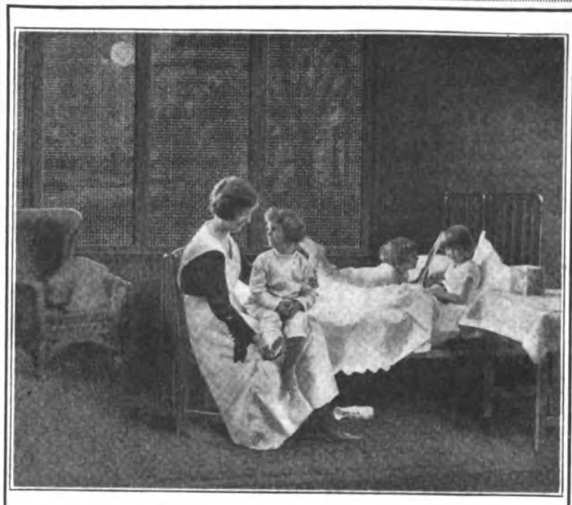

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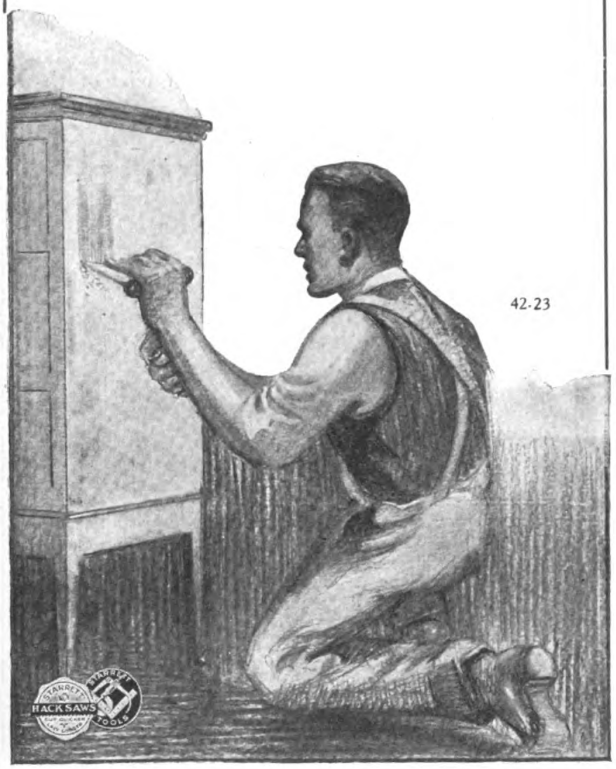

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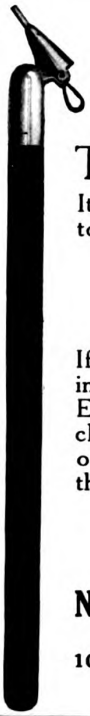

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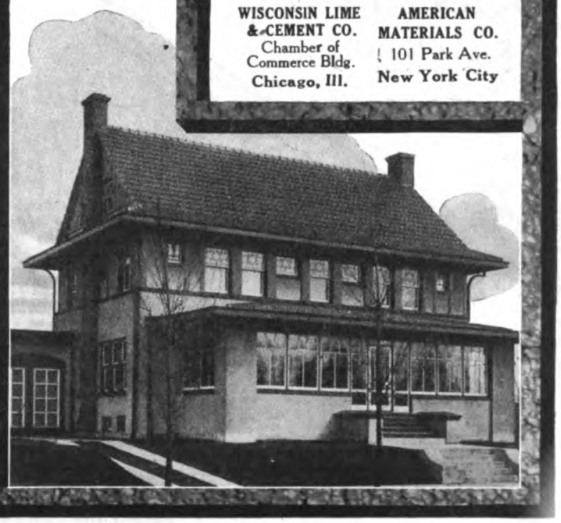

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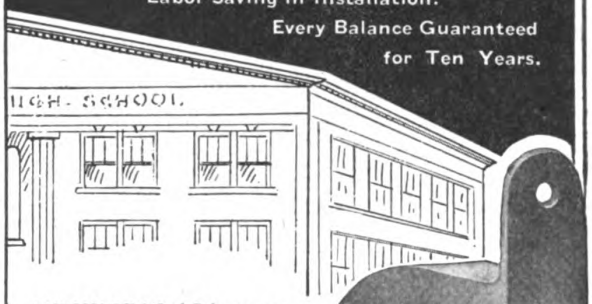

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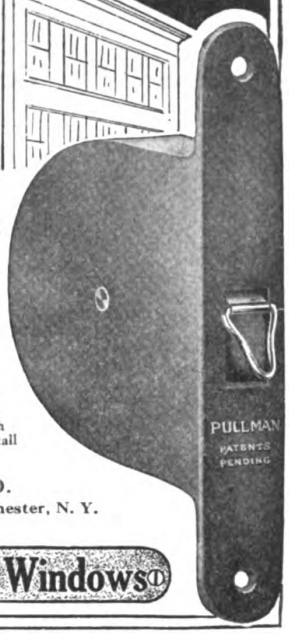

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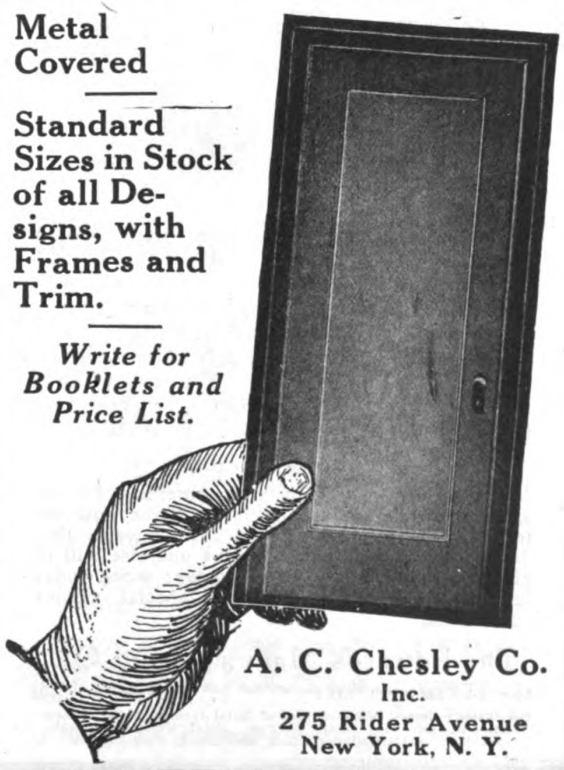

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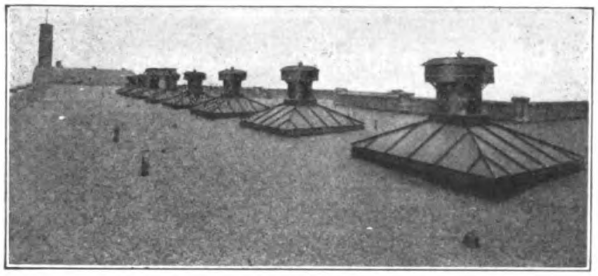

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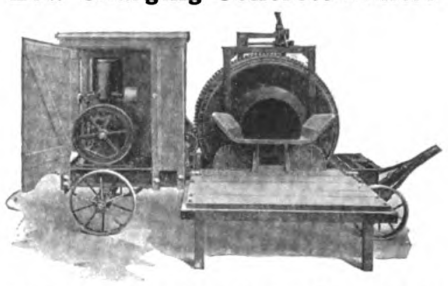

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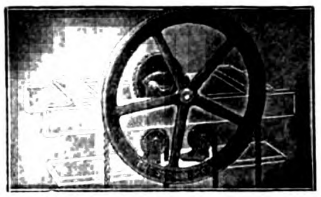

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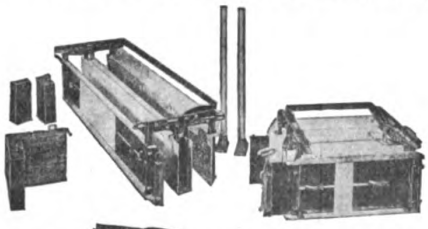

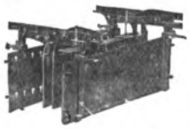

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The window frames are set in place and cemented tight, with air space brought up to frame by the sliding plates on sides of machines—no solid wall anywhere to carry dampness through.

Our wonderful New Window Machine gets into all the small places and short angles, and follows complex architectural designs. Our special exclusive features are time and money savers, and are worth the cost of our entire system.

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"Built Like a Thermos Bottle"

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EMPIRE PIPELESS



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Western Branch: 505 S. Clinton St., Chicago
Makers of the famous Red Cross Stoves & Ranges

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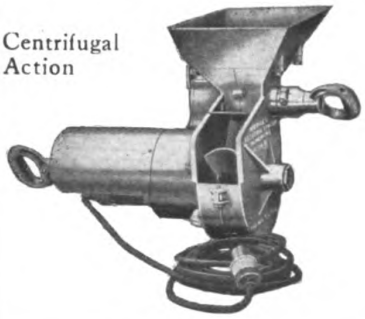
Making Money Is Easy With the Hodges Electric Stucco Machine

Centrifugal Action



There is always a big demand for stucco finishes on both old and new frame buildings. The Hodges electric machine applies stucco, plaster, etc., by centrifugal force and so quickly and cheaply that you can make a good profit on every job.

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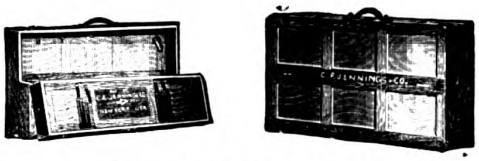

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Double Action, Concrete Finishing Tools

Speed up the work, cut costs and increase profits.

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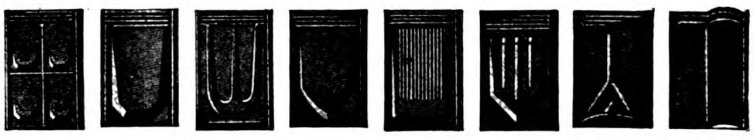

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In every branch of the concrete industry the Low Down Mixer assures satisfactory service combined with a real saving in time and money.

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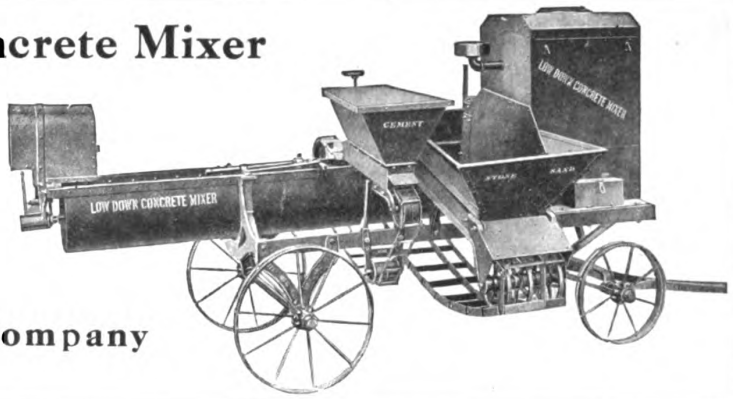

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Will handle a half ton of building material, tools or supplies at a minimum expense. Durable and inexpensive.

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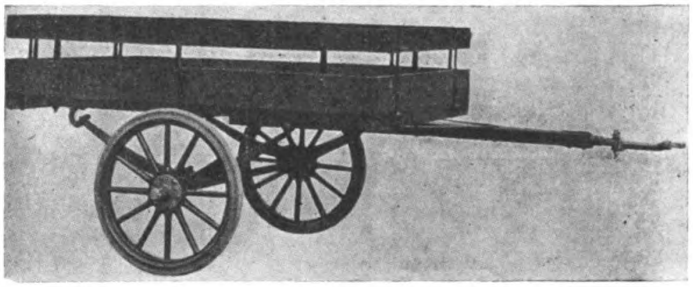

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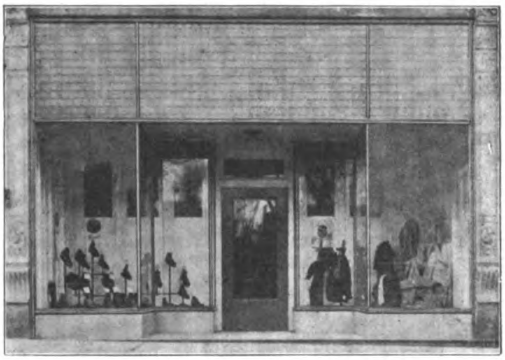

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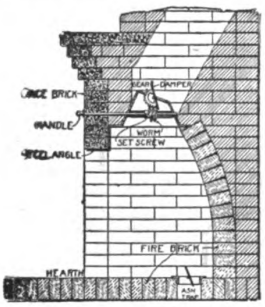

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Made in 7 sizes

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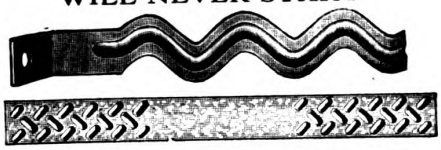

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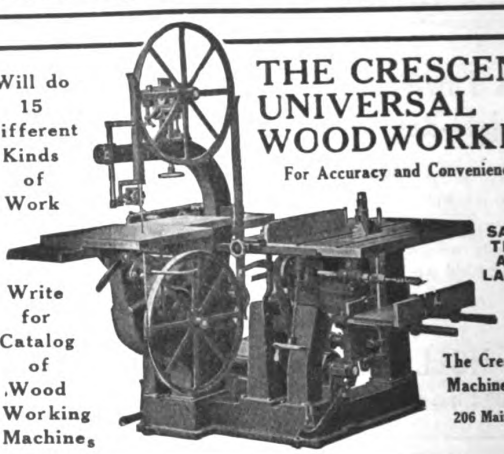

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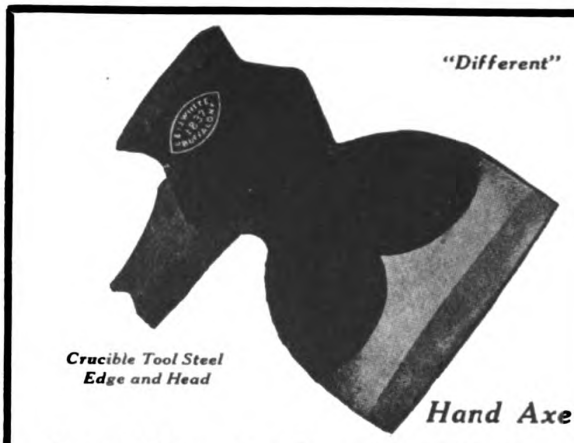

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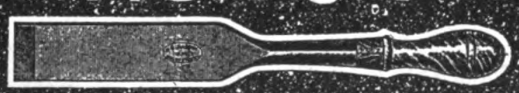

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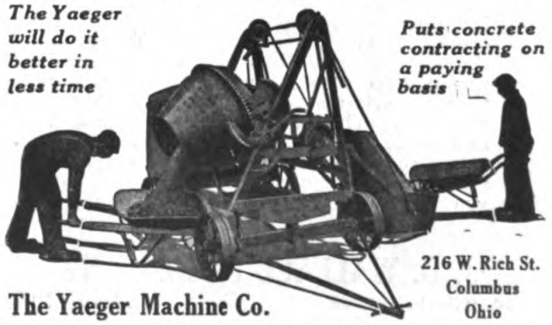

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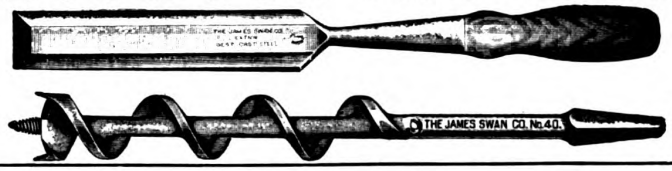

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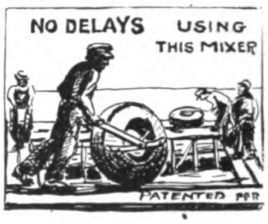

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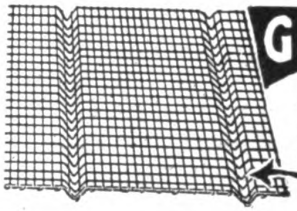

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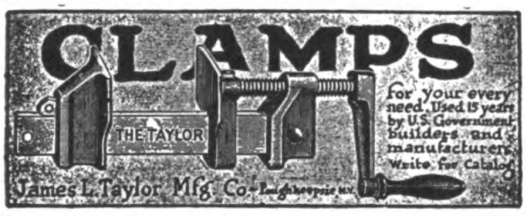

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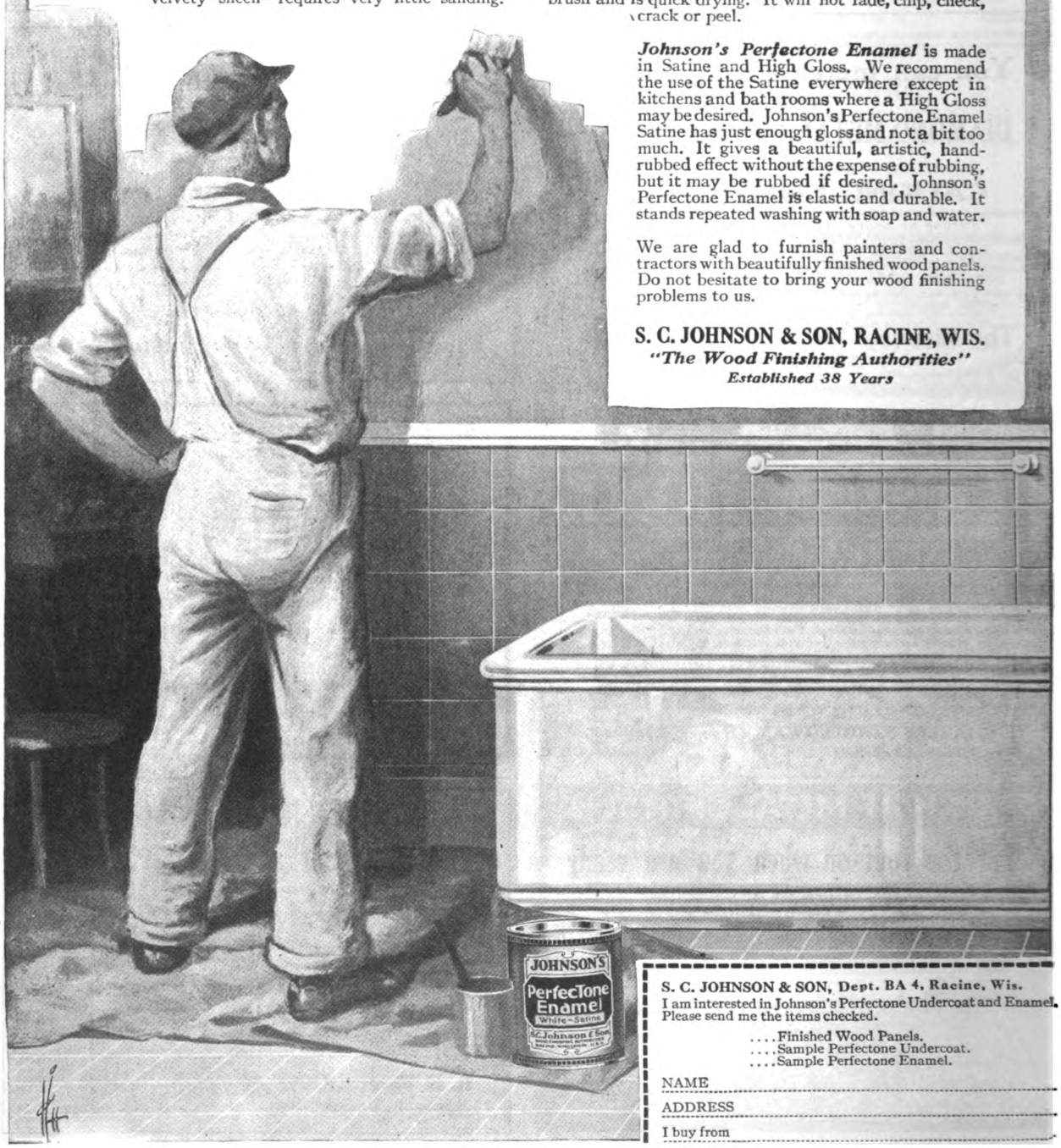

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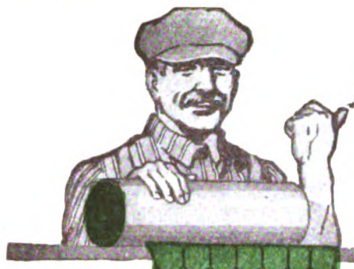

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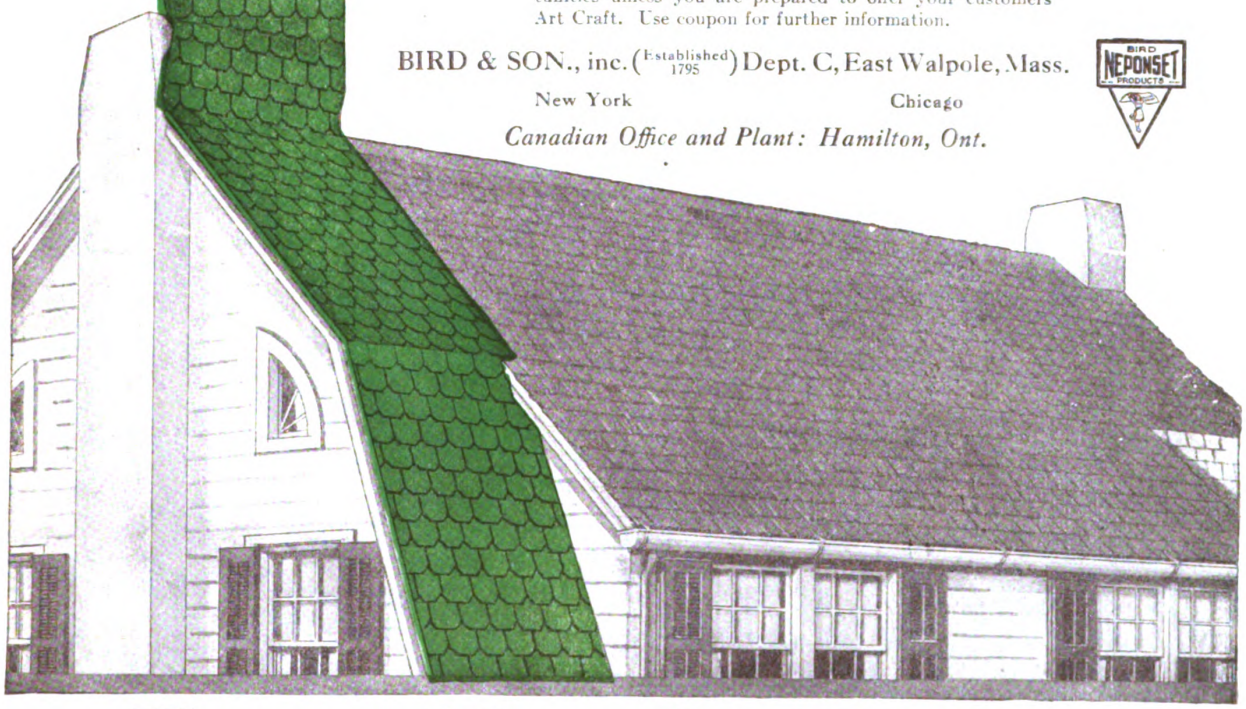

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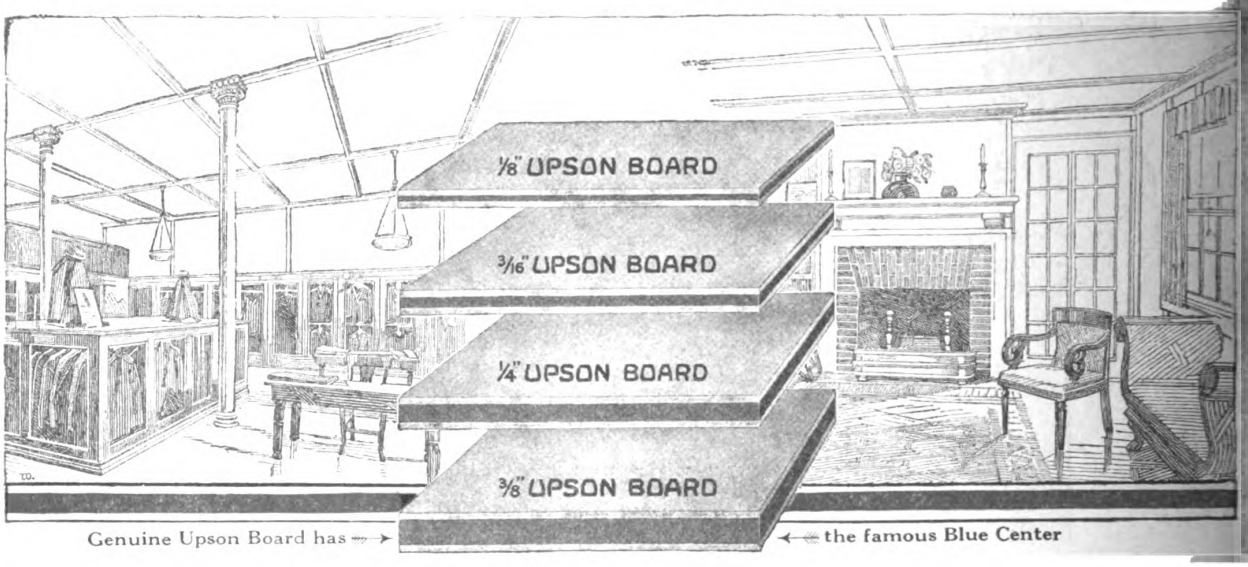

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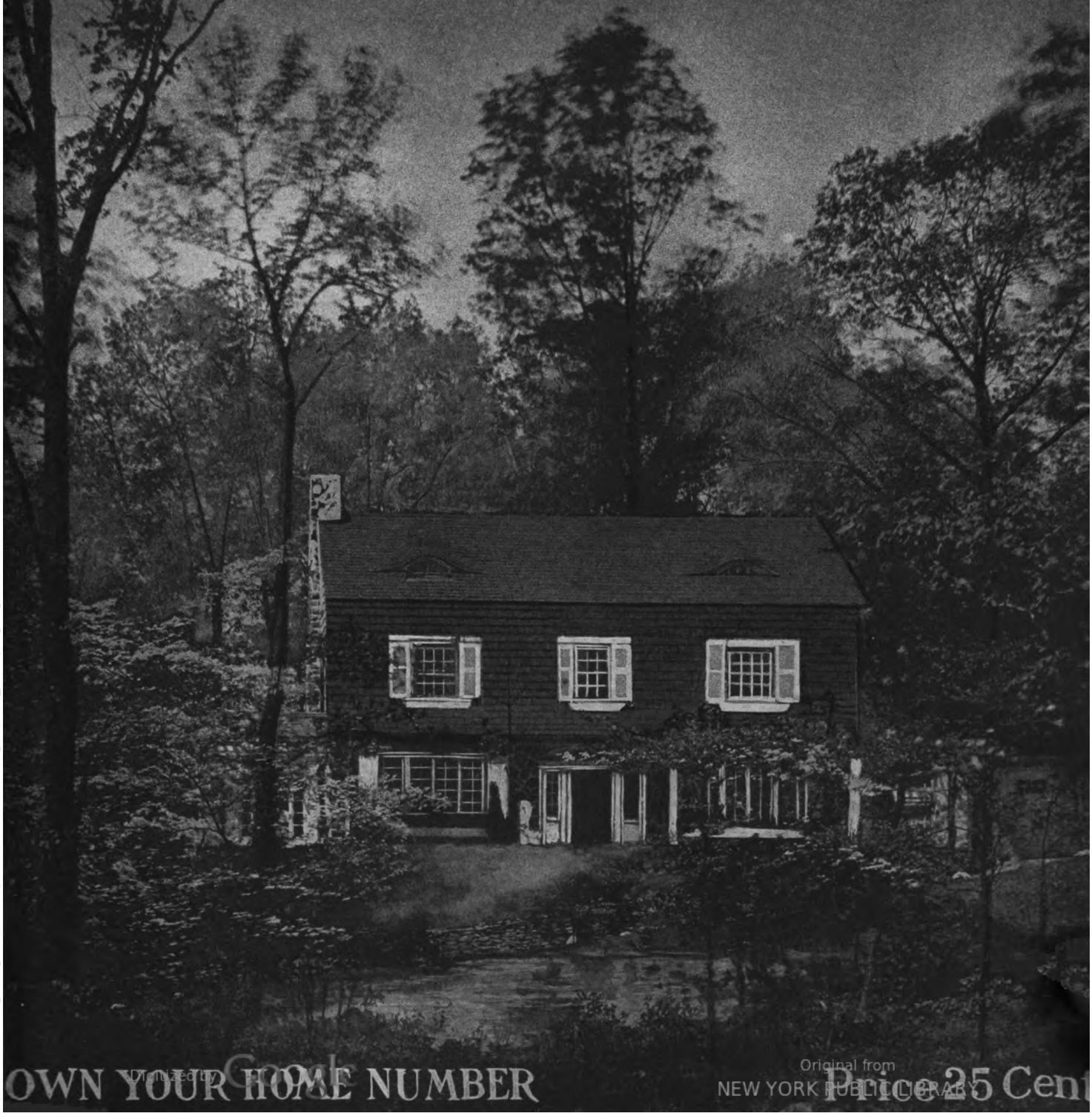

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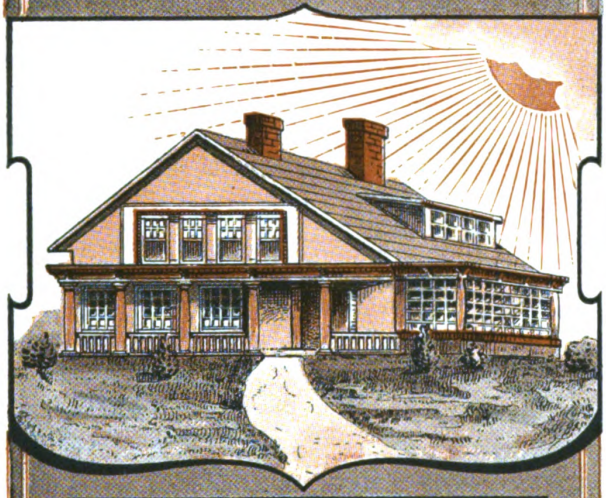

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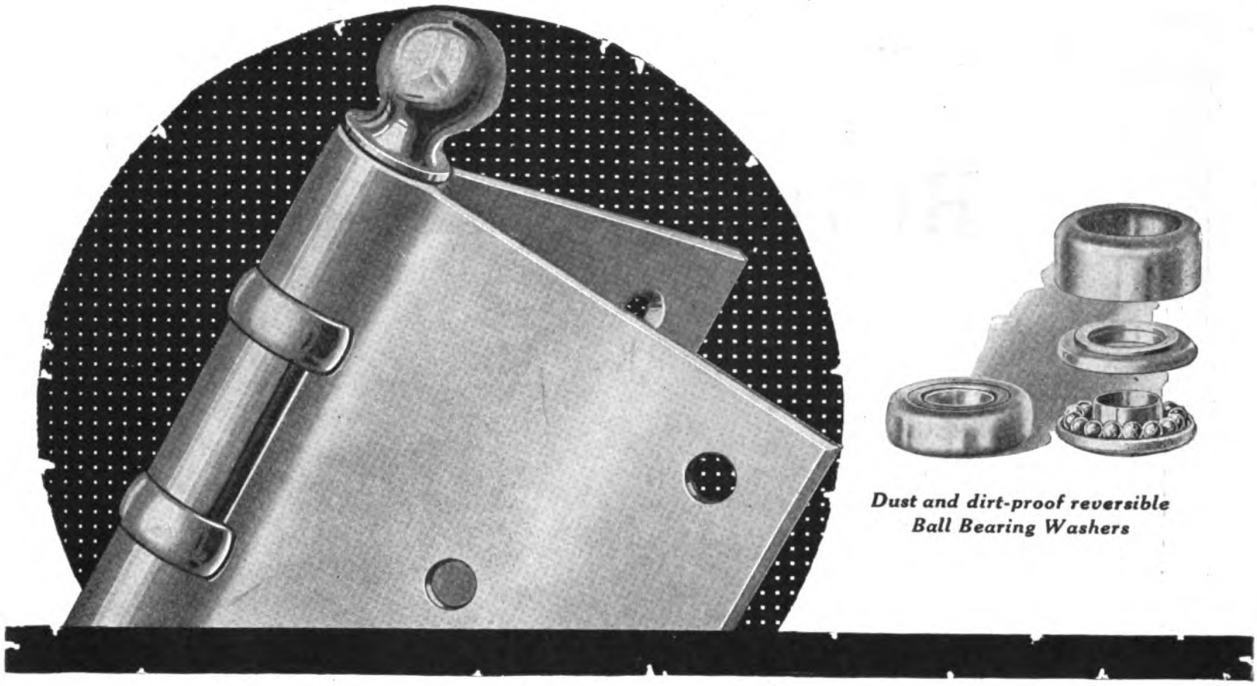

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Formerly Carpentry and Building, Founded 1879

May, 1920 Vol. XLII. No. 5

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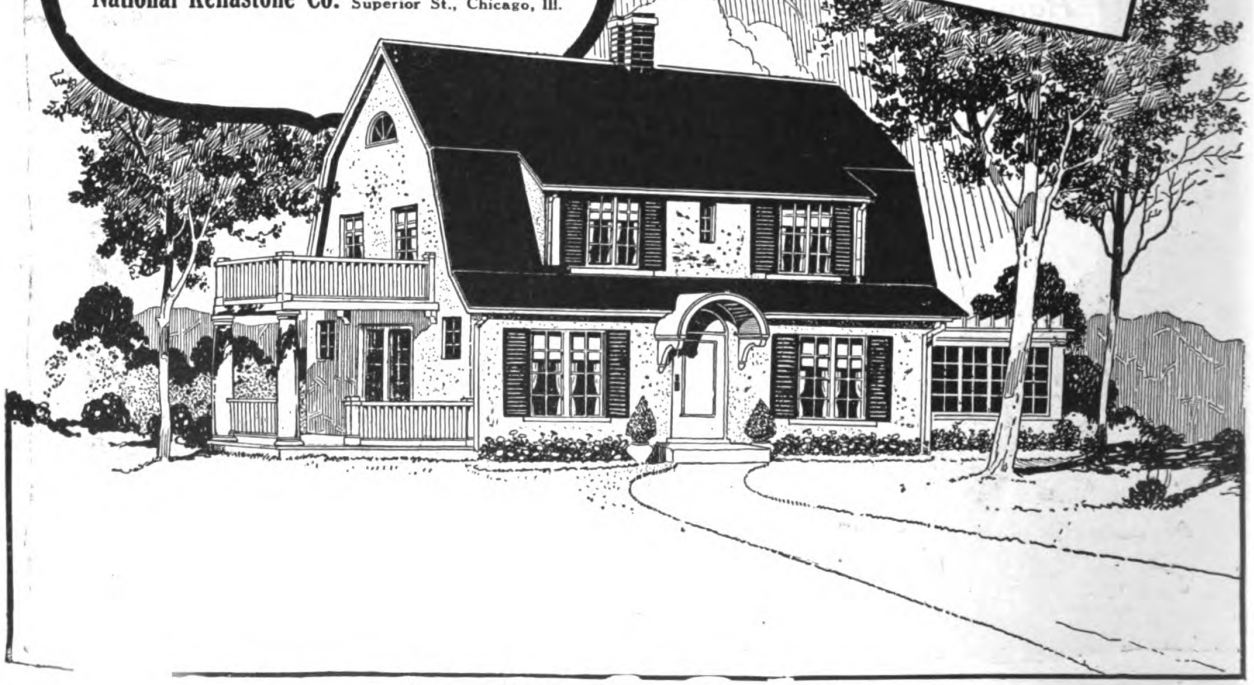

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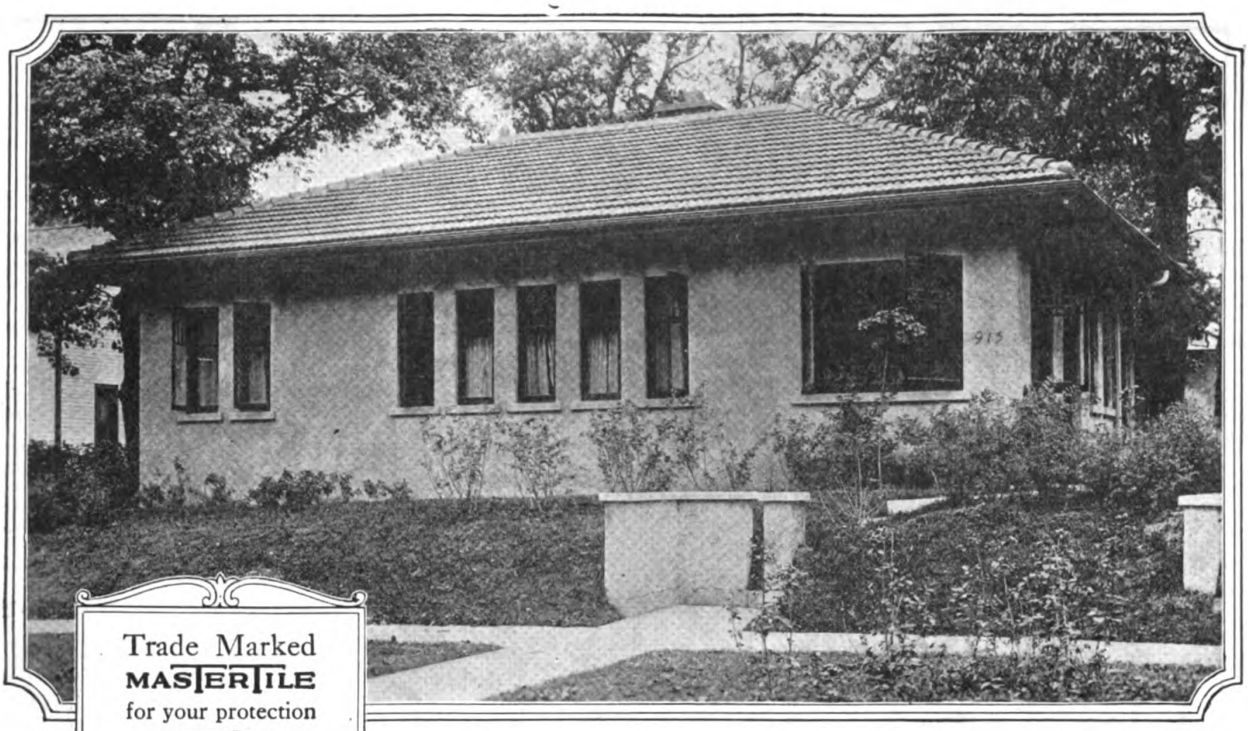

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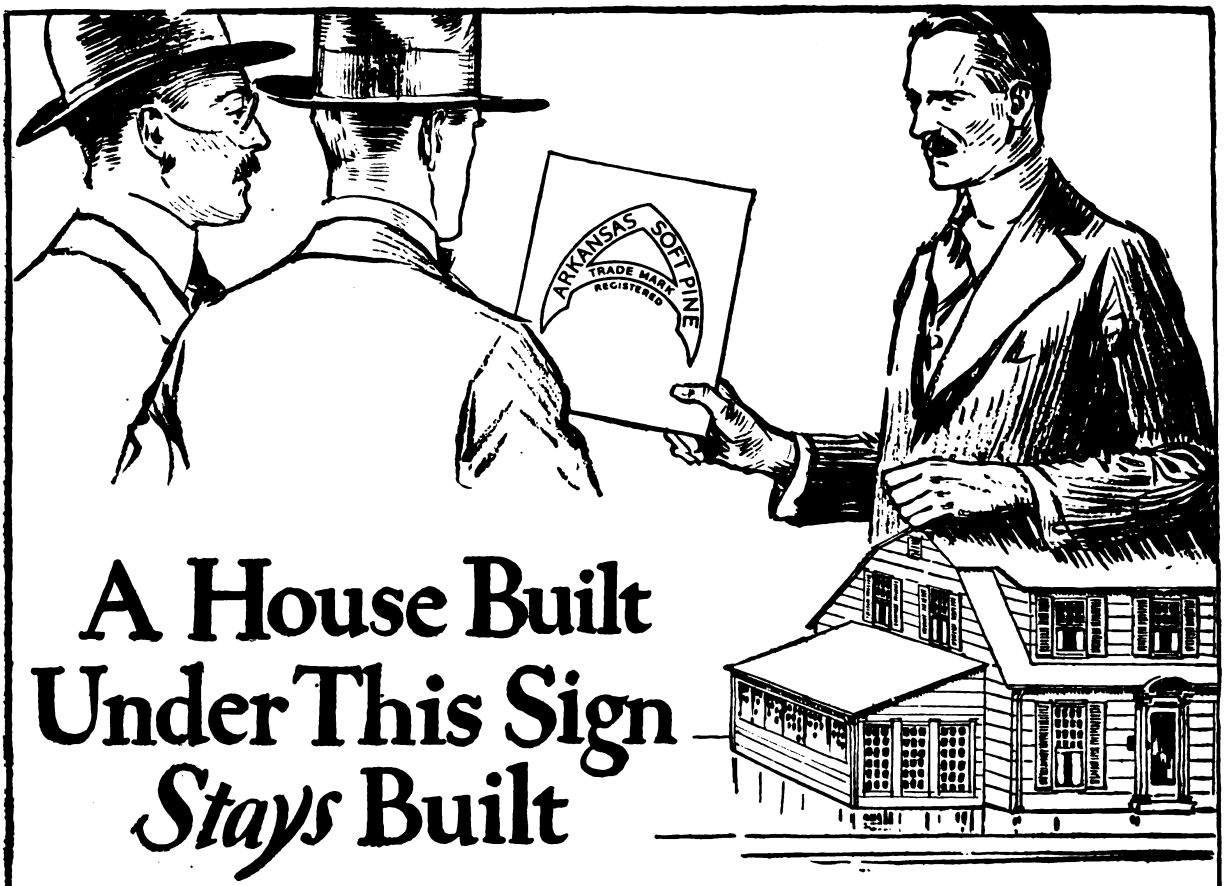

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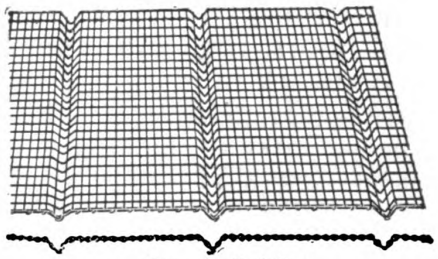

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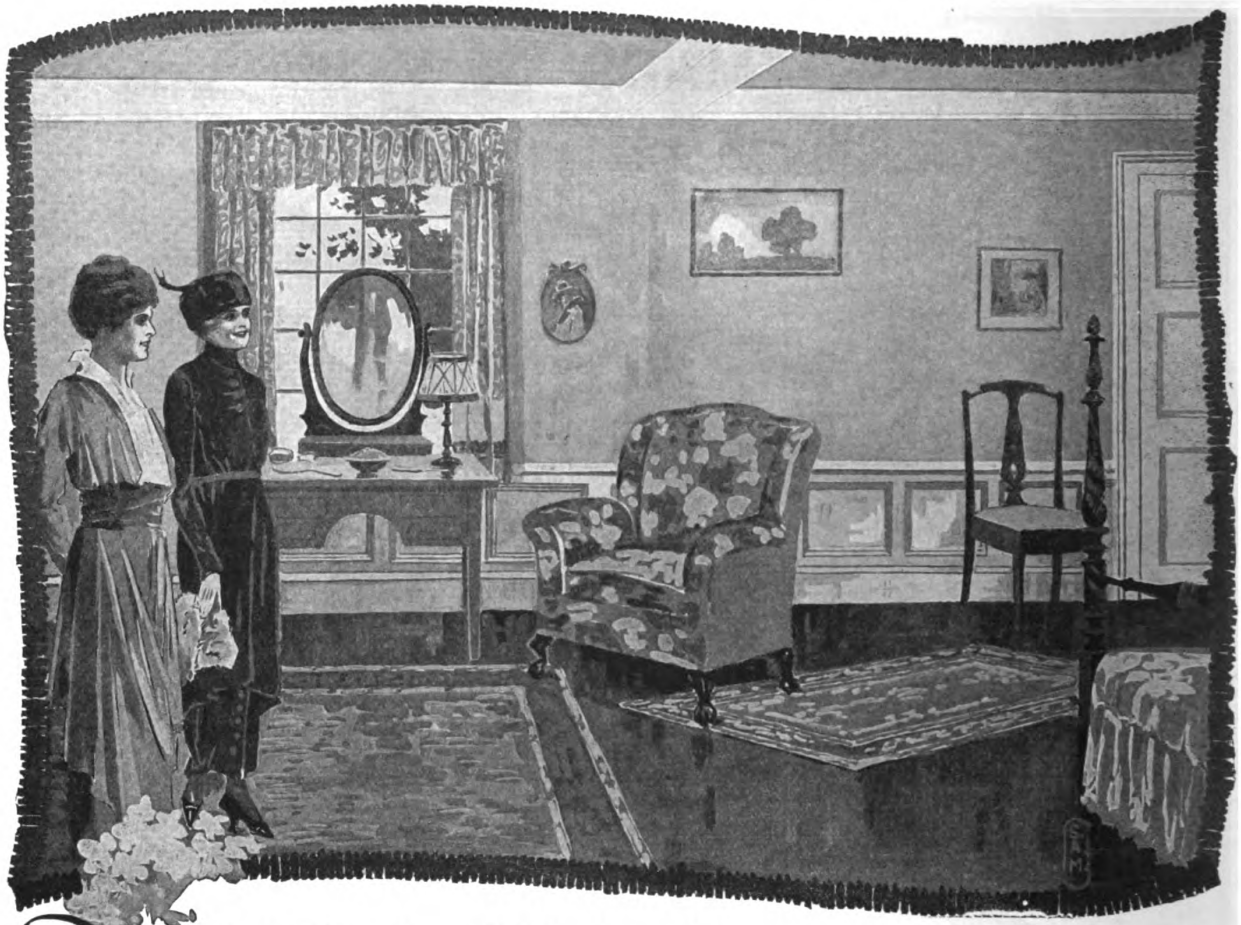

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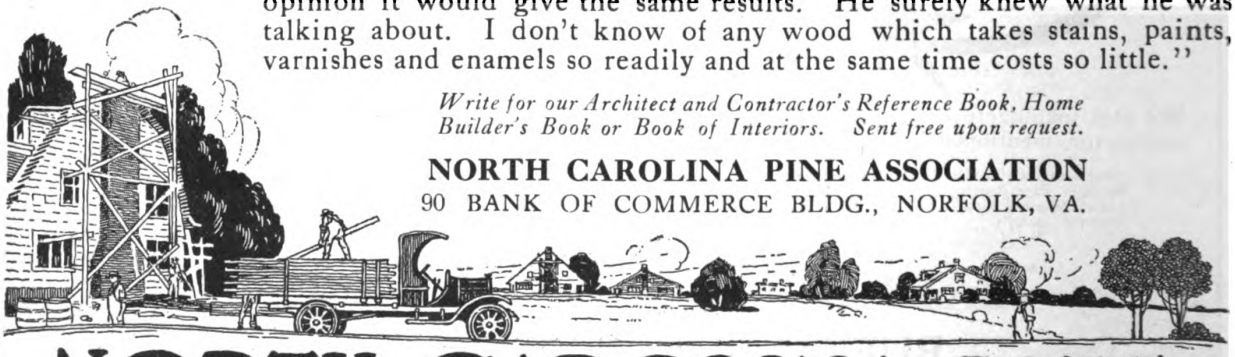

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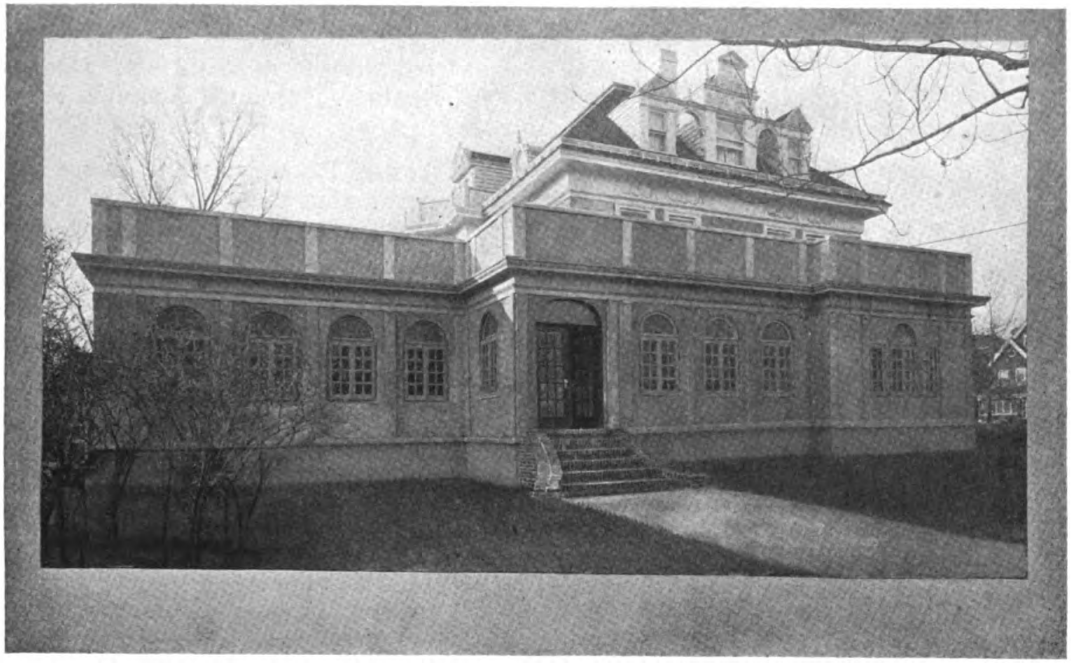

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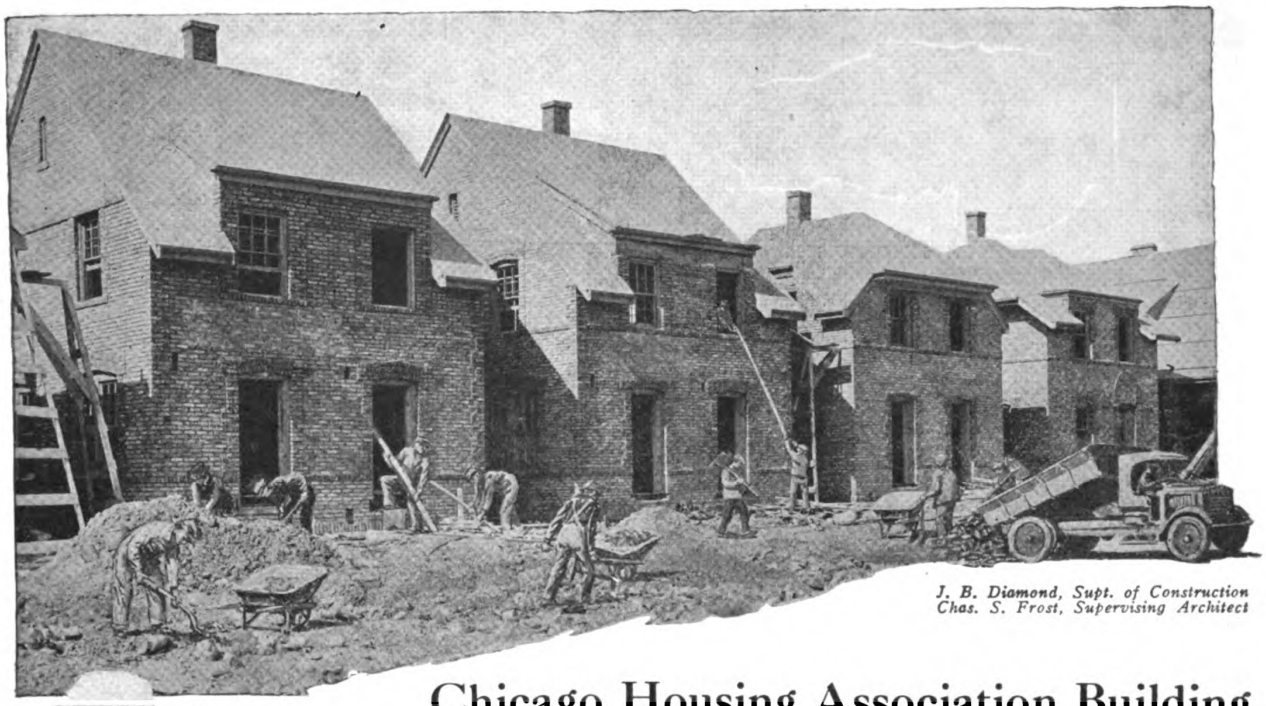

J. B. Diamond, Supt. of Construction
Chas. S. Frost, Supervising Architect

Chicago Housing Association Building 10,000 Homes of Common Brick



IF you were given the job of building 10,000 houses, and had to make a showing for efficiency, low construction cost, and *speed*—what material would you select?

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About 30 of the houses were completed to the roof through the coldest winter Chicago has experienced in years. Yet even under such unfavorable conditions the actual cost was 40c per square foot of wall. The walls are of solid brick, 8 inches thick, furred, lathed, and plastered on the inside, making the driest and warmest wall of its thickness possible to construct.

This National Educational Campaign is sustained by The Common Brick Industry of America. Address, The Secretary-Manager, 1307 Schofield Bldg., Cleveland, O.

We shall be glad to assist contractors, builders, housing associations, industrial concerns, allotment builders, real estate operators—all those interested in housing and building problems—to obtain full information regarding the comparative costs of various types of construction.

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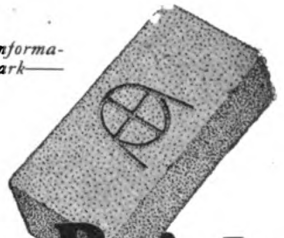

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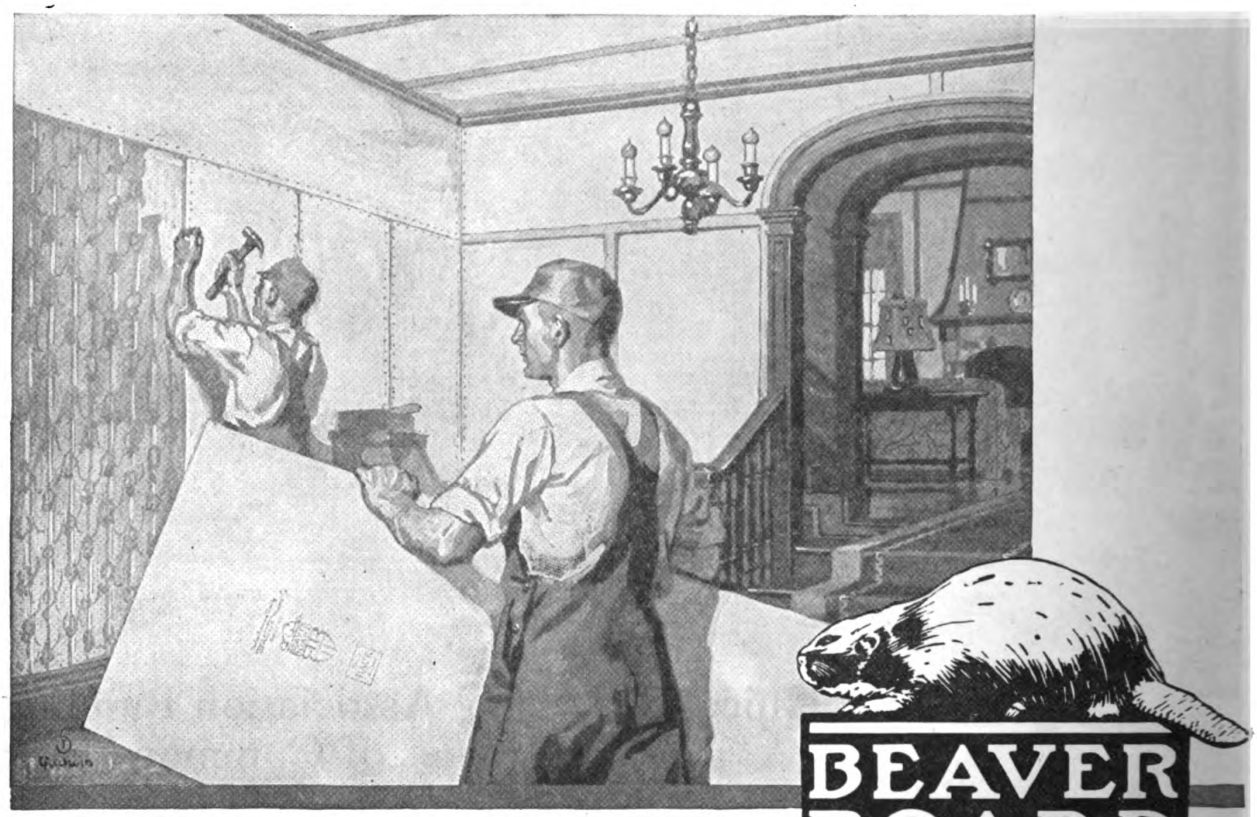

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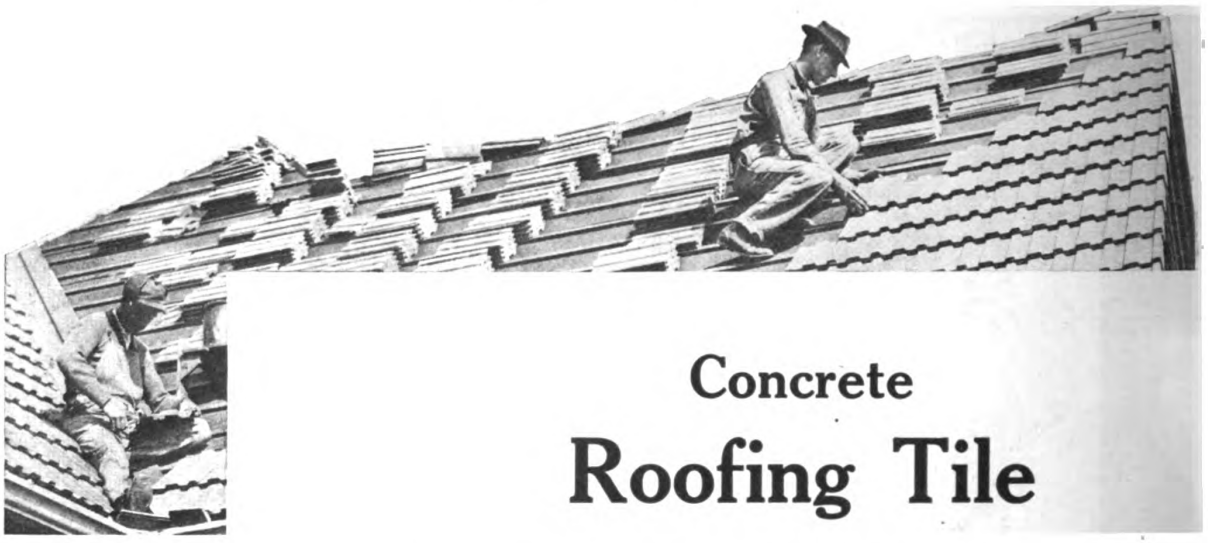

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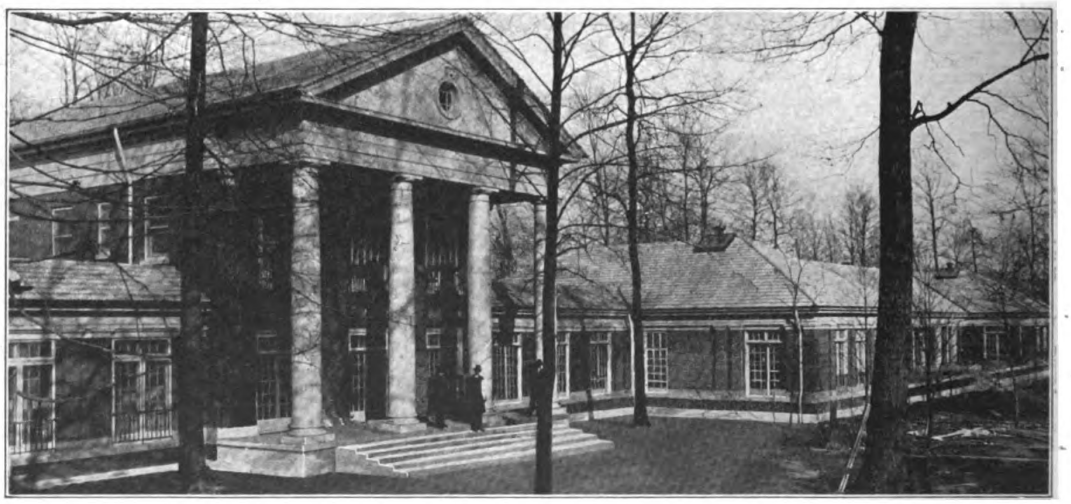

INDIANA TUBERCULOSIS HOSPITAL **These roofs are covered with Silver Grey "Concretile"** **W. E. RUSS, *Architect***

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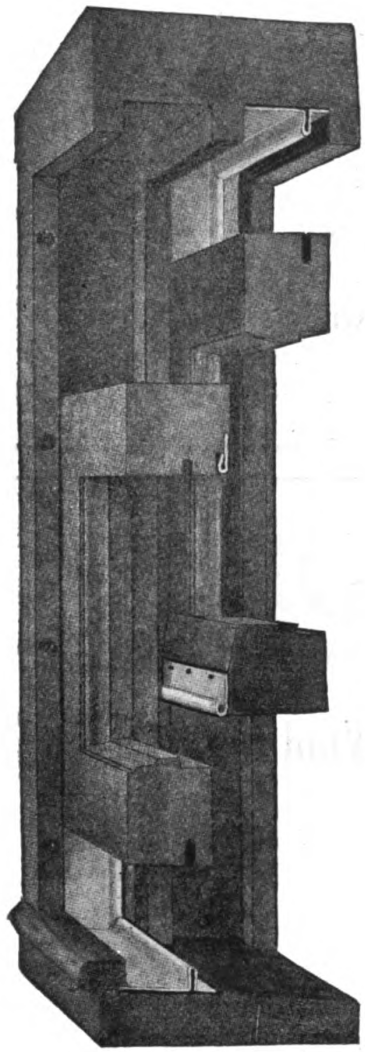
DIAMOND
METAL WEATHERSTRIP



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4—Protect health and greatly lighten the work of house cleaning.

5—Assure smooth, easy operation of doors and windows. Also the Diamond Flexible strip permits removability of sash and compensates for sash warpage.

When you explain to the house owner that scientific tests have proved the air leakage around the average window to be 180 cubic feet an hour with a 15-mile an hour wind blowing, it doesn't take long to convince him of the value of the five big advantages of Diamond Metal Weather Strips.

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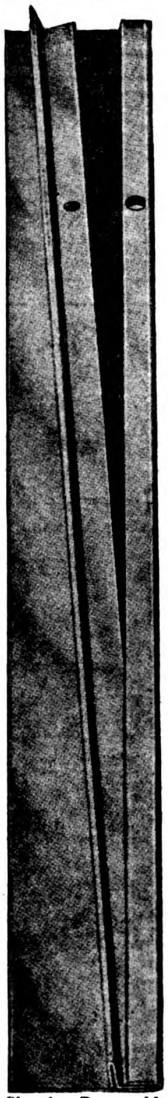

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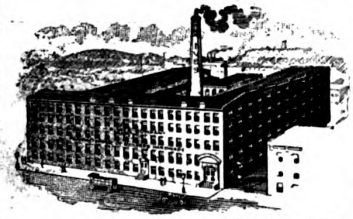

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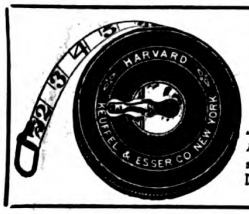

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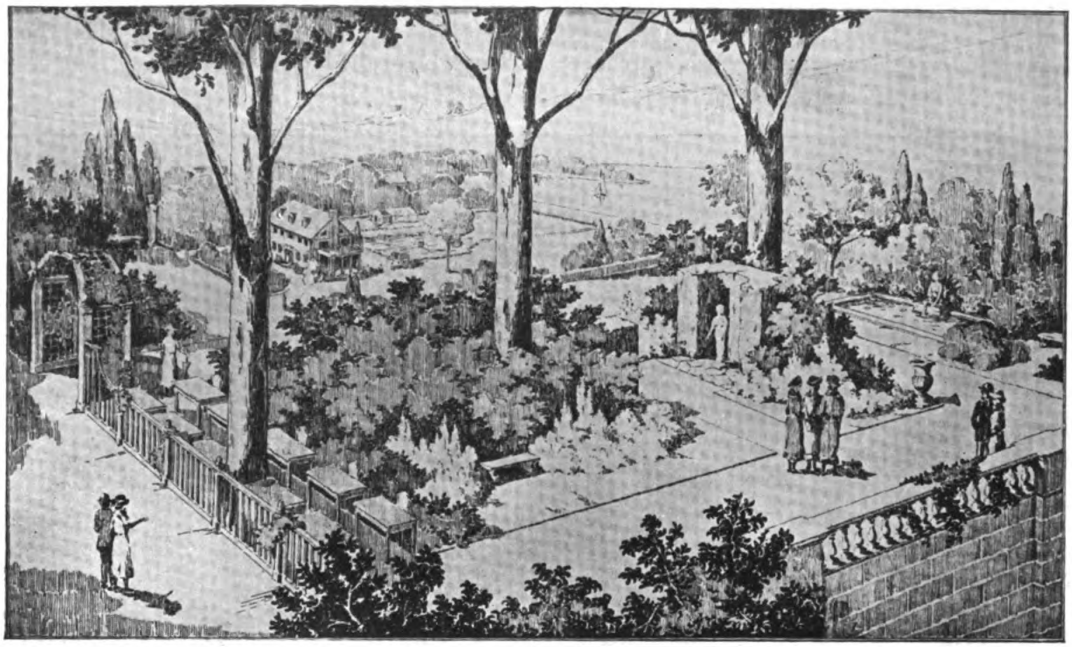
BUILDING AGE

NEW YORK, MAY, 1920



MODEL LANDSCAPE SHOWN AT "OWN YOUR HOME" EXPOSITION, GRAND CENTRAL PALACE, NEW YORK MAY 1-8, 1920

Own Your Home

WITH conditions as at present existing in the building field, the acquirement of a home seems almost impossible to that large number of people who are willing and eager to possess one. Relatively but a small proportion, possibly not more than 10 per cent of these home seekers, have the funds ready in hand. In view of the present outlook in the matter of financing buildings, the procurement of necessary funds, even on good security, appears impossible.

The campaign of education in these matters is now under way, and there are many channels through which the prospective home owner may seek information to help him to solve his problems. The Own Your Home Exposition opening in New York City on May 1st is one of these.

The first thing to learn in the process of home building is also the first or basic thing to learn in any progressive improvement of the economic elements of our daily lives. That is thrift. Thrift will not always mean saving with a purpose, as it often becomes necessary to spend with a purpose to accomplish the end in view. The prudent, thrifty man, who exercises those elements of caution in the financing of his limited means, finds that idle money is sometimes as unsatisfactory as none. He, therefore, endeavors to make such savings as he has accumulated, "work" for him. This in a small way is exactly the same in principle as those large operations that are dignified under the name of finance and successful speculation.

A well conceived and well pursued ideal is more

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easily reached when it becomes the absorbing ambition in our daily lives. A man has but to set his mind on the requirements of a home to find that instinctively his every effort unconsciously tends that way and that one by one obstacles are overcome and the desired end finally achieved. Further, the growing tendency to own a home is a decided aid in the movement toward a better Americanism. Every man who owns his home has pride in a sense of ownership and becomes a better and more valuable citizen.

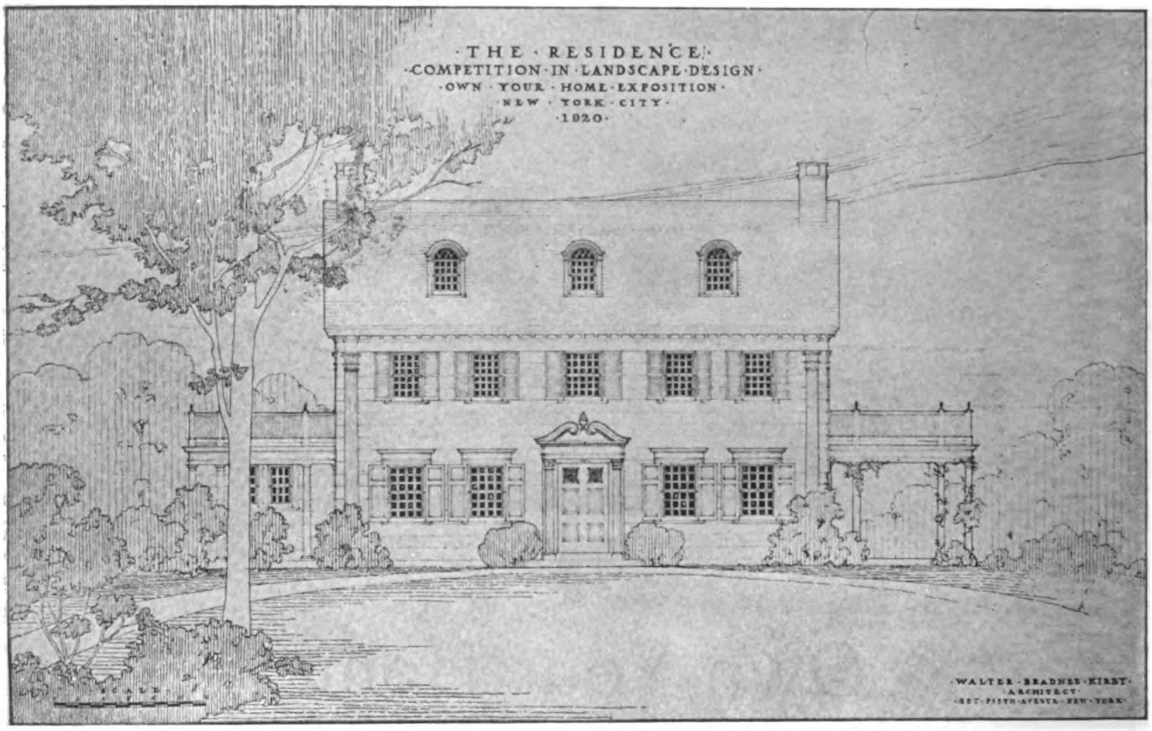
Real Estate dealers, nurserymen, architects, builders, manufacturers and dealers in building materials and building equipment of every character, including interior decorations and housefurnishings, in fact every one whose business is affected by the building industry, should take a broad view of this great subject and contribute their aid in fostering the "Own Your Home" idea.

Real Estate operators, architects and builders predict that the Summer of 1920 will probably see well started the biggest building boom that this country has ever known.

Rents are now at levels previously never dreamed of, and they are still soaring. Manufacturing and industrial space has followed suit. Apartment rentals are very high, and there are practically no vacancies. Private houses, for several years a drug on the market, have been brought well within the scope of demand, and are now being sought assiduously by home seekers and by those who see in their purchase an unusual opportunity to convert them into profit by making multi-family houses of them.

The Winter of 1918 passed without any marked activity in the purchase of vacant land and improvement sites. In the Spring this condition changed and the lot market began to show signs of awakening activity. Throughout the Summer a tremendous amount of sales of home sites were reported and keen observers of conditions in the real estate world at once became cognizant of the fact that the lot market was in the grip of an entirely new group of investors, most of whom were of the thrift saving bank variety and truly representatives of the great wage earning and middle classes, most of whom were contemplating building in the near future.

There are a great many people who know absolutely nothing of buying or building a home. To them the idea immediately brings to their minds



MODEL OF HOUSE, DESIGNED BY WALTER B. KIRBY, *ARCHITECT*, ON EXHIBITION IN LANDSCAPE SECTION, "OWN YOUR HOME" EXPOSITION IN NEW YORK

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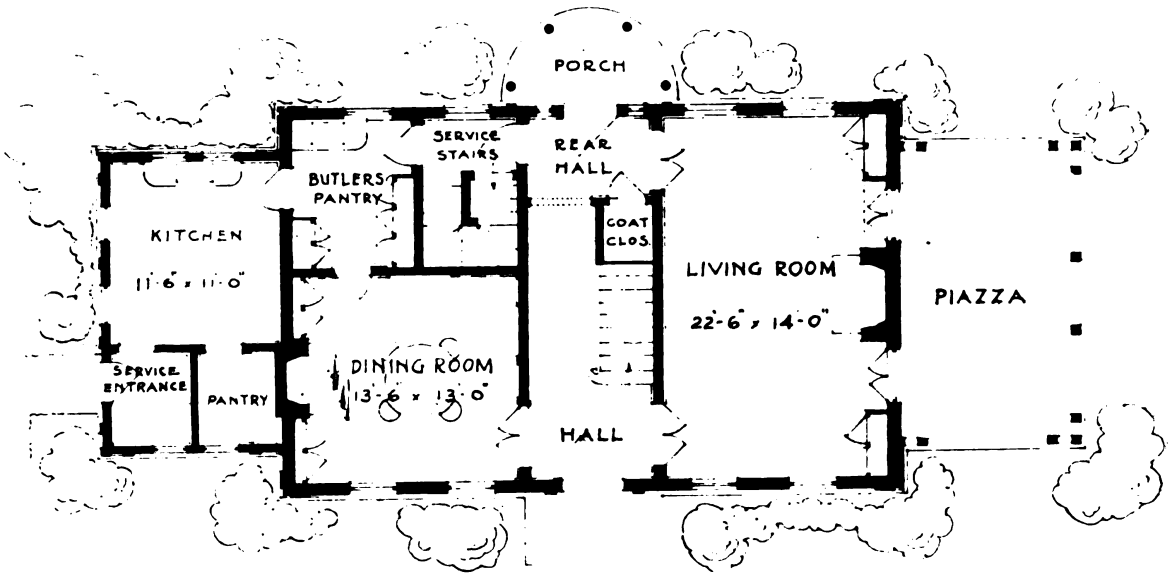
huge sums of money. They know nothing of the method of installment buying whereby the man or woman with a small amount of cash can purchase a home, allowing the balance, after the initial payment has been made, to stand on a first and a second reducible mortgage. They do not know of the Savings and Loan Associations, which, despite their conservative methods have over 3,000,000 members in the United States (75 per cent of these being savers and the other 25 per cent buying their own home), whose assets amount to $2,000,000,000. These associations lend money only on first mortgage and are given the special privilege of loaning up to 80 per cent of an appraised valuation, provided the mortgage is paid off at the rate of 6 per cent each year. For instance, in most associations, with here and there a slight variation of this plan, a borrower pays $1.00 a month on each $100 borrowed, 50 per cent going to interest and the other 50 per cent to the credit of his mortgage. These credits earn dividends at the rate of 4½ to 5 per cent each year, and if kept up persistently, will pay off the mortgage in about twelve years. In the meantime, the borrower has none of the renewal charges that come with term mortgages and if he "plays fair," he will always receive lenient treatment when through some unforeseen difficulty he cannot meet his payments. There are no automatic foreclosures. Foreclosure is only resorted to when every other plan to save the home has proved futile. Of course it is necessary and generally understood by all that the piece of property on which the home is to be built with the borrowed money be free and clear of all encumbrances.

There are over-cautious people, and among these are that large number of people of foreign birth, not yet really aware of the paternal aspect of government in this country, who will hesitate to embark on enterprises or movements similar to this Own Your Home campaign. They will seek to find some ulterior motive, some speculative trap that will eventually catch them and through which they will lose their hard earned money.

This attitude is undoubtedly due to the experience of many who have been caught by the snares of unscrupulous speculative traders. While this



FIRST FLOOR PLAN OF MODEL HOUSE

element has unfortunately not been eliminated, there are now sufficient opportunities guaranteed by the National and State authorities, or sanctioned by them, to permit the prospective home owner to proceed with safety.

The lean years of building during the war, when building except to meet the Government's necessities was prohibited, have served to demonstrate how essential to our economic welfare was that steady, but barely noticed, yearly building that was carried forward in times of peace.

It took but three years' cessation to create the present shortage and abnormal condition.

The prospective home owner may rest assured that these conditions will not become worse, and that they will gradually but surely revert to the normal. So that if under these present conditions

(Concluded on page 33)

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The Possibilities of Brick as a Home Building Material

By VICTOR D. ABEL

PART I

IN our eager search for a material for the exterior walls of our new building which will best express that permanency of design and, with design, the construction so much desired, together with economy in first cost as well as in upkeep, we are too prone to forget, like the man hunting for the four-leafed clover, that the object of our search is close at hand.

There are few portions of the United States which are not within easy transportation distance of the clay beds for bricks, together with the yards for their manufacture. And do not be discouraged if that brick yard manufactures only what is known as "common" or rough hard brick, instead of the brick of special texture and color known as "face brick." You may already have investigated and felt that the latter is too expensive for consideration, although you still wish to build permanently of brick. This, even provided the common brick which you have been used to seeing only in the factory wall and in the backing of "face" brick walls is reasonable in cost. A splendid result can be obtained by the proper selection and use of this common brick for facing purposes, wherever the special case does not particularly make desirable the more expensive face brick.

It is our intention to discuss in this series the many and varied uses of all types of brick and its intelligent application, and so to encourage its use where otherwise it may not have been understood or appreciated.

From the latest reports available, it can be roughly estimated that in the United States there are now manufactured every year the enormous total of seven billions of brick for use in building construction. Think of the possibilities of its use!

In the manufacture of the brick, the chemicals in the clay govern the body color, which may be either the familiar red or one of the various colors and shades resulting from the material itself in the localities where manufactured. In most of the kilns, the piling of the clay during the process of being burnt into its finished product necessitates, of course, that some be closer to the fire than others These result in burning darker and in being rougher, those farthest away being lightest in color. It has hitherto been the practice of manufacturers to discard all except those of a uniform shade and many good brick have been so laid aside. This has been particularly true in the manufacture of the "stretcher" and repressed brick which was almost constantly used in the desire to obtain a wall

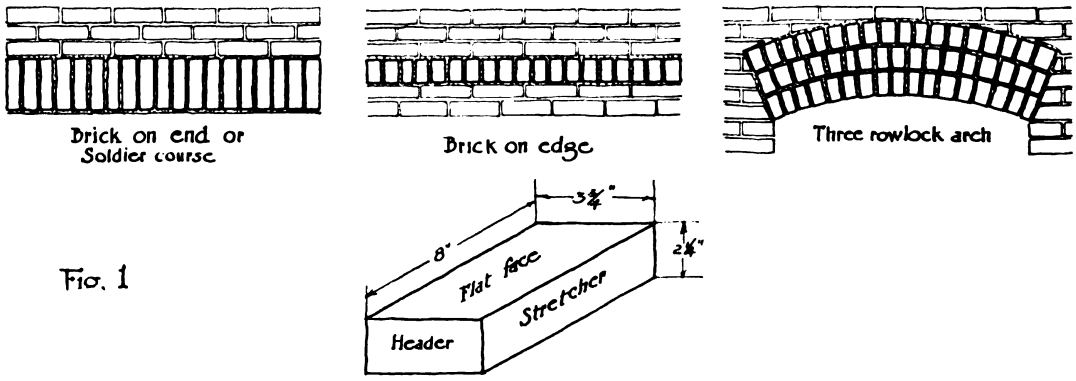

FIG. 1

Isometric view of standard sized brick showing names of various faces.

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of uniform color and with thin joints. Only such brick as had square, true edges and were of even color were saved. Even in the so-called Harvard or dark rough red brick was this true, although to a lesser extent.

In the last few years, however, the study and development of the brick wall has shown the advantage of the varying shades of color, the surface and the roughness of the brick is now no drawback, as the brick by reason of increased cost has become too expensive to throw many away. It always has been and is still hard to convince the manufacturer of the ordinary common brick that, if he would only save the darker burned brick with their varying shades their product would be of far more value as face brick than merely for structural use. It is, in fact, only recently that an architect in looking for a good inexpensive face brick discovered thousands of brick at a brick yard which had been discarded as worthless because of color and unevenness, not because of lack of strength. The architect purchased these for only a portion of the price of the "new" brick, gaining thereby not only financially but in effect in the finished wall.

One has but to study the old buildings of our country which are the foundations of our architecture as well as our liberty to see that the brickwork which is half their charm is in the shading of color of the material and the jointing and bonding of the brick. Examine closely the photographs of Independence Hall and William Penn's house, Philadelphia; Old North Church and Faneuil Hall, Boston, or some of the Colonial mansions of Virginia and it will be seen that these are the three factors in the exterior use of brick in design, and so it is with these three that we will mostly deal. It is of further interest to note that in all of these old buildings, as may be seen by the illustrations, the facing brick was merely a selection of the best of the ordinary brick delivered to the job for the building, thus showing the possibilities of a careful selection.

In the present era of high building costs there is little difference between the different forms of exterior wall construction, other things being equal, so that the factors of safety to life, which include fire resistance and construction, no longer work an imagined hardship upon the owner. In fact, there is the additional advantage that a building of brick stands on a plane of its own. When you mention your house as being of brick or of masonry there is no question in the mind of the listener. He knows you have built upon a solid foundation. And the value of that knowledge is nowhere more evident than in the financing of your building. To the mind of the man who is going to lend you the money upon which to build or buy the most important question to consider, that of its future value and lack of depreciation, has been definitely answered.

If your house is one of a row or semi-detached you will probably find that the majority of building laws already require the wall separating you from the next house to be of brick. This material is given the fullest recognition in the construction of buildings wherever safety to life is required; for, burned as it is under a temperature of around 2000 degrees Fahrenheit, the average fire of from 700 to 1000 degrees can have no serious effect.

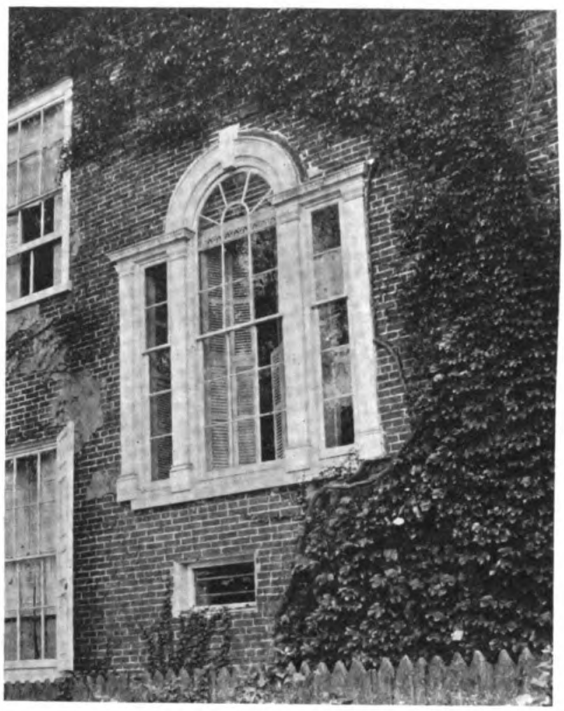

FIG. 2. REED HOUSE, NEWCASTLE, DEL. BUILT 1801

Building codes in general also fix the thickness of walls in nearly all cases, where such regulations exist; and particularly in the construction of the larger type of building, such as apartments, factories, office buildings, etc. Generally also in the larger type of building the employment of an experienced architect is more usual, although the future owner will also find it to his advantage to employ a capable architect for even the smallest house, for it presents problems all of its own.

It is in the small house also that the structural use as well as design of brick needs probably more explanation and understanding, so that this series of articles will study also this phase of construction, as well as the exterior treatment of both small

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and large houses and buildings. This first article will primarily treat of the essentials of brick—namely, the surface, the bond and the joint, and also briefly its comparative cost in the small house.

The second article will describe and illustrate the use of brick in the small house and in housing developments, where are probably its greatest possibilities; the subject of the third article will be the use of brick in the larger house and other types of buildings. The concluding installment will illustrate decorative forms and treatments, fireplaces, gardens, walks, entrances, etc.

The most important question in the selection of brick for the facing is its color, texture and shading. As the effect of these three together in the finished wall is the success of the final result attained, they must be studied inclusively. By color and shade is meant, gray, dark or light; red, dark or light, etc., in accordance with personal choice or design. The individual brick may be of even shade of color and the effect secured by using several shades of brick, or each individual brick may vary in color, either of which adds to the interest of the wall by giving it that play of light and shade which, after all, is its beauty.

Texture is the effect of the surface of the individual brick when a part of the completed wall. It may vary from the usual fairly straight even surface of the machine or hand-made brick to the water struck brick of New England, the wire-cut brick or any of the various surfaces most available in the locality. The brick need not necessarily be absolutely true to size, and with even straight edges, such as the repressed or stretcher brick. The tendency is rather away from that type and if in the burning the brick has come out uneven in form as well as in color, it is all the more to be desired. For this reason the appearance of iron spots in the brick is also quite allowable, particularly showing as they do in what are known as "clinker" brick, and which are now being extensively used as a face brick.

Brick are made in certain sizes, of which the most usual is close to the standard size just adopted by the more important organizations of manufacturers and users. The size just agreed upon is eight inches long by two and one-quarter inches thick by three and three-quarter inches wide. This works out properly to an eight, twelve and sixteen-inch wall, which is the standard used throughout these articles. This size is known as the standard brick. In addition there are two other sizes used, one the Roman, being 11¼" long by 1⅝" thick by 3¾" wide, and the other, called the Norman, 11¼" long by 2¼" thick by 3¾" wide.

The two latter sizes are not very frequently used and then only in special designs, particularly as a similar effect can be obtained by placing two standard brick together with no joint between, called "blind" jointing.

Each exposed surface of the brick has a name of its own, the long thin side is the flat face (Fig. 1). The others as shown are the header and the stretcher. The brick when on the header is called "brick

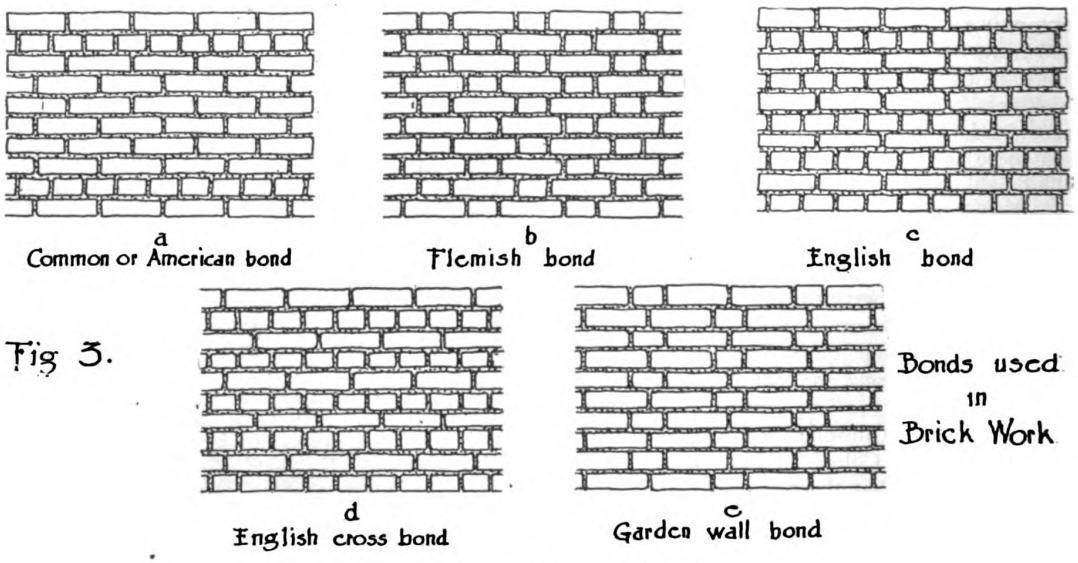

FIG. 3. BONDS USED IN BRICKWORK

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on end," or a "soldier" course; when laid with the stretcher face down is called "brick on edge." The layers of brick one above the other are called "courses," so the average standard brick laid with ½" joint runs between four and five courses to the foot. The brick for face work and for fire walls where strength is required should have a clear ring

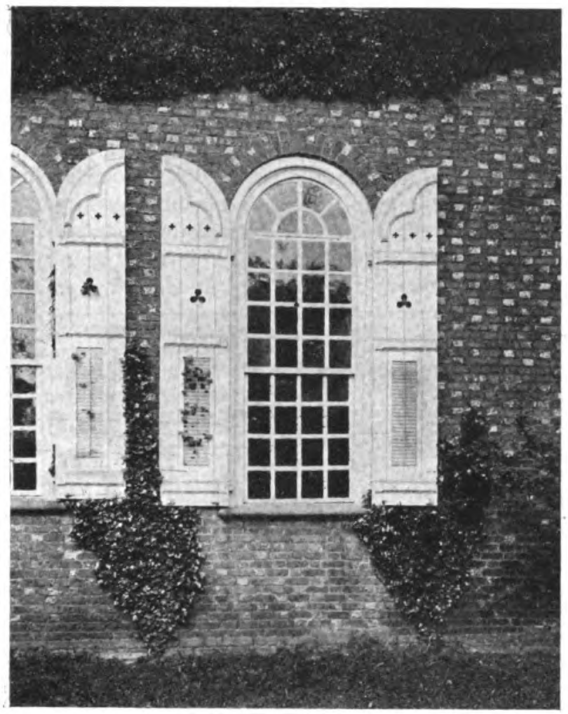

FIG. 4. BRUTON PARISH CHURCH, WILLIAMSBURG, VA. BUILT 1715

and break hard. If they are light in color, soft, absorptive and easily broken they are what is known as "salmon" brick and should only be used in backing up certain walls or for solid interior non-structural walls. Brick broken, if half size or smaller, are called "bats." When brick are used structurally in arches, laid stretcher face down, they are called rowlock arches, each course being a "rowlock." The arch shown in Fig. 1 is a 3-rowlock arch.

With these explanations we can discuss in detail the various "bonds" used in the average wall laid, being the design or method of laying the exposed four inches of brickwork. Except in an eight-inch wall or one exposed on two sides the backing brick (as those not to be exposed are called) are laid in the same manner as the first type illustrated in Fig. 3 which shows the bonds as here described. The backing brick must, however, be always tied together or bonded together to the exposed four inches and to each other in such a way as to make the wall structural.

The "common" or American bond (a) is by far the most generally used. Unless specified distinctly this is the kind of bond which will be estimated upon and used. See Fig. 2. It is the most easily laid and therefore the least expensive. It has the additional advantage of being tied in directly with the backing brick and being laid in the same bond results in a further saving of time. The others are more decorative in value and must be tied properly to the backing brick, although this would naturally follow in most cases were it not for the fact that for ease of laying the greater part of the exposed headers are in reality half bricks, and care must be taken to see that the bond between facing and backing brick is secure.

The Flemish bond, of the decorative bonds, is the most used. It occurs in a great deal of the old Colonial work, as for instance in Bruton Parish Church, Fig. 4. This bond (b) consists of a header and a stretcher alternately laid in each course. In the finished wall it is particularly effective, often adding to the building, depending solely upon brick for its effect, a dignity which it otherwise would not possess. For the same reason it is also much



FIG. 5. STENTON, HOUSE OF JNO. LOGAN

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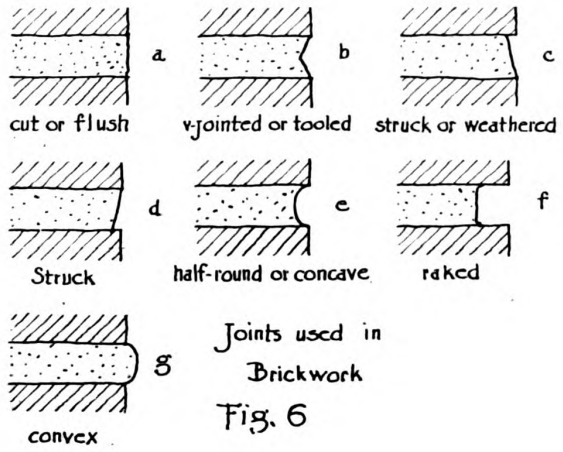
used in the larger work, such as public buildings. In laying this wall it is a saving of expense to use the full brick with exposed header only every seventh course, the others being halfbricks. To use full bricks for headers in every course adds considerably to the cost of laying. This particularly applies where black headers are used, as often occurs in Flemish bond. The beauty of this bond as well as of the other decorative forms is enhanced by the wide joint, the color of the mortar



Joints used in Brickwork

Fig. 6

and the rough texture and uneven shading of the facing brick.

Two interesting variations in brick walls are the English bond (c) and the English cross bond (d). Both are alternating courses of all headers and of all stretchers; in the former the vertical joints between alternate courses of stretchers are directly over each other and in the cross bond the vertical joints also alternate, forming an interesting diamond shape. Fig. 5 shows an interesting detail of the English bond in the wall.

These two English patterns are, however, difficult to lay, and expensive for that reason. The last bond shown (e) is, as its name indicates, used mostly for garden treatments, although it may be considerably varied in its application.

With the consideration of each bond is also the infinite variety which may be secured by the width and the color of the joint and the type of pointing. It is not generally known what can be done with the mere striking of the joints by the trowel or other tool used in cleaning off the excess mortar on the face after the brick has been laid, commonly known as "pointing." There are some seven generally used joints and of these the struck joints and the concave or half round are in most general use. Fig. 6 shows the joints and the names by which they are known. The first four are made with the trowel, the others by the use of special irons or tools.

The width of the joint varies with practice and the effect desired. Modern practice and good design is increasing the width of the joint until ¾" is not unusual. The ½" is most common, although if the full effect of the white joint is desired ⅝" is perhaps better. In one building which will be later illustrated a one-inch joint was used, increasing it to 1⅛" in the upper part of the wall on account of the optical illusion of decreasing its apparent width when looking up.

The width of joint as here described refers primarily to the horizontal joint and the good architect in designing his exterior openings will work them out to fit with the brick courses (Fig. 7).

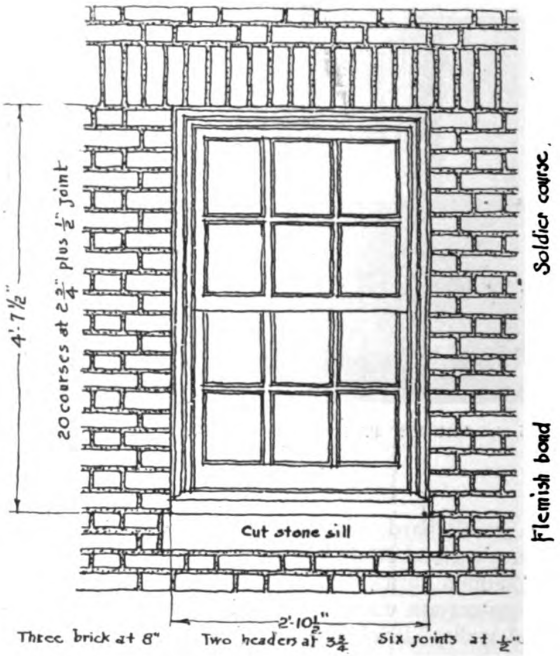


FIG. 7. DETAIL OF REVEAL, DOUBLE HUNG SASH IN BRICK WALL

The vertical joint should be as near as possible of the same width, but necessarily there must be a little more leeway allowed in order that the bricks may be adjusted to the width of openings, piers, etc. They must, however, line up vertically in accordance with the arrangement of the bond used. Often the vertical joint is purposely made smaller than the other and in some cases it is made very thin or omitted between certain bricks so as to give

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the effect of a long brick instead of two, as previously mentioned. This, of course, only in special decorative treatments which will be later covered.

The kind of mortar to be used depends entirely upon local conditions, including temperature. Straight cement mortar is inadvisable except in freezing weather, in exposed situations or where especial strength is required. Cement-lime mortar is more easily worked and better for general use. For ordinary home construction, above the first floor, straight lime mortar is quite satisfactory, except in freezing weather.

The color of the mortar is entirely a question of design. If a white joint is desired white sand and cement should be specified. In the East, where Jersey or yellow gravel, which is a course sand of a light buff tint, is available, this in itself gives a fine soft color blending well with the color of the red brick mostly used. Special dark or other color joints must have the coloring matter distinctly specified. Where either of the above is not available expense can be saved and a satisfactory result procured by a careful mixture of the materials at hand, proportioned to the color of the sand and cement available, and using lime to the amount required.

Having now considered the characteristics of brick, to be followed by descriptions of the effects which may be obtained by its use, there remains for the further consideration of the owner its approximate cost in relation to the usual methods of construction of the smaller houses, meaning, in this connection, only the individual detached house. In the case of semi-detached and row houses conditions of construction are such as would require special study in each case, although, when the greater fire resistance of brick is considered there can be no question as to the economy of its use, especially in the "party" wall, as the wall separating one house from the one joined to it is called.

Stone is confined to such few localities for face work that it can well be eliminated from consideration here, and the cheaply built frame house and other special forms of exterior wall construction must, of necessity, be individually considered.

The three basic types of construction are the well built frame house, the terra cotta block house and the house with brick walls. It must be remembered that of the three brick is the only one with solid walls, thus no comparison of costs can state in figures the immeasurable advantage of such solid masonry construction. In the brick house the walls would be considered as 12" for bearing and 8" for non-bearing walls, furred on the inside to receive lath and plaster. The facing brick would be a selection of rough hard. If face brick is desired there would be a difference of from $15 to $30 per thousand for such brick, depending upon the type selected and its cost delivered to the job. The average brick house of about $10,000 cost has about 35,000 brick in the outside walls above the first floor level, of which from 12,000 to 15,000 are facing brick.

The frame house with which it is to be compared would be of the recommended type of building—namely, with 4" or 6" outside studs covered with sheathing, paper and then either shingles or clapboards, or lath and plaster on furring strips. On the inside would, of course, be the usual lath and plaster.

The house of terra cotta, for purposes of proper comparison, would have at least 8" blocks in the first story and should be furred on the inside to receive the lath and plaster.

After examination of estimates taken in every part of the country it would be safe to say that there is but slight difference in the first cost of either of these three types of construction. Estimates vary to such an extent that it would be impossible to formulate any safe rule of comparison. For instance, in Chicago, Ill., and in Toledo, O., it has been found that small houses of brick are cheaper than frame. In Philadelphia some years ago a terra cotta building proved to be cheaper than frame, while last Fall a frame building ran less than the same house of terra cotta blocks.

In both cases it would have appeared that brick would be slightly more, but so little that any increase would indeed have been no penalty, rather a good financial investment when the resultant gains were considered in full; particularly when it is considered that the upkeep would have been at a minimum and the insurance rates the least possible, and further, in case of financial help being required, the greatest permissible amount would be forthcoming.

As a result of these investigations and experiences, the owner who is thinking now of building can well choose without regard for the difference in cost. Rather let your adviser tell you in each specific case, and if brick is in your mind, do not hesitate—you are spending no additional money which is not in every way giving you full and better return, dollar for dollar.

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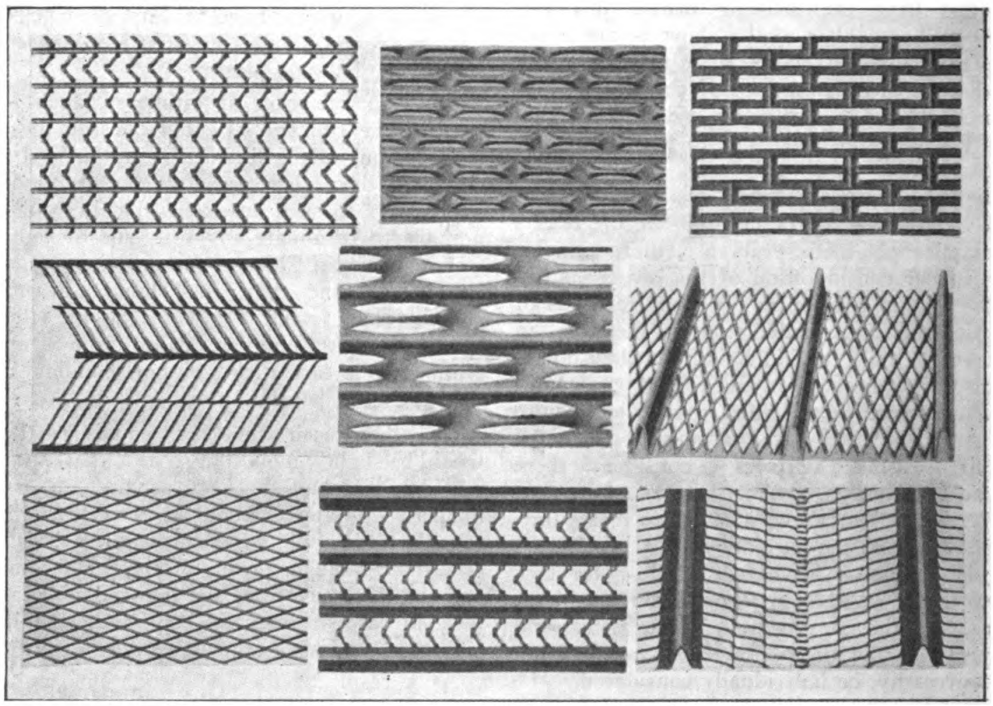
The Stucco House

Illustrating the Proper Use of Metal Lath on Balloon Framing as a Base for Exterior Plastering

WHAT kind of a house does your client want? Well, it's an even break that he or she—more often it's she—would like a "stucco" house. One would almost come to the conclusion after hearing this term used so often that it designated a type of architecture—it seems in many instances to be the beginning and ending of a person's conception of the "type" of house they want. And—more's the pity—so many stucco houses betray the confidence placed in them by an overtrustful owner. For in numerous cases the stucco has cracked and dropped off, or it has crazed after a few years, like a wrinkled old woman—and only its former beauty is to be remembered. Now, the purpose of this article is to explain and illustrate how the stucco house should be built when metal lath on a timber frame is used as the base. Unless, in addition to following the recommendations contained in this article, careful, experienced and competent workmen execute the design, no guarantee can be given that stucco will not develop cracks. To obtain the best results the matter of workmanship is of prime importance. If the methods here set forth are carefully followed and the workmanship is of the best, a satisfactory job will result. Men who are good interior plasterers will not necessarily produce the best stucco, unless they have become experienced in exterior plastering and understand its requirements.



TYPES OF METAL LATH. THESE ARE NOT ALL BUT ARE SUFFICIENT TO ILLUSTRATE THE MAJOR VARIATIONS

PROTECTION OF STUCCO ADVISABLE

THE 1920 report of the Committee on Treatment of Concrete Surfaces of the American Concrete Institute states: "Successful stucco work depends in large measure upon suitable design of the structure for *stucco*. Exterior plaster of any kind merits whatever protection can legitimately be given it, and while concession must sometimes be

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made to architectural requirements, there is rarely any necessity for subjecting stucco to an exposure which it cannot reasonably be expected to withstand. Even where stucco will remain structurally sound it is sometimes wiser to use other treatment for the sake of appearance. For example, it is better not to run stucco to grade, not only because of the danger from frost action, but also to avoid staining of the stucco from dirt and moisture. For the same reason special attention should be given to details of flashing and drips, wherein a little foresight

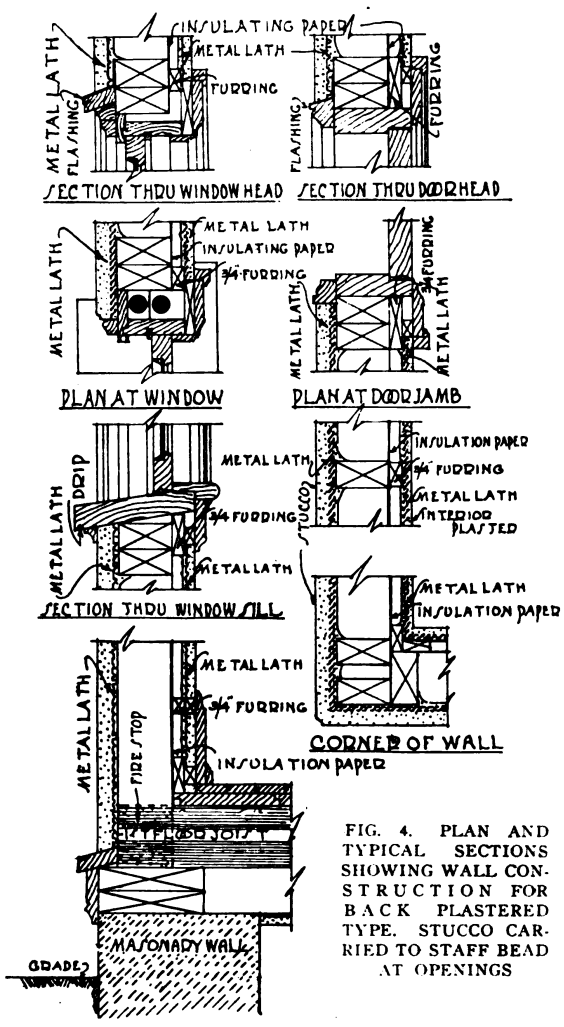

FIG. 4. PLAN AND TYPICAL SECTIONS SHOWING WALL CONSTRUCTION FOR BACK PLASTERED TYPE. STUCCO CARRIED TO STAFF BEAD AT OPENINGS

will prevent much unsightly discoloration and possibly more serious defects.

A fundamental rule in the design of a stucco structure is: "Keep water from getting behind the stucco." The architect should go even further than this and endeavor to keep any concentration of water flow from getting at the stucco at all. Real study of methods of avoiding damaging leaks and drips, and of providing properly for roof drainage will be well repaid.

METHOD OF CONSTRUCTING WOOD FRAME

AS was natural, in evolving a stucco covered frame dwelling from those with clapboard or shingle siding, the only change originally made

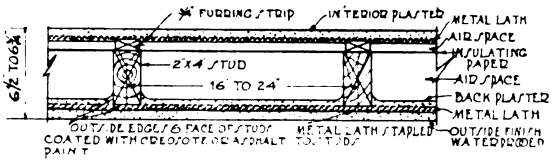

FIG. 1. BACK PLASTERED, TYPE A

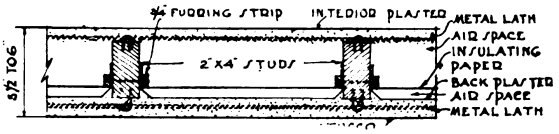

FIG. 2. BACK PLASTERED, TYPE B

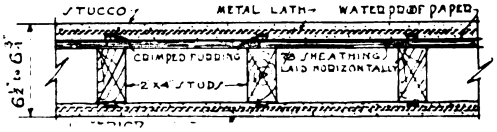

FIG. 3. STUCCO OVER WOOD SHEATHING

HORIZONTAL WALL SECTIONS

was to omit the siding, applying lath to the under-sheathing and plastering the stucco thereon. The sheathing in most cases was placed diagonally in order the better to brace the wood frame. Such construction is not good and will result in cracked stucco. When sheathing is used no reliance should be placed upon it as a bracing for the frame. The timber frame, whether or not sheathing is used, should be independently braced by installing diagonal bracing at the corners and bridging between the studs. Diagonal bracing should consist of at least 1 in. by 6 in. boards, about 6 ft. long, let into the studs so that the face of the bracing is flush with the inside face of the studs. The exact location and length of corner braces will depend to some extent on the position of window and door openings. Bridging should be provided at least once in each story height set horizontally. If back plastering is to be used the outside edge of the bridging should set back 1 in. from the face of the studs, to permit the back plaster to continue past the bridging. In such construction use 2 in. by 3 in. bridging. Studs should be at least 2 in. by 4 in. spaced 16 in. on centers, extending from foundation to rafters without any intervening horizontal members. They

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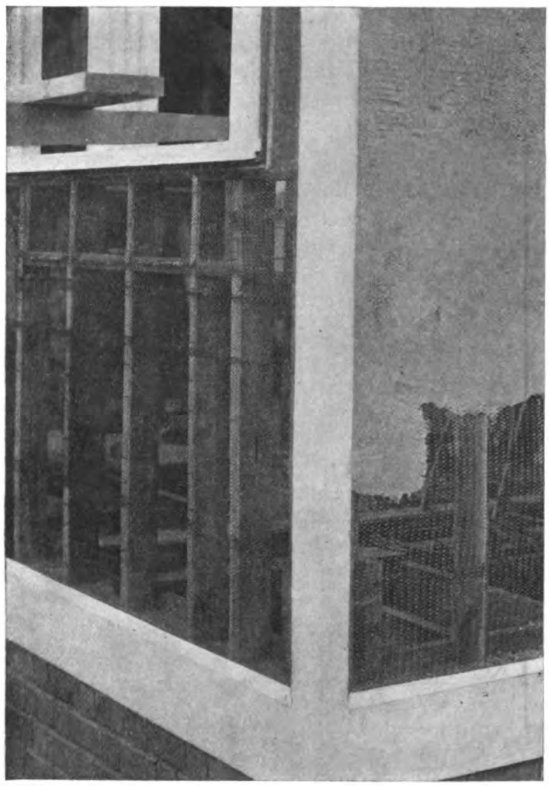


ILLUSTRATING METHOD OF APPLYING THE EXTERIOR COATS OF STUCCO

should be tied together just underneath the second floor beams by a 1 in. by 6 in. ribbon board let into the inner face of the studs and be securely nailed thereto. Floor joists, besides resting on the ribbon board, should be well spiked to the studs.

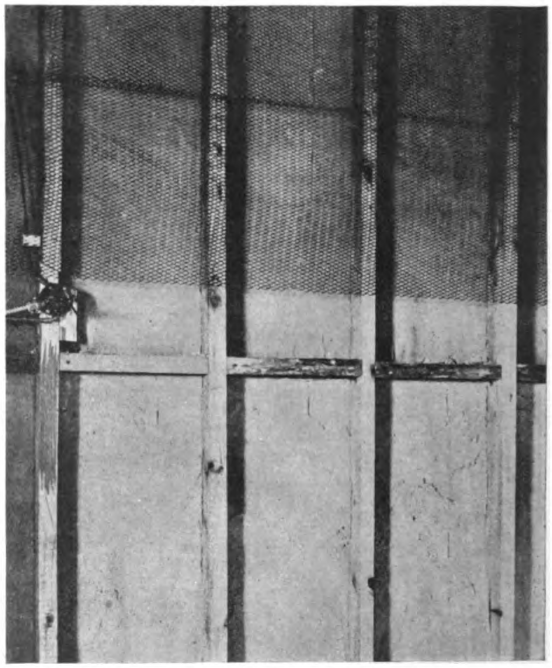
The stucco test panels erected at the Bureau of Standards in 1915 and 1916 have demonstrated conclusively that diagonal sheathing tends to crack the overlying stucco by setting up strains in the supporting frame. This result is undoubtedly due to the shrinking of the sheathing, and whatever benefit might be anticipated from the more effective bracing provided by diagonal sheathing appears to be more than offset by the shrinkage effect. Diagonal sheathing is also less economical than horizontal sheathing, both in material and labor.

THE BACK PLASTERED WALL

AFTER a careful analysis of the results observed to date of the Bureau of Standard's test panels (many of which have been exposed for five years) together with an investigation of buildings completed a sufficient length of time to afford a basis of judging results, it is safe to conclude that for stucco work no wood sheathing is required for properly braced frame walls when they are covered with metal lath, provided one coat of back plaster is applied on the inside of the lath between the studs, as shown in the accompanying illustrations. This type of construction, properly executed, is more desirable than when wood sheathing is used. It will be referred to in this article as the "Back Plastered Type." Figs. 1 and 2, page 29, show a horizontal cross section of a wall so constructed.

After the wood framework of the building, commonly called "Balloon Framing," is erected, the outside faces of the studs are sometimes coated with a waterproofing or preservative paint. While this is not objectionable, there is insufficient evidence of its value, and its elimination is recommended by the American Concrete Institute's Committee.

Applying the Lath: If a ribbed type of metal lath is used the furring is integral with the lath and no other furring is needed. However, if a uniform, non-ribbed lath is used it should be furred out ⅜ in. from the face of the studs, and permit the plaster to key behind the lath at the studs. Galvanized or painted ⅜ in. crimped furring not lighter than No. 22 gage, or some other equally good type, should be fastened directly to the studs by 1¼ in. by 14 gage fastened staples spaced 12 in. apart.



BACK PLASTER APPLIED

METAL LATH FOR INTERIOR PLASTER BEING PLACED. A COMMON BUT IMPORTANT OMISSION HAS BEEN MADE. THE INSULATING PAPER HAS BEEN LEFT OUT

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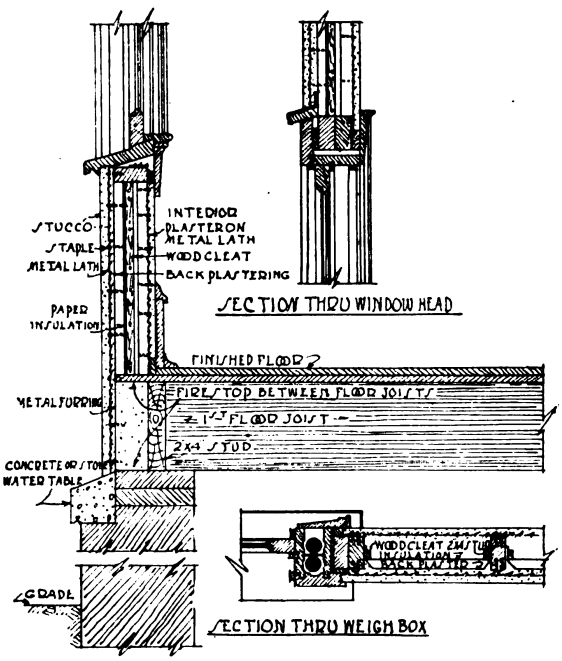
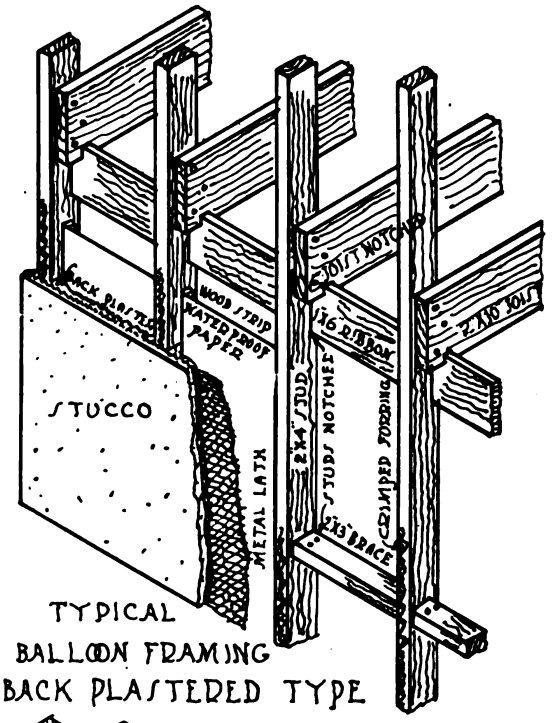


FIG. 5. DETAILS OF CONSTRUCTION FOR WINDOW OPENINGS, BACK PLASTERED TYPE WITH FLAT OUTSIDE TRIM



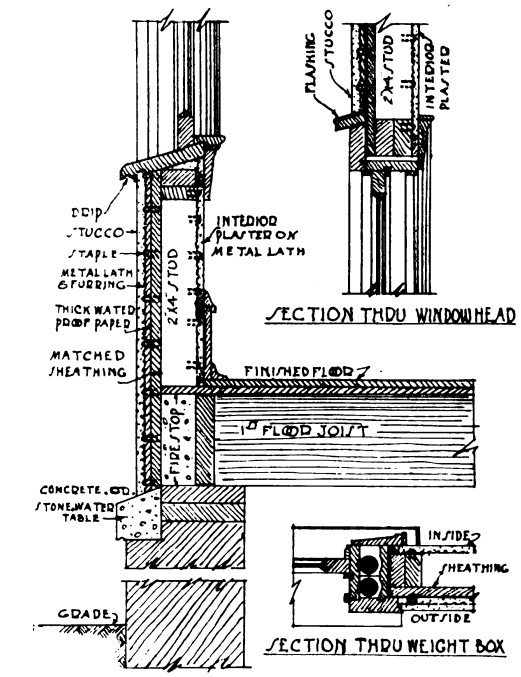


FIG. 6. DETAILS OF CONSTRUCTION AT WINDOW OPENING FOR WOOD SHEATHED TYPE

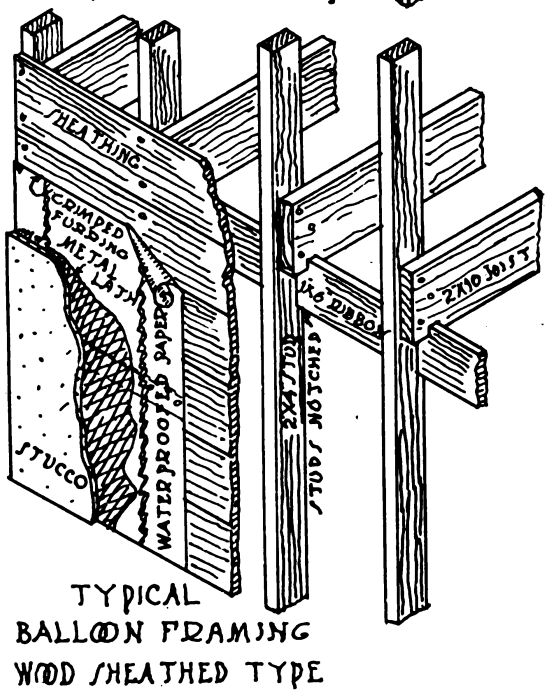


FIG. 7. PERSPECTIVE VIEWS SHOWING CORRECT METHODS OF WALL CONSTRUCTION FOR BOTH BACK PLASTERED AND WOOD SHEATHED TYPES

DETAILS FOR STUCCO ON METAL LATH CONSTRUCTION

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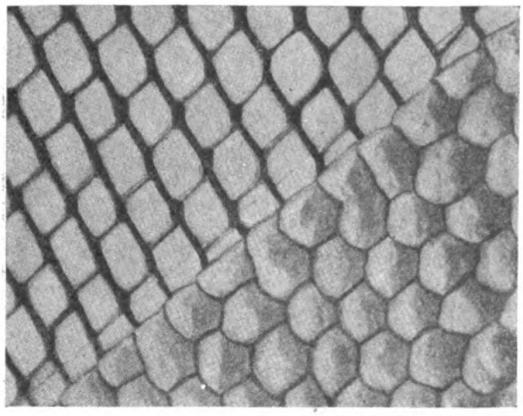
Metal lath should be specified by weight rather than by gage. It should be galvanized or painted expanded lath, weighing not less than 3.4 lbs. per square yard. When back plastering is used, painted lath is entirely satisfactory.

Wire lath should be galvanized or painted woven



ENLARGED VIEW SHOWING KEYING OF PLASTER ON THE METAL LATH

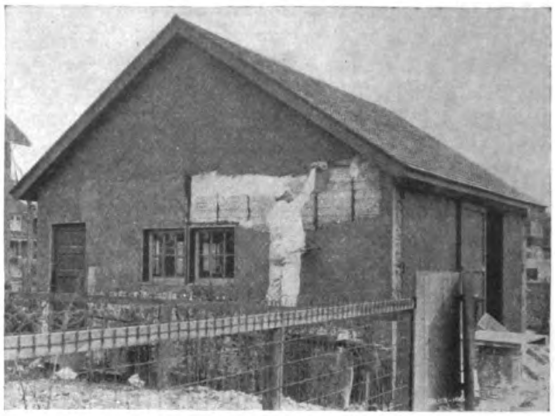
wire lath, not lighter than 19 gage with 2½ meshes to the inch, provided with stiffeners 8 in. on centers.

The lath should be placed horizontally and fastened to the studs by 1¼ in. by 14 gage staples not more than 8 in. apart, driven over the furring or stiffeners.

In placing metal lath the method of fastening adjoining sections is important. Unless proper connections are made such junctions constitute a weak point and are likely to be the cause of cracks developing later. Horizontal joints can best be made by butting the lath and tightly lacing with 19 gage galvanized wire, drawing the lath taut. This method is preferable to lapping. Where ribbed lath is used, carefully locked horizontal joints should be specified. Vertical joints should always be made at studs, where the lath can be lapped and well stapled at intervals of not over 4 in. Joints should not occur at corners, but the sheets of metal lath should be folded around the corners for a distance of at least 3 in. and stapled down. It is not advisable to use corner beads. The stucco can be rounded at the corners to avoid sharp edges. To secure the best results the corner posts of the timber frame should be chamfered, otherwise the thickness of the stucco at the corners will be reduced and this will constitute a weak point.

Plastering: After the application of the lath in the manner specified the work of plastering the stucco over coating should begin. The back plaster may be applied at any time after the first or scratch coat of stucco has been placed. Sometimes the back plastering is done first, and the material which is forced through the lath acts as a scratch coat for the exterior coats of stucco. By applying one coat of back plaster and from two to three coats of stucco the metal lath is placed in the interior of the stucco, where it rightly belongs; thus the stucco really becomes a reinforced artificial stone slab 1½ in thick, and as such presents an effective, durable and fire-resisting exterior wall surface.

Heat Insulation: One requirement for a dwelling is that the walls provide insulation against the elements. The house should retain the heat in Winter and prevent heat penetration during the Summer. This can be accomplished in the back-plastered type of stucco building by providing a membrane of insulating weatherproof paper, of which there are



STUCCO GARAGE OF BACK PLASTERED TYPE. IN THIS INSTANCE THE BACK PLASTER WAS APPLIED BEFORE THE EXTERIOR COATS

many good makes on the market, applied in the manner shown in either Fig. 1 or Fig. 2. The method shown in Fig. 1 is probably the easier of application. After the back plaster has set the insulating paper is fastened to the inside of the studs and held in place by furring strips. This provides a 3½ in. air space between the stucco and the paper, and a ½ to ¾ in. air space between the paper and the interior plaster.

The method of construction shown in Fig. 2 also provides a double air space, the insulating paper being held in place by cleats nailed to the sides of the studs. This permits the walls to be finished slightly thinner than for the method illustrated in Fig. 1. The construction is clearly shown in the upper drawing of Fig. 7.

Recent tests on the heat insulating value of stucco walls have shown that ordinary building paper laid double gives even better results than a single layer

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of more expensive paper. It is strongly recommended that the interior plastering be done on metal lath since it materially increases the fire resistance of the building and provides a better construction. If, however, it is not possible to do this, wood lath may be substituted in the construction details shown. In any case, the space between the studs for the depth of the floor beams should always be filled with incombustible material, such as brick, concrete, gypsum blocks, etc., to provide an adequate fire stop. A frame building stuccoed as described plastered on wire lath in the interior and fire stopped between beams is a safe structure from a fire hazard standpoint.

Several of the accompanying photographs show the method of application of both the stucco and back plastering.

A report by the United States Bureau of Standards on the test panels under observation states:

The four metal lath panels comprising Group III, constructed with metal lath attached to studs without sheathing, and lath back plastered, were all rated "Fair" or better. In other words, the back plastered metal lath without sheathing has the full 100 per cent rating the same as monolithic concrete and brick. Of this type of metal lath construction is Panel No. 15, the panel which has received a rating of "Excellent" in all inspections.

WOOD SHEATHED TYPE

WHERE it is desired to use wood sheathing in preference to the back plastered type, the method of construction should be as illustrated in Fig. 3 and the lower drawing of Fig. 7. As already stated, the sheathing should be placed *horizontally* and not diagonally, and the wood frame well braced. The sheathing boards should not be narrower than 6 in. nor wider than 8 in., dressed on one or both sides to a finished thickness of ⅞ in. In nailing the sheathing to the studs at least two 8d. nails should be used at each stud. Bridging is desirable, but may be dispensed with without serious detriment to the construction.

Directly over the sheathing boards a substantial waterproof paper impregnated with tar or asphalt should be applied in horizontal layers, beginning at the bottom and working upward. The bottom strip should lap over the baseboard, where one is used, while each succeeding strip should lap the one below by at least 2 in. The paper should lap the flashings at all openings.

Over the waterproof paper and directly along the line of the studs, ⅜ in. metal furring strips, composed of either galvanized or painted 22 gage or heavier metal, should be fastened by 1¼ by 14 gage staples, spaced not over 12 in. apart. This depth of furring should be maintained around curved surfaces and at openings, the furring being placed from 1½ in. to 4 in. on either side of as well as above and below the opening. The metal lath should be attached to the studding as described for the back plastered type.

The method of construction around openings is shown for both types in the accompanying detail drawings, Figs. 4, 5 and 6. In some instances it will be desirable to provide exterior flat trim at the openings, while in others the appearance of the building will be improved by omitting this and bringing the stucco to the staff bead and drip cap. Both methods are shown.

In addition proper foundations and the use of well seasoned timber are essential to obtain satisfactory results.

Brick, stone, tile or concrete foundation walls should always be carried up well above the grade level.

If stucco houses are worth building at all they should be worth building well.

The houses shown in the following article are constructed with walls of stucco on wire lath. Their excellent condition after many years' service testifies to the durability of this type of construction.

Own Your Home

(*Concluded from page 21*)

his judgment warrants him in assuming the obligations that accompany home ownership, the burden will each year become lessened and easier to bear.

The end to be attained is one of the highest privileges of citizenship and the knowledge that none of the hazards of our daily lives, which might remove the head of the house, will deprive those that are left of a home and an opportunity for self support.

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VIEW LOOKING SOUTH, OAK COURT TERRACE DEVELOPMENT

Development at Bronxville, N. Y.

BATES & HOW, *Architects*

Oak Court Terrace Provides Attractive Stucco Houses

TO-DAY more than ever before, attention must be given to attractive block planning. Instead of promiscuously placing a dozen or more houses upon a vacant piece of property, it is necessary to give careful consideration to their spacing and their inter-relation in order to produce an attractive housing scheme.

The location of such residences must be worked out so as to provide ample light, air and ventilation.

In the March issue of BUILDING AGE several attractive and well-planned bungalow courts were described and illustrated. These have proven of such great interest, as has been manifested from the numerous letters which are still coming in, that a subsequent article will be published showing additional types of houses and arrangements for such courts. That many bungalow courts will be constructed in the East as well as the West, where they originated, is evident. But the two and three-story cottage will still be built in large numbers, both detached, semi-detached and in rows, and the scheme here shown is one possessing considerable merit. The plan and layout of the ten residences of the Oak Court Terrace development at Bronxville, New York, completed some few years ago, are worthy of careful and intelligent study.



VIEW LOOKING NORTH,
OAK COURT TERRACE DEVELOPMENT

The corner houses each accommodate two families—a central wall dividing the sections, each family thus receiving light on three sides. The central group, accommodating six families, is set back a sufficient distance from the building line to provide an attractive front court yard. By this arrangement, as will be noted from the plan, one side of the corner houses as well as the front of the central group face the court yard. The two end sections of the central group have light on three sides, while the four middle sections receive light only at the front and rear. However, since these sections are but two rooms deep, and the windows large, all rooms located therein are well lighted and have adequate ventilation.

Each residence contains sufficient rooms for comfortably housing the average size family, the rooms

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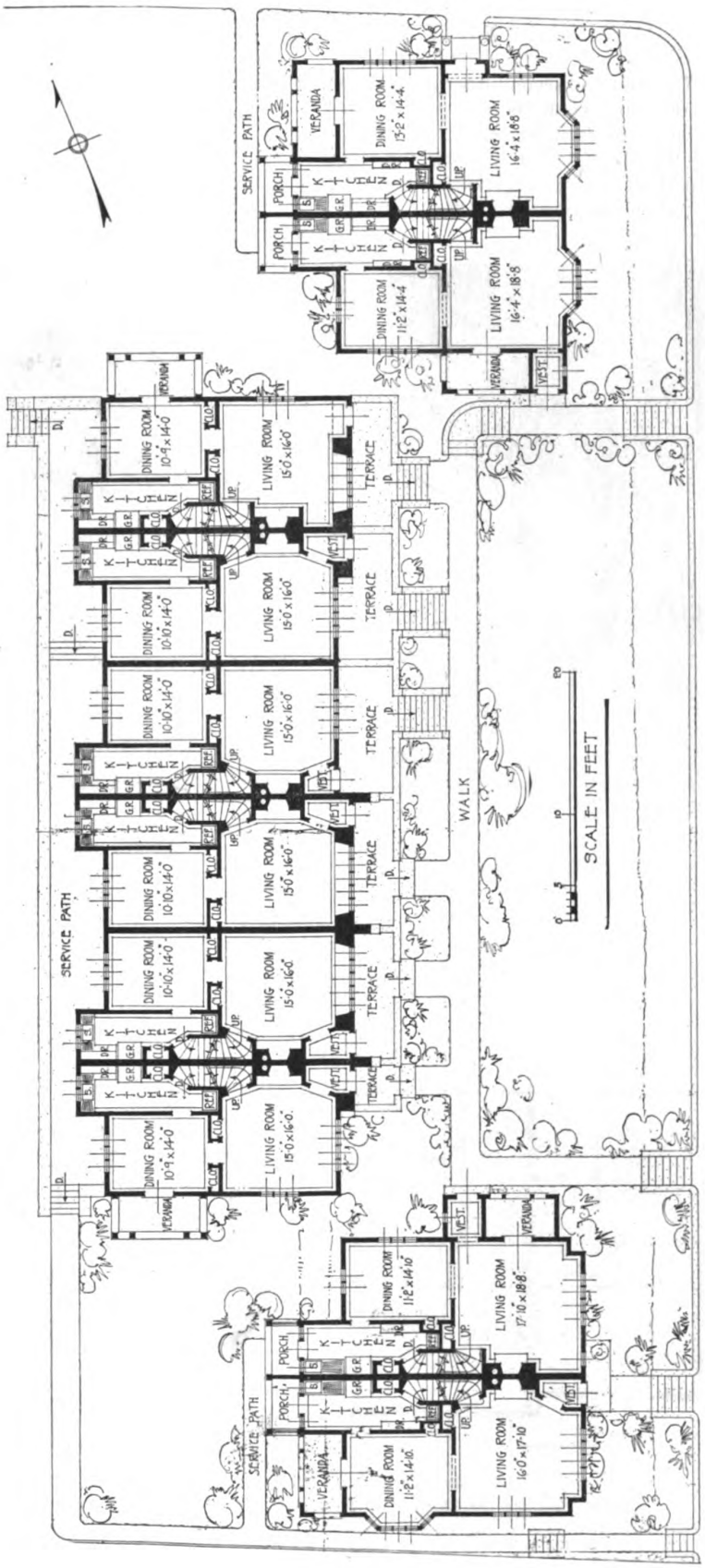

FIRST FLOOR PLANS, OAK COURT TERRACE COTTAGES, BRONXVILLE, NEW YORK

BATES & HOW, *ARCHITECTS*

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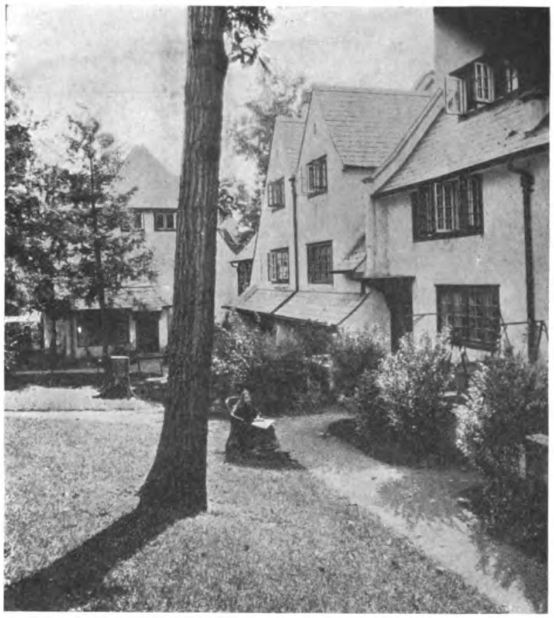
being of ample size. The first and second floor plans are here shown. In addition several rooms are also provided in the third story of each house.

An attractive walk has been laid out along the front and a service path at the rear. The absence of fences, hedges or other dividing obstructions is one of the attractive features, and could be incorporated to advantage in similar housing developments. The architects for this development were Bates and How, of New York City.

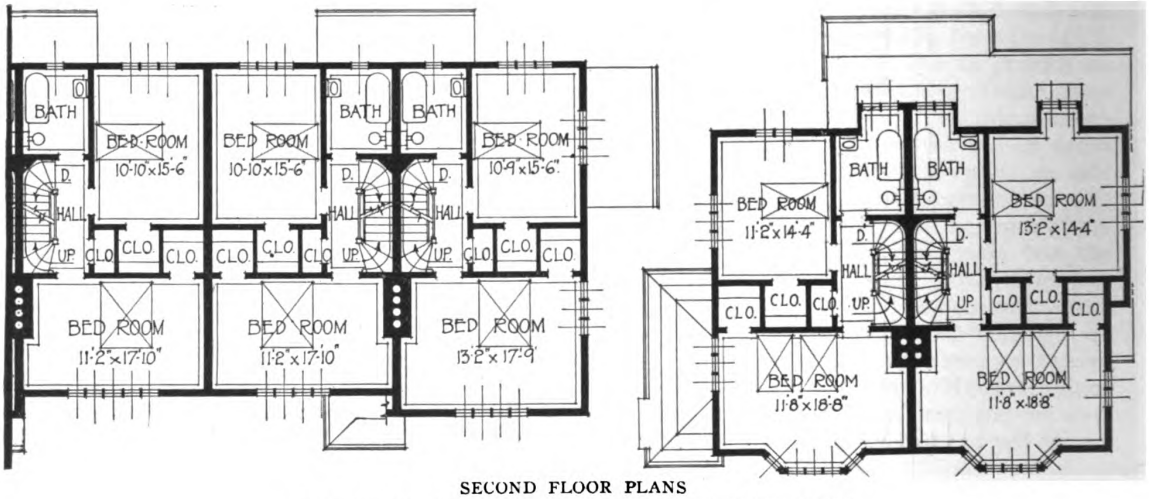
BUILDING AGE stands for building better homes, whether of the bungalow, cottage or multi-family type. In a subsequent issue an article illustrating some of the most attractive arrangements for the multi-family (often termed tenement) type of housing will be published.



VIEW IN FRONT COURTYARD



SEMI-DETACHED TWO-FAMILY HOUSE AT NORTHERLY END



SECOND FLOOR PLANS

OAK COURT TERRACE, BRONXVILLE, NEW YORK

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SEMI-DETACHED TWO-FAMILY HOUSE AT SOUTHERLY END, OAK COURT TERRACE, BRONXVILLE, N. Y. BATES & HOW, *ARCHITECTS*. NOTE FIRE WALL DIVIDING THE TWO SECTIONS, WHICH EXTENDS ABOVE ROOF IN BACK OF CHIMNEY

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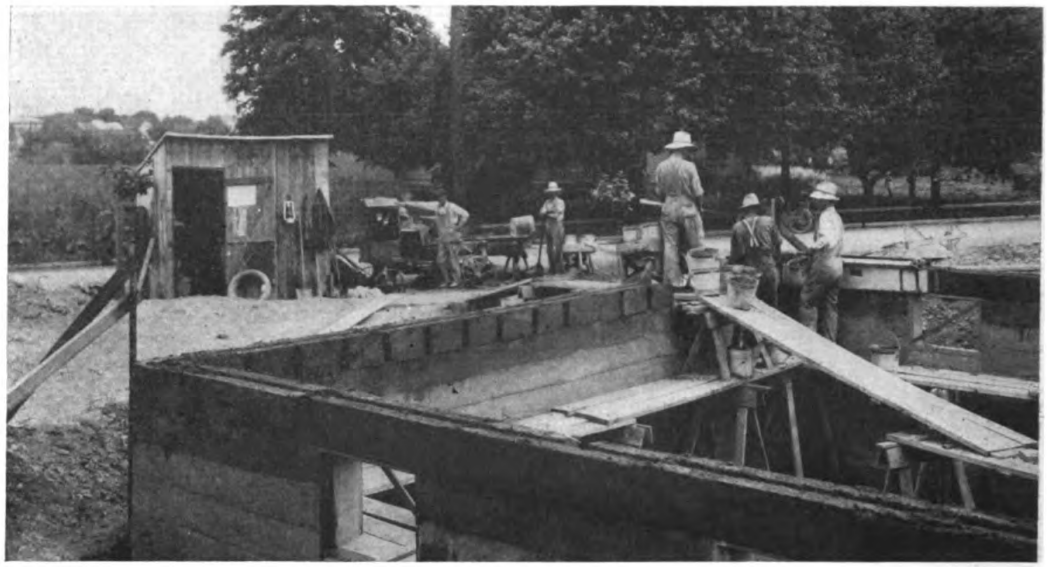

A DOUBLE-WALLED RESIDENCE IN COURSE OF CONSTRUCTION MOLDING MACHINE SHOWN IN POSITION ON FAR WALL. NOTE NECESSARY EQUIPMENT, CONSISTING OF WHEELBARROWS, PAILS, SHOVELS, MIXER AND WATER BARREL. ANGLE IRON GUIDE CAN BE SEEN AT CORNER OF WALL

A Type of Double-Walled Concrete Construction Suitable for Small Homes

DURING recent years many new types of construction, adaptable for the home of moderate cost, have made their appearance. Concrete has come into increasing prominence as a suitable material for such purpose, and numerous systems have been developed. From time to time those which possess merit will be featured in BUILDING AGE. This article will deal with a type of double-walled concrete construction built by what are known as Van Guilder machines, and commonly termed the Van Guilder system.

The machine—so called—is simply a double mold, without either bottom or ends. In erecting a building by this method the footings are placed in the usual manner, after which angle iron guides are set up at the corners to maintain the perpendicular. In starting the wall the machine is placed on the footing, starting at one corner, the two sides are filled and tamped with concrete mixed to a stiff consistency so as to allow the immediate release of the mold, which is then pushed ahead ready for filling and tamping on the next section of wall. Each such operation completes a tier of the wall approximately 9 inches high and 5 feet long. This wall consists of an outer and inner shell or slab, each 4 inches thick and separated by a 2½ inch air space. The only physical connection between these shells is made by galvanized iron wire ties placed at short intervals in each course. The operation of filling, tamping and sliding ahead is repeated until a complete circuit is made, after which the next tier is started.

An average day's work will produce four tiers, thus from three to four working days are required to complete a story. Sills are cast in place. The machine works directly up to window or door frames. Due to the complete insulation afforded by the 2½ inch dead air space, plastering is done directly on the inner wall, while the exterior surface is stuccoed, one coat work usually being adequate.

One of the features is the method of providing for the placing of floor joists. Small beveled wooden blocks or inserts are used in the inner wall

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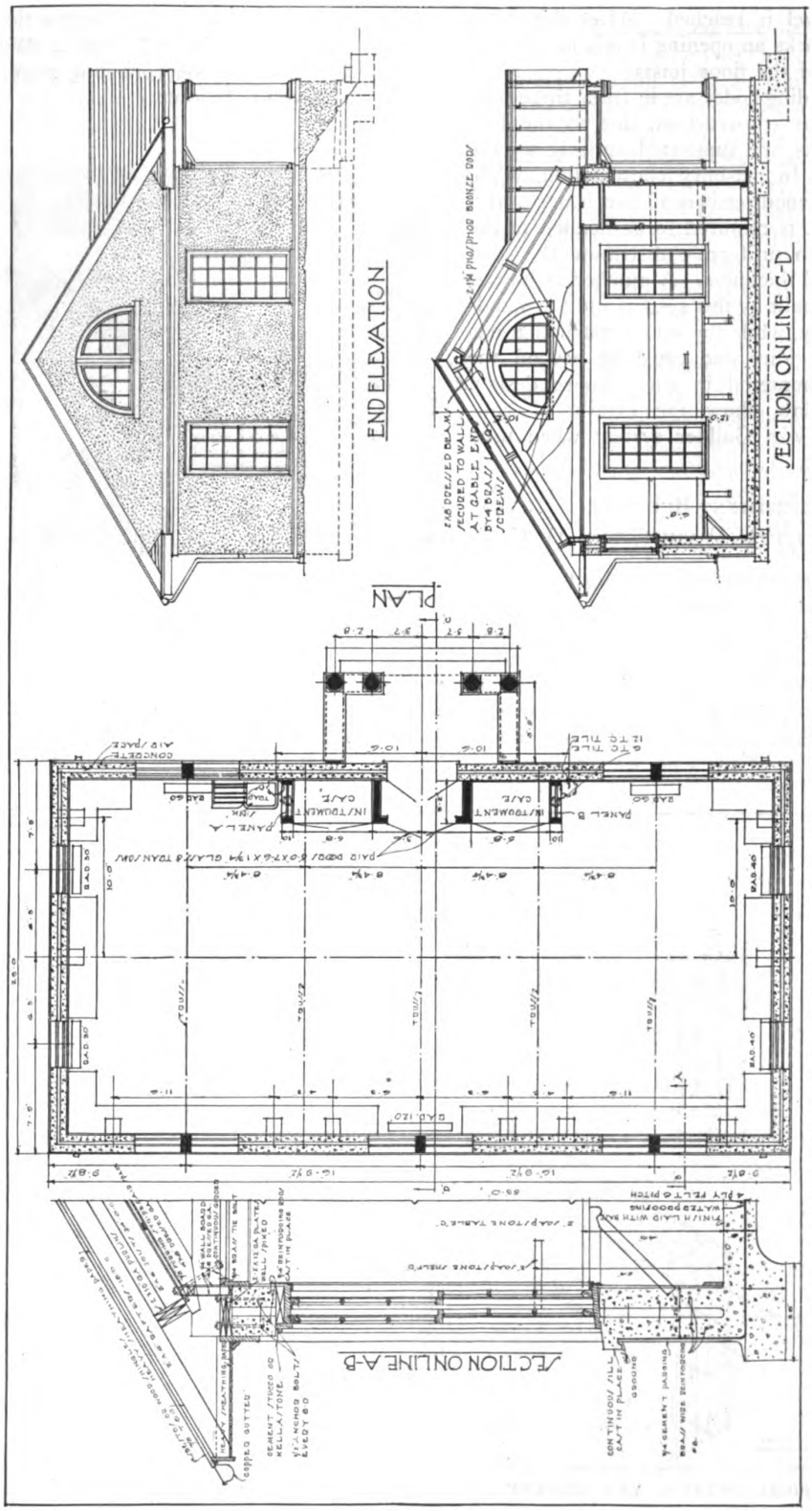

PLAN, ELEVATION AND SECTIONS, CARNEGIE INSTITUTE BUILDING, DEPARTMENT OF RESEARCH IN TERRESTRIAL MAGNETISM, 36TH STREET AND BROAD BRANCH ROAD, WASHINGTON, D. C.

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when the floor level is reached. After the withdrawal of these blocks an opening is left in the wall for the insertion of the floor joists.

Where rigid building codes are in force there may be objection to this construction, due to the fact that the floor joists are supported entirely on the inner 4 in. wall. In masonry construction, while a 4 in. bearing for wood joists is all that is necessary, yet this inner 4 in. is required to be bonded to the rest of the wall to uniformly distribute the load over the entire wall thickness. A number of houses have already been built by this system and are standing up satisfactorily, while the wall construction has been tested for rigidity and crushing beyond the loads usually encountered in small house design. The drawings below show the details of construction for the Van Guilder system when used for residence work.

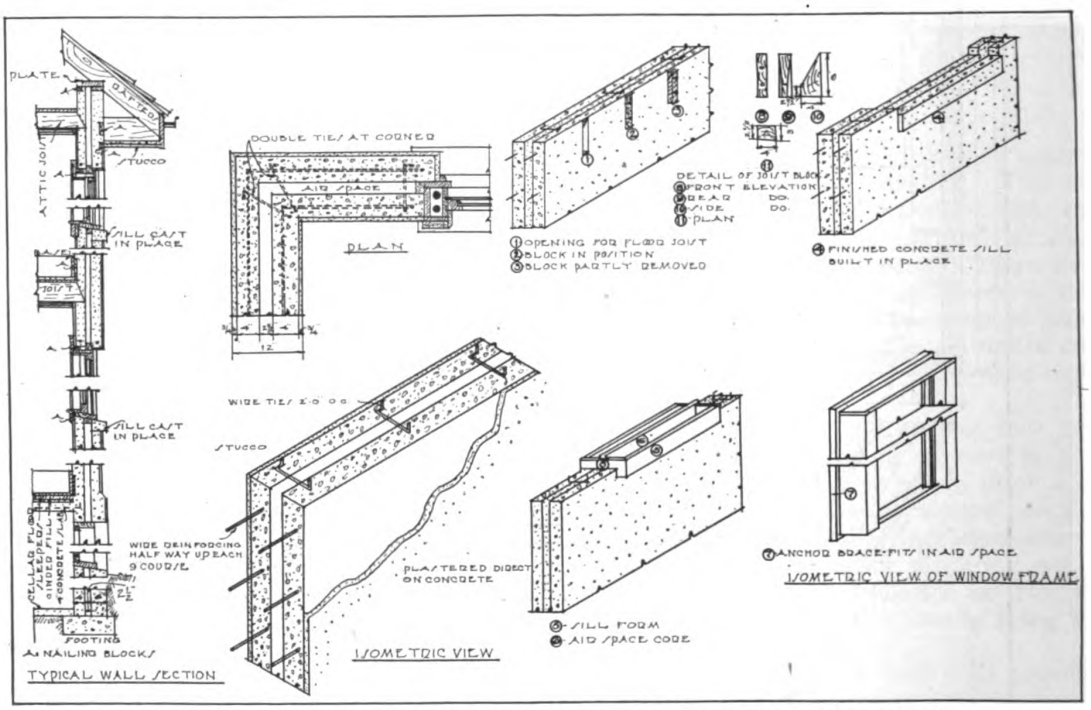
The Experiment Building, Carnegie Institute, Washington, D. C.

THE construction just described has been made use of in an interesting building just completed, to be occupied as the Experiment Building, Department of Terrestrial Magnetism, Carnegie Institute of Washington. Because of its peculiar use, special construction throughout was used; for instance, no steel or iron nails, or for that matter no iron or steel of any kind, was made use of. Perhaps the best idea of the construction of this unique structure can be had from a study of the plans, reproduced on the following page, and the specifications which follow:



CARNEGIE INSTITUTE BUILDING, WASHINGTON, D. C.
DOUBLE-WALLED CONCRETE CONSTRUCTION

Concrete.—All concrete to be one part first-class Portland cement, two parts clean, sharp, coarse sand, and four parts clean gravel (1½-inch and smaller for foundations and 1-inch and smaller for



TYPICAL DETAILS, VAN GUILDER DOUBLE-WALLED CONCRETE CONSTRUCTION

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walls). All walls to be cast in place using the Van Guilder hollow-wall machine. All reinforcing and ties between walls to be brass wire or rod as indicated. Lintels and sills to be cast in place in wood forms. Top dressing of floor 1-inch thick to be of one part cement to two and one-half parts clean, sharp sand, and to be placed before bed sets. All walls in contact with earth to be smoothly parged ⅝-inch thick with cement mortar made of one part fresh cement, 10 per cent hydrated lime paste, and three parts of clean "down-river" sand.

Waterproofing.—Floor and exterior walls below grade as shown to be waterproofed with four layers felt and pitch, allowing 6 inches lap on every joint A "waster" is to be placed to keep extension from floor clean and dry until the wall waterproofing is attached.

Plaster.—First coat one part "ivory" cement to not more than two parts down-river sand; rough sand finish to be made to ¾-inch grounds.

Stucco.—First coat ¾-inch thick to be of one part cement to two parts down-river sand floated up true and even and scratched for next coat; when set to be covered with mortar made of fresh burned lime, cement, and sand of proportions to be selected from different test samples and stippled to true finish with short cloth-covered board. All stucco must be kept thoroughly wet with hose for one week after applying and must be protected from wind and sun by canvas. In case "Kellastone" is used it is to be applied in accordance with the printed specifications of the manufacturer. Lathing, where needed, must be of wood nailed with copper nails.

Lumber.—Structural wood work, nailing blocks, furring strips, tongue-and-groove stuff for overhang, etc., must be of No. 1 well-seasoned Georgia pine. Tongue-and-groove stuff for roof sheathing to be well-seasoned Virginia pine.

Millwork.—All sash and doors to be of white pine 1¾-inch thick. Window and door frames outside wood sills to be of No. 1 well-seasoned Georgia pine. Hook rail to be of oak. All other interior trim to be No. 1 poplar. All metal fastenings and sash pulleys must be of copper or brass. All sash and doors to be glazed with AA double-thick glass (zinc points to be used). No shutters are to be provided.

Hardware.—All metals used must be non-magnetic brass, copper, zinc, or lead, including nails, lag-screws, wood screws, pipes (to all points within 40 feet of the outside of building), locks, lifts, sash weights, etc. Rabbeted-face locks and flush bolts to be provided for the two entrance doors.

Plumbing.—Sink to be vitreous, as indicated, with 1½-inch waste to connect with sewer at main building and to be properly vented. Down-spouts to be connected to salt-glazed terra-cotta tile as shown to grade at culvert. Cold-water, hot-water, gas, and compressed-air mains from main building are to be 1-inch, 1-inch, 1½-inch, and 1-inch respectively.

Electric Work.—Wiring and conduits for alternating-current and direct-current from main building are to be as shown by sheets 5, 6 and 7. Telephone circuit to be provided for connection to main building rooms 201, 207, 301.

Heating.—Low-pressure, single pipe return system from "Ideal" cast-iron boiler in main building basement room 0022 (another section to be added to boiler). Three-and-one-half-inch main to be laid in 8-inch salt-glazed terra-cotta tile laid with oakum and cement joints with suitable expansion arrangements and packed around loosely with mineral wood. All radiation and piping within 40 feet of the experiment building to be copper or brass.

Roofing.—To be of cypress shingles (or asbestos) laid over tongue-and-groove sheathing and sheathing paper. All down-spouts, gutters and flashings to be of 14 oz. copper.

It will be noted from the drawings that in this building the outer and inner walls were made 6 inches thick instead of the usual 4 inches.

Our Cover Design

The attractive cover design of this issue is a reproduction from a photograph of a house at Fieldston, New York City, designed by Mr. Dwight James Baum.

This design is particularly fitting for an Own Your Home issue, as it represents a type of house and a locality that are typical of the home in its most perfect form. Fieldston lies along the banks of the Hudson River, directly west from Van Cortlandt Park. It is a locality not well known even to dwellers in New York. Its sylvan beauties are alike attractive as is that long stretch of country on the banks of the Hudson, of which Fieldston may be said to be the southern boundary. Here the men who want to find havens of rest from the restlessness of city life have through the guidance of their architects erected houses that are in the truest sense homes. It is for these reasons that this well designed and placed house has been selected as a cover for this Own Your Home issue.

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ITALIAN TYPE

Architectural Styles or Types for Small Houses

By KENNETH W. DALZELL

THAT architectural types are as adaptable to small houses as to large ones has been proven by the many examples set forth during the past few years. Of course some styles are more adaptable than others. The New England Colonial houses, the Dutch Colonial, and the English cottages undoubtedly furnish the most adaptable examples, the French, Spanish and Italian being the least so.

All architecture is based upon some precedent modified to present-day needs. And the best of the modern houses of to-day are no exception. To reproduce the old house is neither practical nor desirable, but they furnish admirable inspiration for the design of our modern houses.

The little New England Colonial house illustrated is a fair example of the small Colonial house. The porch is larger, the second floor ceilings, or at least the eaves, are higher than was customary in the old houses. This house also has a room and bath on the third floor.

The design of the Dutch Colonial house illustrated was suggested by an old Dutch house in the vicinity of Hackensack, N. J., a section in which there are many examples of this type of house. The plan, of course, is quite different, the garage and breakfast porch taking the place of the kitchen addition and woodshed of the old house. The sun porch and sleeping porch are also modern developments. The garage is of 12" hollow tile with reinforced concrete and hollow tile ceiling; a self-closing fire door connects it with the house. The increase in insurance rate is very nominal.

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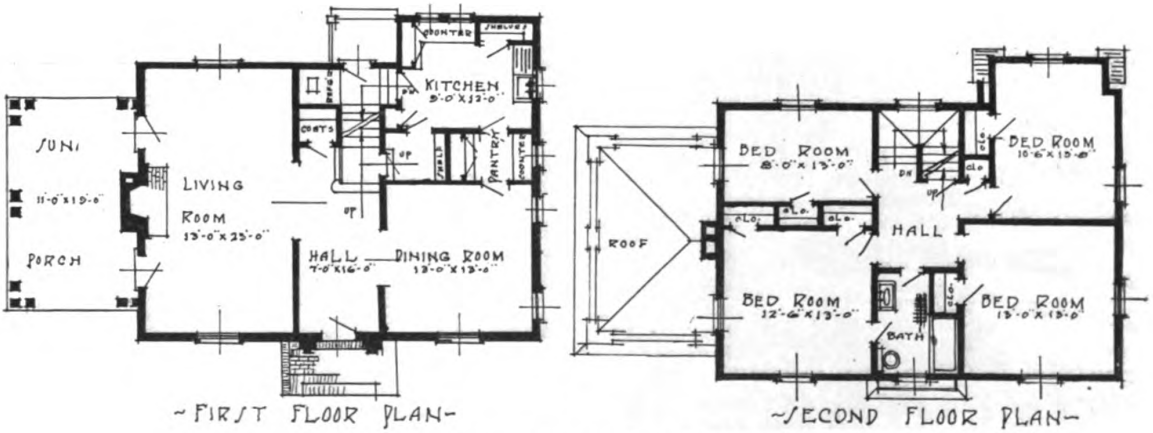

~FIRST FLOOR PLAN~ ~SECOND FLOOR PLAN~

NEW ENGLAND COLONIAL TYPE

KENNETH W. DALZELL, *ARCHITECT*

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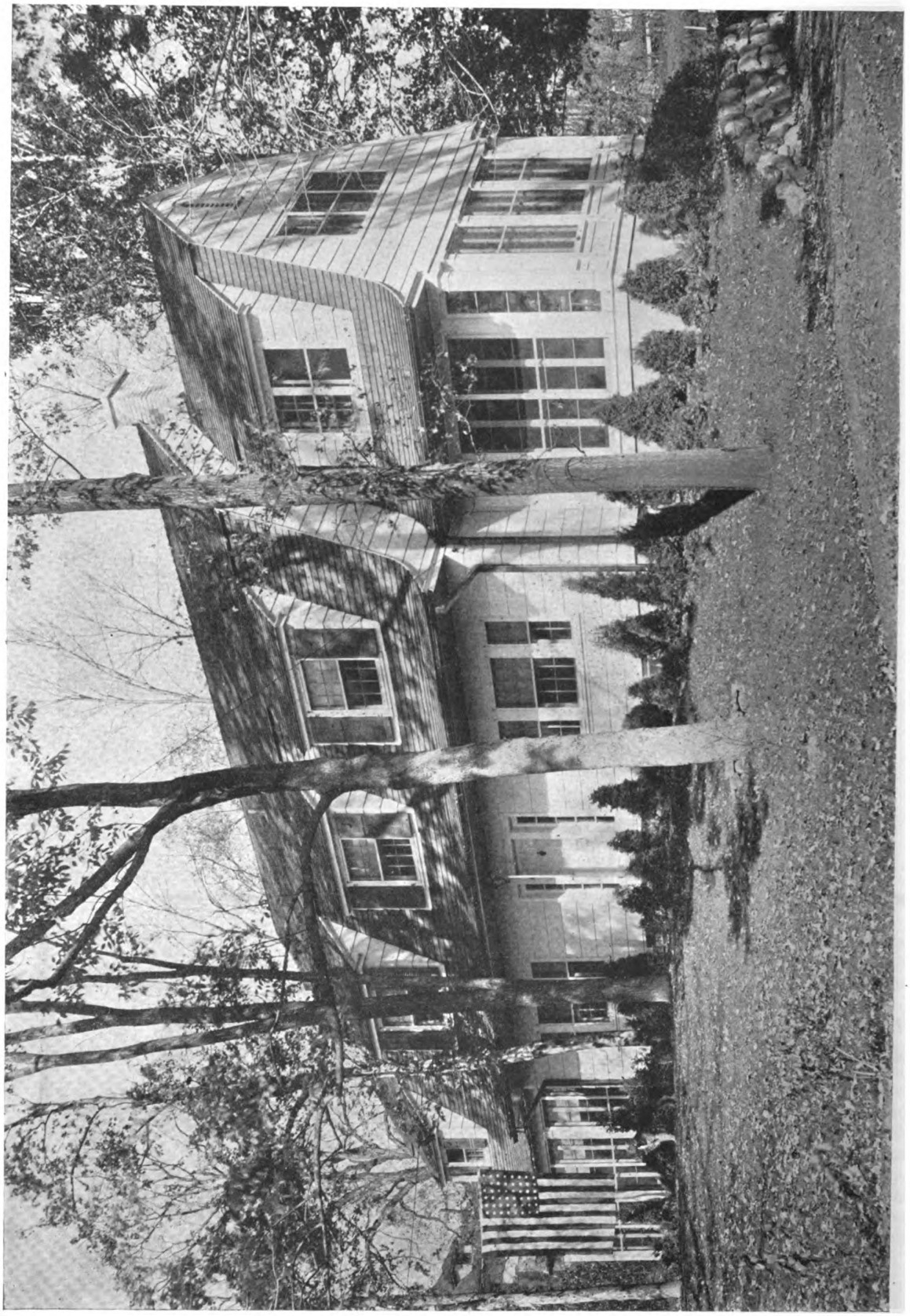

DUTCH COLONIAL TYPE

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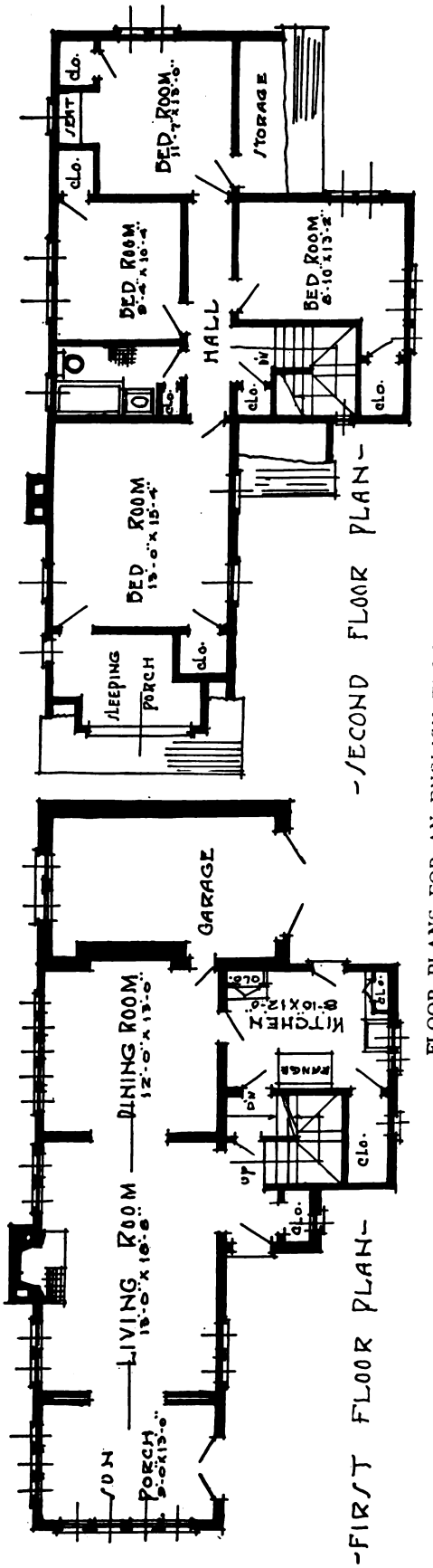
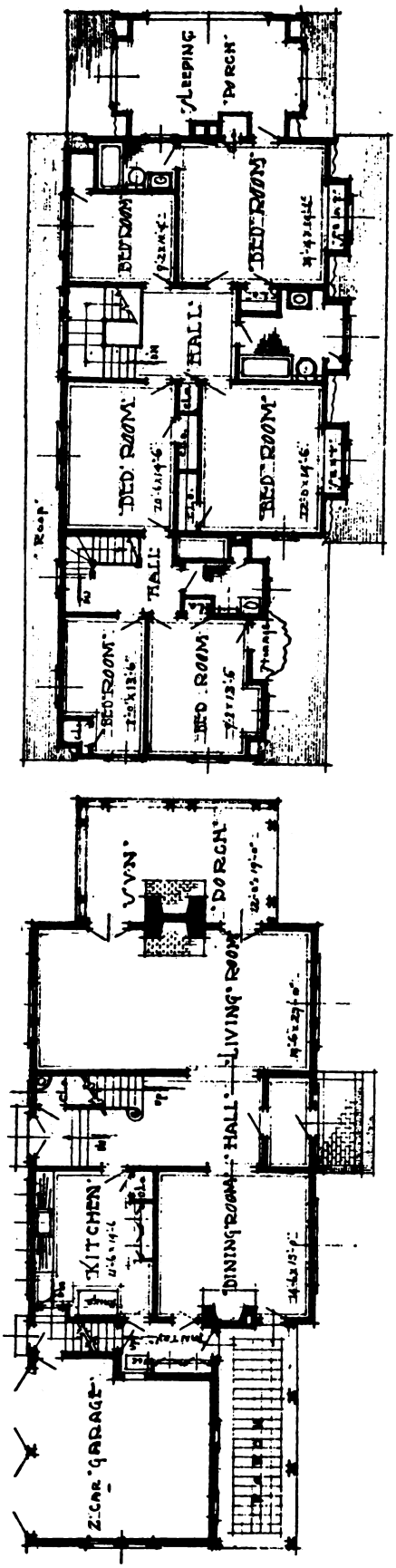


FLOOR PLANS FOR AN ENGLISH TYPE OF HOUSE



FLOOR PLANS FOR A DUTCH COLONIAL TYPE

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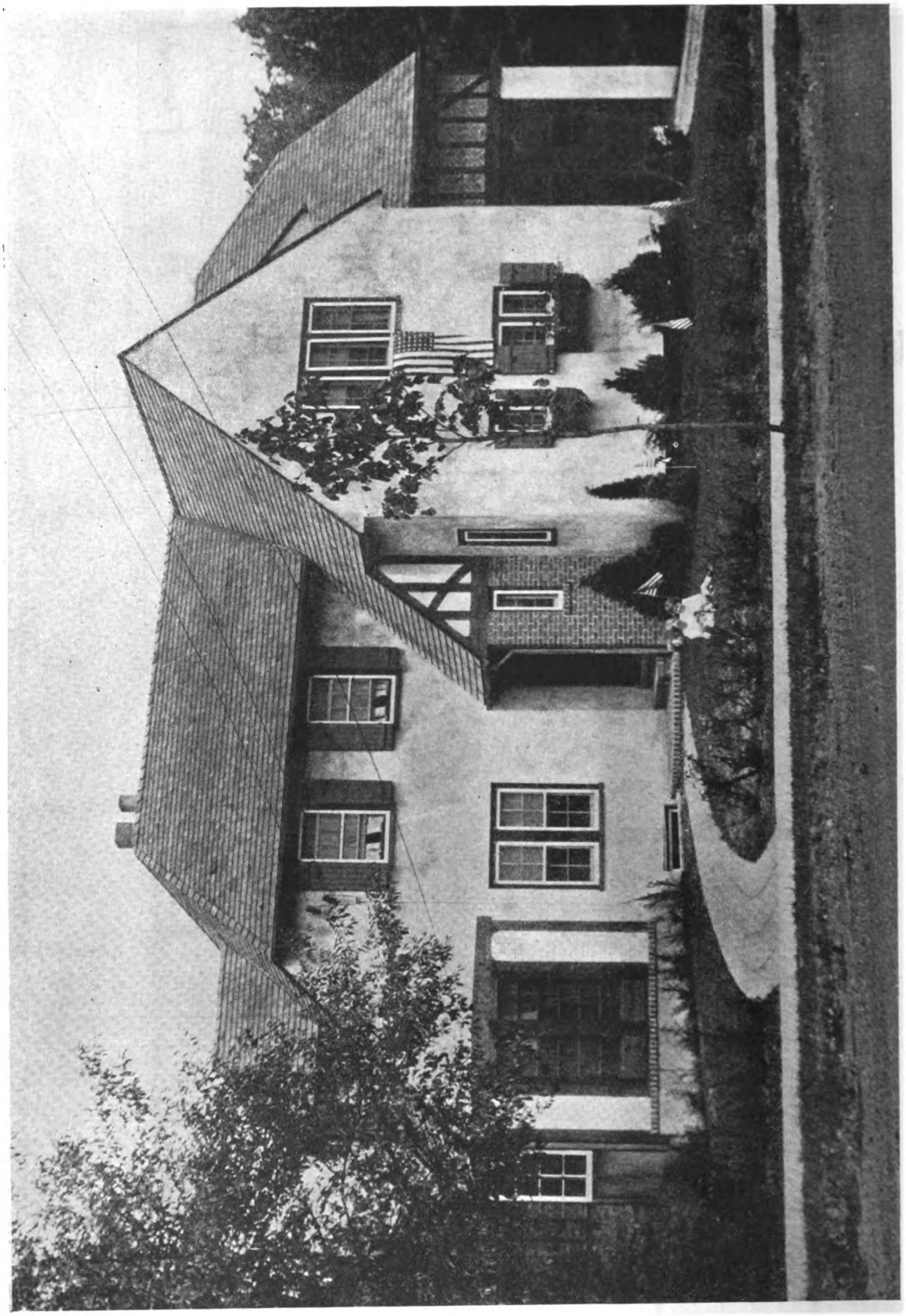

ENGLISH TYPE OF HOUSE

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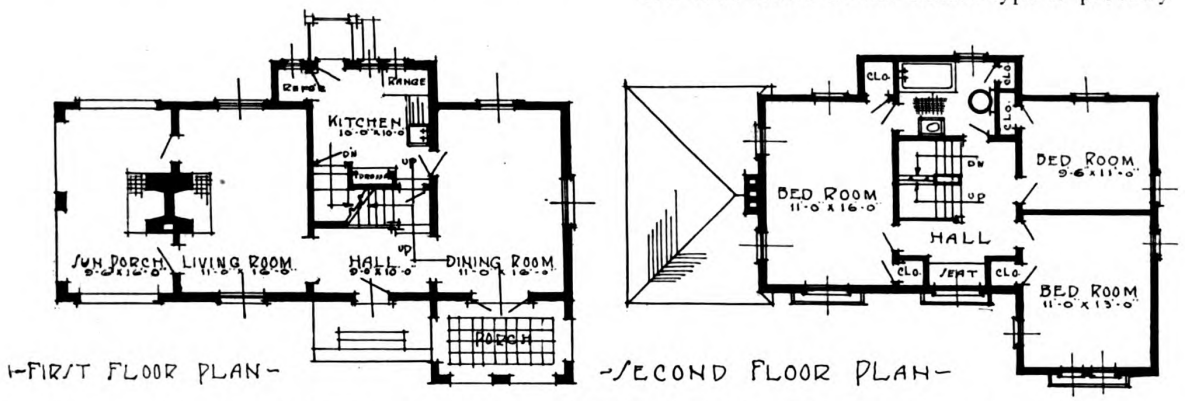
There are many advantages in this type of construction. The ease of heating and lighting and the convenience of being able to get to the garage in bad weather without going out of doors warrant it if nothing else. The greatest factor in its favor is the greatly improved appearance of the property by having the garage incorporated in the design of the main building. It makes a larger appearing house and eliminates otherwise often unsightly outbuildings, leaving the entire rear of the property for gardens and lawns with unobstructed views.

The house of English type is a modern adaptation of that character. It is more that it has the feeling of the English cottage than that it is a reproduction or copy of an old English house. From my observations, the people who like a house of this type like it very much; the others do not like it at all. I like it. It is comfortable and homelike, requires no elaborate details, can and should be furnished modestly. It makes a very livable house, and the plan can be almost anything one wishes.

The little house of the Italian type is probably less like the small Italian houses than the others are like their prototypes. It is more of an Italian villa greatly reduced in size. The arches, circle head doorway, tile work, over-hanging eaves, and white stucco are the principal characteristics, although many Italian houses have the narrower classical cornice. It is especially good for seashore or summer home.



FLOOR PLANS FOR ITALIAN TYPE HOUSE ILLUSTRATED ON PRECEDING PAGE

Salvation Army Makes Annual Home Service Appeal



The Salvation Army is to make its annual Home Service Appeal from May 10 to May 20. As a result of this effort it hopes to secure the funds for its work for the coming year. New methods have come in the army and the famous tambourine has passed away as a means of providing for the vast work carried on. Funds subscribed in this Home Service Appeal will be used largely in the locality where they are given to carry forward the work of providing assistance for the needy. With it will be maintained free coal, ice and food distribution, homes and refuges, and the vital relief work of all kinds for which the Army is famous.

Personals

Mr. Joseph H. Lecour has been elected treasurer of the Mitchell-Rand Manufacturing Company, New York City, manufacturer of structural paints, varnish, waterproofing compounds, etc., succeeding Mr. W. E. G. Mitchell in this capacity, who will now devote his entire attention to his duties as vice-president of the company.

* * * * *

Mr. W. R. Hill, for twenty-two years manager of builders' hardware sales for the Yale & Towne Manufacturing Company, of Stamford, Conn., has resigned his position with that company on March 1st to take up the work of director of sales for the Isko Company, of Chicago, Ill., manufacturers of electrically driven and automatically controlled refrigerating machines for domestic and commercial use.

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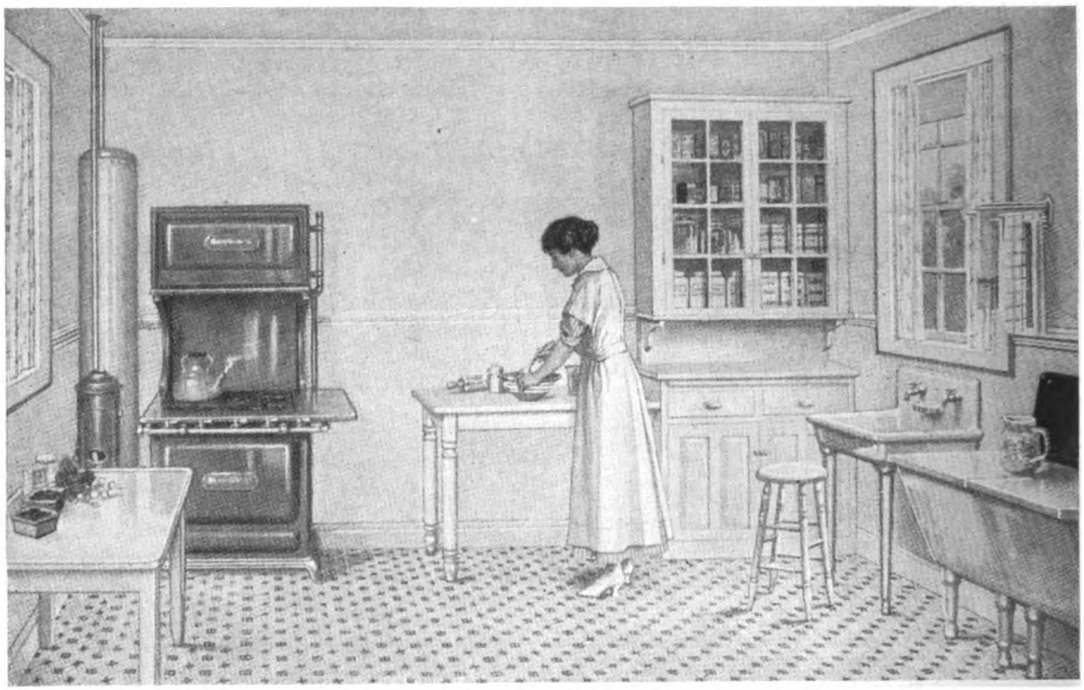
Decorating and Furnishing the Low-Cost House

THE KITCHEN—Part I

THE old-fashioned theory that a thing of use must necessarily be one into which the idea of beauty cannot enter no longer, fortunately, holds true. A useful thing is beautiful, in fact, if it performs its purpose in the most efficient way. Beauty is not a matter of superficial decoration laid on top of anything. It is an integral part of the thing itself and cannot be separated from it.

No one will deny that the kitchen is useful. The kitchen in the modern house has more to do directly with the health and happiness of the household than any other room of the building. It is the kitchen that "makes the wheels go 'round." The manner in which food is cared for and prepared, the cleanliness with which the business of housekeeping is performed, the ease with which certain essential duties are done, all bear forcibly upon the sum total of family contentment. A family will endure other hardships if the meals are good and if the domestic routine is unruffled by temper-trying faults in kitchen planning. It will, then, be the object of this article to describe how such faults may be avoided; how kitchen processes may be performed with the least "fuss" and confusion, and how the beauty of efficiency will thereby be revealed.

The presiding genius of the kitchen is the housewife, and a genius she must be indeed if she is to get the highest service from her home. Recent years have taught so much, so profoundly much, about ways of living; of working without undue fatigue; of eating with a view to nourishment; of saving time and properly utilizing leisure; of tact-



THE FACILITY WITH WHICH THIS KITCHEN MAY BE KEPT CLEAN IS SHOWN IN THE RESULT. THE WINDOW CURTAINS, THE CROCKERY IN THE CUPBOARD, EVEN THE TOWEL ON THE RACK HAVE SPOTS OF THE SAME COLOR THAT DOMINATES THE LINOLEUM, GIVING THE EFFECT OF UNITY IN THE WHOLE ASPECT. THE LOCATION OF THE WINDOWS IS GOOD. THERE ARE CHEERFUL OUTLOOKS OVER THE SINK AND WORK TABLE; THE INTERIOR OF THE STOVE RECEIVES LIGHT, AND THERE IS THROUGH VENTILATION IN THIS KITCHEN THE PRODUCT IS ROUTED FROM RIGHT TO LEFT

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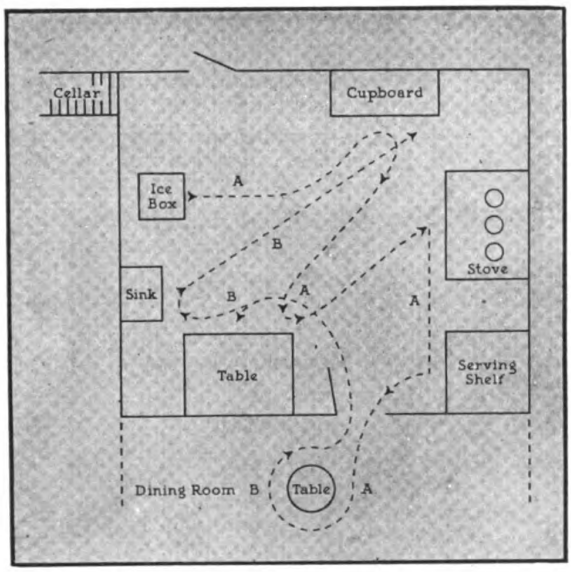
fully dealing with tradesmen, servants, even with husbands, children and mothers-in-law, that the business of housewifery is growing more and more into a profession, an all-absorbing science.

No greater mistake can be made than to assume that the culinary art is solely a matter of manual labor. It is not manual labor alone that turns out those wonderful Thanksgiving and Christmas dinners. Long practice has made almost instinctive the knowledge of chemistry and physics and dietetics and physiology that goes into these things, and, while in daily kitchen parlance they may not be discussed under these formidable titles, that knowledge, instinctive or otherwise, has entered into every successful meal.



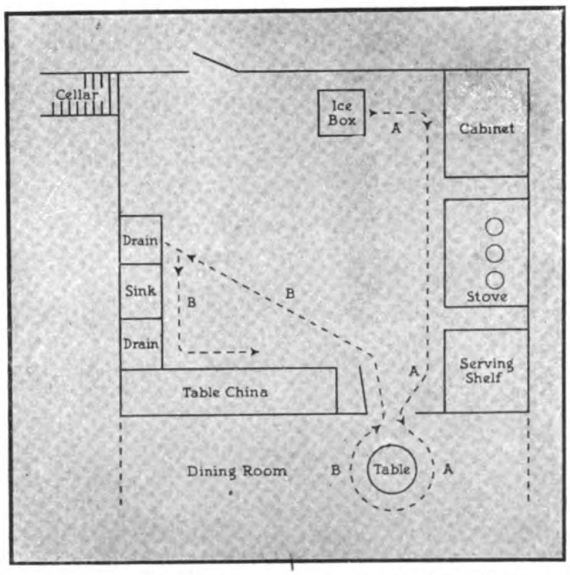
FLOOR PLAN OF A KITCHEN BEFORE IT WAS ARRANGED TO ROUTE THE PRODUCT SCIENTIFICALLY AND LOGICALLY. NOTE THE CONFUSED NETWORK OF STEPS RESULTING FROM POOR PLACING OF EQUIPMENT. "A" IS THE PREPARING PROCESS, "B" CLEARING AWAY

It is then only the part of justice that the creative work of the housewife shall be given every facility for its best execution; that her laboratory, the kitchen, be well appointed and a cheerful, decent place to work in; for only so will the kitchen radiate out to the whole family those elements of a full life that make or mar success in the outside world.

The kitchen may be called the industrial and manufacturing center of the home. Its processes undergo the same repetition day by day that factory processes do, and, like the factory, it is necessary that the final result be a perfect combination of many interrelated and interdependent smaller processes. The modern factory manager knows that if each small part is not perfectly made the whole will be unsatisfactory. He lays as much stress on the little detail as on the most apparent element in the final product. This can the housewife learn: it is only by perfection of detail that perfection of result may be achieved.

In a model factory the product, as it passes through its various stages of development, goes consistently in a continuous direction for each succeeding process. In the model kitchen it will save the housewife untold confusion and countless steps if she, too, will "route the product" in an equally logical and businesslike way.

There are two main kitchen processes connected with each meal, the "before" and the "after," the dining room being the line of demarcation. The two-fold object is first to get the meal prepared and into the dining room, and, second, to clear it away from the dining room and remove all the indications of disturbance. These processes are independent of each other. In the first, all the action is toward the dining room. In the second, all the action is away from the dining room. Thus in the well-planned kitchen the equipment needed for the first process will be grouped in logical sequence on one side of the room and the equipment needed for the second



THE SAME KITCHEN AFTER IT WAS PROPERLY ARRANGED AND EQUIPPED. NOTE THE SAVING OF STEPS AND TIME BOTH IN PREPARING AND CLEARING AWAY THE MEAL. "A" IS THE PREPARING PROCESS, "B," CLEARING AWAY

process will be grouped in logical sequence on the other side. Each process may then be performed without conflicting with the other and can be carried to conclusion with the least effort.

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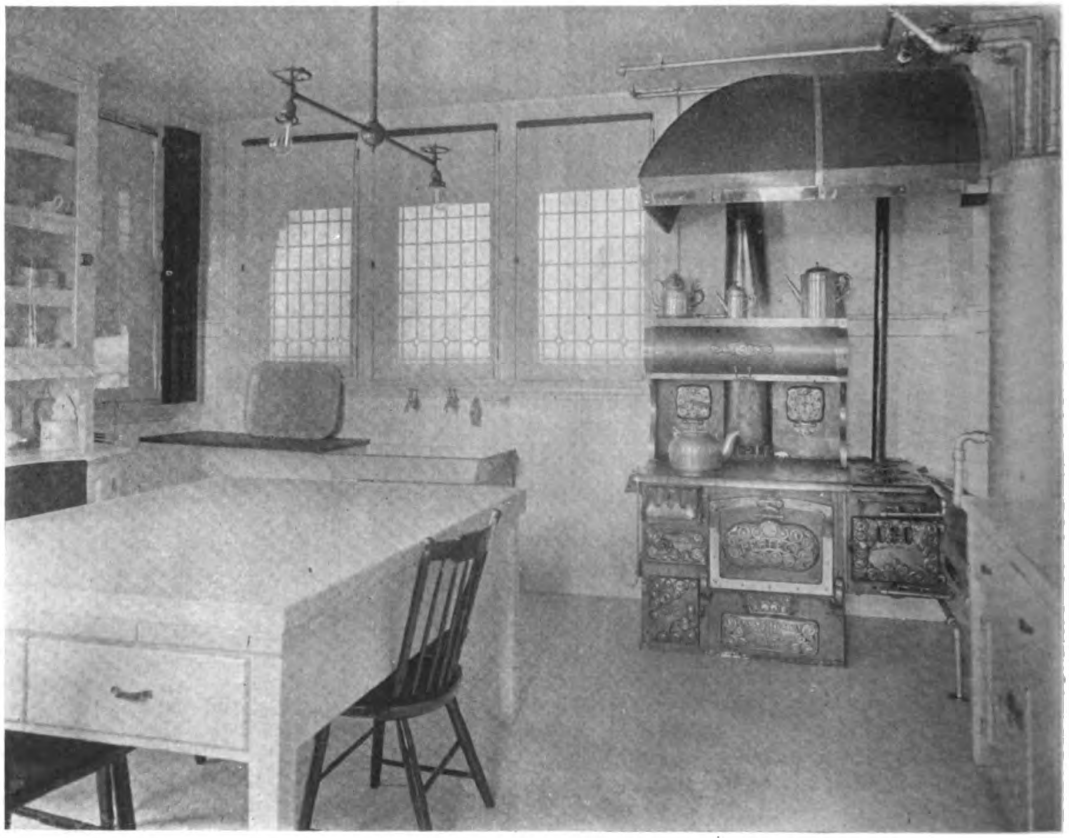
Mentalize the process. Take the meat from the ice-box. Put it through to the dining room, stopping on the way first at the cabinet containing dry groceries to add seasoning, next at the stove right by, to cook it, and finally at the kitchen table, just beyond, to serve it. The passage to the dining room, in the well planned home, is right at that point. The housewife has not needed to retrace her steps uselessly in this whole process. The second process, getting the dishes out again, is equally direct. They come first to the kitchen table, where they are prepared for washing, thence to the sink and drainboard, thence to the closet where they belong—straight ahead and without confusion. If two people are in the kitchen conducting these two processes simultaneously, it will be immediately seen that this careful charting of the route will eliminate their bumping into each other and getting involved in chaos. If there is only one, the simplicity of this system is doubly valuable.

It is a useless effort to attempt to carry hot, heavy pots from the stove way across the room to the nearest table where the contents are to be served. It is useless, similarly, to have an ice-box next to a sink, or a grocery cabinet on the wrong side of the stove or opposite instead of adjacent to the ice-box. Too much emphasis cannot be laid on these things. The matter of planning the kitchen with a view to simplifying and perfecting the result of the work is something that every housewife should insistently demand, and every builder and architect should co-operate to give her. Logical planning in the beginning can be the source of comfort for years to come. Illogical planning is largely to blame for the present indifference of the hired help, for the slipshod methods that frequently characterize the administration of the entire household, for the irritability of the housewife and the justifiable impatience of the rest of the family. This thoughtful planning is so reasonable in its demands and so fruitful of good results that it may well be regarded as the first and most important essential of the modern kitchen.

In deciding upon a location for the ice-box, it



THIS TILED KITCHEN HAS THE PRODUCT ROUTED FROM RIGHT TO LEFT. THE CABINET AND STOVE ON ONE SIDE, THE MODEL SINK, DRAINBOARD AND CHINA SHELVES IN LOGICAL ORDER ON THE OTHER. THE WORK TABLE IS PLACED WHERE IT IS EQUALLY ACCESSIBLE FROM EACH GROUP

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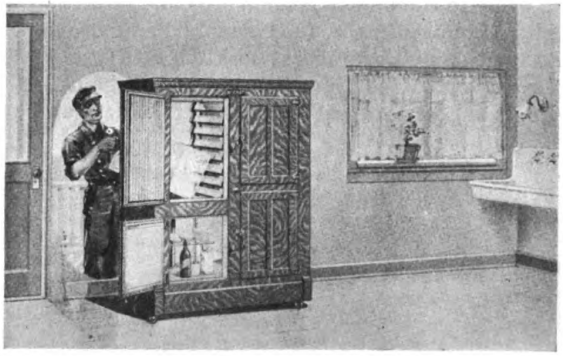
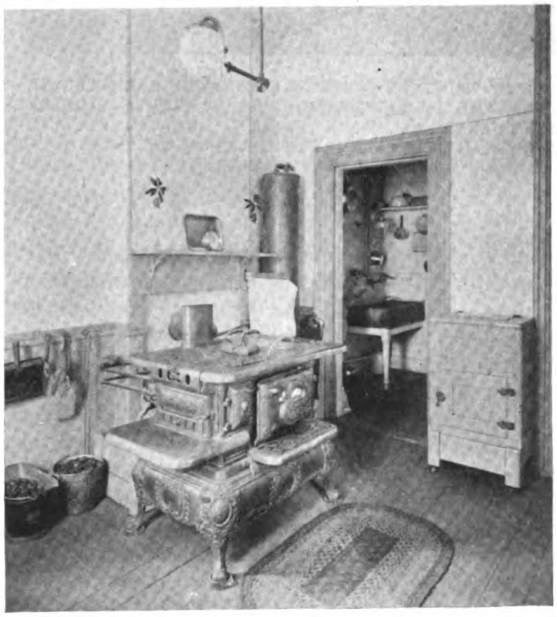
should be back to back with the kitchen porch, and should have an opening paralleling one in the wall of the porch that will enable the iceman to deliver the ice without walking across the clean kitchen floor with muddy boots and trailing dripping water behind him. As the other kitchen pieces are to be placed with relation to the refrigerator, it is advisable to arrange for its placing first. A north part of the house is desirable for the kitchen to preserve the ice as far as possible, and also because the kitchen is normally warm anyhow. The stove should, of course, be as far removed from the ice-box as is practicable in order to prevent wasteful melting of the ice.

Nowhere in the whole house is cleanliness of greater importance than in the kitchen. Its appearance should at all times, even at the height of activity, give an unmistakable impression of purity. Every bit of equipment purchased for the kitchen should be considered with that idea in mind; first, its utility, and, second, the ease with which it may be kept clean. This effects a simplicity in the aspect of the kitchen that will be found definitely restful to the worker in the interims between her varied tasks. With this in mind, it is desirable to eliminate as many corners as possible. The object of cleanliness is readily achieved where the floor meets the wall in a curved line, where the five-inch horizontal wooden panels cutting the wall midway all around the room are eliminated, and where the walls are rounded where they join each other. Tile lends itself admirably to this purpose and is decorative as well as immaculately clean, but its first cost is high for the moderate-priced house and for flooring it is cold and hard to stand on.

Linoleum is the favorite floor-covering. It is simple to clean, has good wearing qualities, is comfortable to stand upon, and its pattern may be chosen frankly for a decorative effect. Oil-cloth soon shows wear and is no longer regarded with the same preference as formerly. The wooden floor uncovered is troublesome to clean and is not adaptable for the busy and efficient housewife. It is, furthermore, not so easy to the feet as the more resilient linoleum, nor has it the decorative interest. The seams should be cemented, to prevent water from going through these places. The color of the linoleum is an important feature not only in the matter of its sanitary aspect, but in the general attractiveness of the kitchen. A soft, light green or blue may be the dominating tone and will give a cool, clean result. The walls may then be plain in color, either white or cream, or a light gray, and the color of the floor may be taken up by the figure in the window curtains or the design in the crockery and various utensils, thus relating the floor to the rest of the room.



THIS SHOWS A MODERN REFRIGERATOR THAT MAY BE FILLED FROM THE REAR PORCH DIRECT, WITHOUT TRAILING MUDDY BOOTS AND DRIPPING ICE OVER THE CLEAN FLOOR. NOTE THE SPECIAL LIGHT OVER THE SINK



THIS SHOWS WHAT TO AVOID. THE ICE BOX IS TOO NEAR THE STOVE. COAL SHOULD BE KEPT IN ONE RECEPTACLE. THE SINK IS IN A DARK CORNER. THE TOWELS ARE AT THE STOVE WHERE THEY MAY CATCH FIRE INSTEAD OF AT THE SINK WHERE THEY ARE NEEDED

It is desirable that there be oil-cloth over such wooden surfaces as are subjected to the most use —tables, shelving and the like. Such oil-cloth may have a border that will also partake of the character of pattern in the linoleum. If it is not possible to obtain a design reasonably in harmony with the linoleum, oil-cloth pure white throughout, without any border, is equally desirable.

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It is to be emphasized that on such shelving or tables only the border should be figured, for if the entire surface has a pattern, the eye is confused while working upon it, and, further, the urge for absolute cleanliness which it is supposed to stimulate is lessened.

Paint is the preferred wall surface for the low-cost kitchen, and if expense is not a vital consideration, it is pleasant to have a whimsical or colorful stencilled border painted at the upper edge of the walls to give individuality and interest to the room. It will be found a source of comfort to have a couple of thick heavy cork or linoleum rugs before the sink and other important centers of activity. These should be heavy enough always to lie perfectly flat so that they cannot be tripped over.

In no way can the efficient housewife better reduce the effort of exercising the culinary art than by the aid of the modern kitchen cabinet. These are made to combine in a small area and in the most logical arrangement a food supply pantry, a tool and utensil cupboard and a work table. If the cost of such a cabinet is beyond the means of the housewife, it is possible that her present facilities can be remade or converted, or a home-product devised that will fill this need. But it will be seen that a large sacrifice should be made to acquire what housewives the country over are finding more and more invaluable. The typical cabinet has the following characteristics: The work table feature slides out about sixteen inches beyond the front of the base, so that the housewife may sit comfortably at the large part of her work. It is no longer thought necessary to stand up to get results. The less one is tired, the greater the duration and effectiveness of effort. When the table is not in use it may be slid back out of the way. This table is ordinarily made of aluminum. It cannot rust and may be kept absolutely clean. The pantry part of the cabinet is scientifically arranged so that forty or more packages—all the supplies likely to be needed—may be stored where any one of them may be reached instantly without disturbing the others. In addition, the flour, sugar, salt, spices, tea, coffee and other supplies needed frequently, are all placed in handy compartments labeled and arranged to be taken out and replaced with one short, quick motion. All the customary tools are provided for in the same way. The can-opener, the rolling-pin, the egg-beater, etc., all have their special place where they can always be found. Lids and pie pans are in a pocket on the inside of the left-hand door. A sliding shelf in the base brings part of the pot and pan cupboard to the front when wanted. Special places are assigned for towels and kitchen linen, for cutlery, and all the convenient and important ac-

(Continued on page 58)



EVERYTHING LOGICALLY ARRANGED SO THAT THE WORKER MAY SIT AT HER WORK AND REACH HER SUPPLIES WITH THE LEAST EFFORT. THERE IS A DEFINITE PLACE ALLOTTED FOR EACH DESIRED ARTICLE. BOTH UTENSILS AND GROCERIES ARE HERE. IF THE HOUSEWIFE CANNOT BUY ONE OF THESE SHE SHOULD MAKE EVERY EFFORT TO HAVE ONE BUILT INTO HER WALL



FINE EXAMPLE OF BUILT-IN CUPBOARD, CABINET AND SINK. THE TWO OPEN SHELVES AT EITHER SIDE OF SINK SERVE AS WORK TABLES, DRAINBOARD AND GENERAL UTILITY WHERE SPACE IS SMALL. DISH PAN, DRYING PAN AND WASTE BASKET WELL LOCATED UNDER SINK. WINDOW ABOVE

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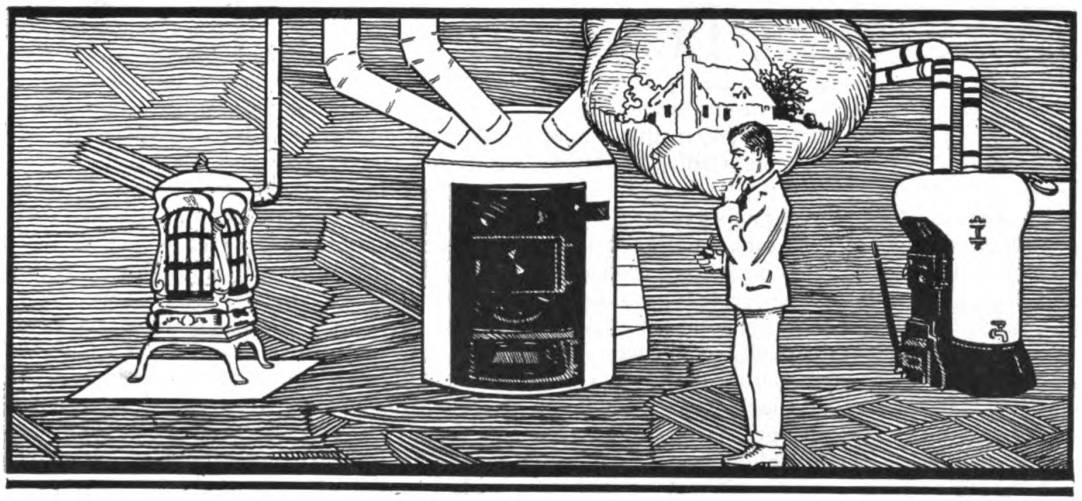

Heating Equipment for the Building of Moderate Cost

By CHARLES L. HUBBARD

II—Selection of the Heating System

IN selecting a heating system for a given building it must be borne in mind that no one method possesses all of the most desirable points, and the best we can do is to choose one which has the greatest number in its favor. It is safe to say that the average dwelling costing less than $20,000 may be satisfactorily heated with either hot air, hot water or steam, provided the system is properly designed and installed, but the most desirable method in any given case will depend upon local conditions, such as exposure to winds, arrangement and special use of certain rooms, cost of installation and operation, whether the house is to be closed frequently during the winter, etc. Furthermore, the owner often has pronounced views relating to the matter which must be considered. For compact dwellings of six to ten rooms, not too much exposed to the strong winds, there is probably nothing much more satisfactory than a good hot air furnace properly installed. It is simple in construction, easily cared for, and lower in first cost than any other system. Heat can be gotten up quickly in the morning, and the supply is easily varied to suit outside weather conditions, thus adapting it to the milder temperatures of Spring and Fall when a steam-heated house is likely to be too warm. There is nothing to freeze and the house can be closed at any time during the Winter by simply letting the fire go out. The former objections to furnace heating have been largely overcome, or are possible of being overcome, by improved methods of design and installation. The apparent dryness and "burned" quality of the air often complained of in warm-air heating is due to a furnace too small for its work, making it necessary to force the fire and sending air to the rooms at a temperature sufficiently high to scorch the dust in the air and also that which has collected in the pipes beneath the registers. Forcing a furnace is liable to crack the plates and loosen the joints, thus allowing gases from the fire to leak through and still further injure the quality of the air supply. All this can be avoided by using a larger furnace, supplying a greater volume of air at a lower temperature, and which will do its normal work without forcing. Another objection to the furnace has been the inability to warm the house, or at least certain portions of it, in windy weather. This may be practically overcome by a proper location of furnace, together with a suitable arrangement for air supply, which should include ducts for recirculation at such times.

Furnaces taking their entire air supply from out of doors require approximately twice as much fuel as would be necessary for warming by direct steam or hot water. This has been an objection to hot-air

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heating, but when re-circulation of air is suggested it is usually met with the objection that the strong point of furnace heating, that of ventilation, will be lost. As a matter of fact a furnace system taking its entire supply of air from inside the building is more efficient as regards ventilation than either direct steam or hot water, while burning practically the same amount of fuel.

This is because of the better air circulation within the building, which not only equalizes the heat, but draws in leaking fresh air from unused rooms into those more frequently occupied. A furnace heated house, taking its entire air supply from out of doors, especially in windy weather, is greatly over-ventilated. For example: the natural leakage around doors and windows and through walls amounts to 1 to 3 complete air changes per hour. Taking the lower figure, in case of the small house, this will give ample ventilation for nine or ten people without any outside air at all being admitted through the cold-air box. Under the usual conditions of furnace heating, with all of the air drawn from the outside in zero weather, enough fresh air will be admitted to supply over forty people with the requirements called for by law in schoolhouse ventilation. Hence, we see that a hot-air system need not require more fuel than either steam or hot water, even for a good degree of ventilation.

Hot water heating has been a favorite method of warming buildings of the general class included in this article, and is still widely used. It has the advantage in buildings which are very much exposed and where the wind pressure is strong in certain rooms.

Also in the case of houses of rather large size, of the bungalow type, having a comparatively large ground area and requiring extended runs of horizontal hot-air piping to first floor rooms. In cases of this kind the air flow is likely to be weak and a better distribution of heat may be obtained by placing direct radiators in the rooms. Sometimes third floor rooms are difficult to reach with furnace pipes of the proper size and directness, and this point alone may be of sufficient importance to effect a decision in favor of steam or hot water.

The flexibility of hot water as to regulation places it practically on par with hot-air heating, so far as this point is concerned, and a low fire may be carried in mild weather to give just the amount of heat required. It is also adapted to furnishing a small amount of heat at night just sufficient to keep the rooms from becoming chilled. When it is desired to close the house in cold weather, the boiler and the entire system of pipes and radiators must be drained after the fire has been allowed to go out and filled again when opening the house. This is a decided inconvenience unless the work is turned over to a plumber, which is quite an item of expense. As with hot-air heating, temperature regulation must be general for the whole house, rather than for individual rooms, unless the radiator or register is entirely shut off. Throttling the supply valve on a hot-water radiator is too delicate an adjustment for ordinary practice and it is usually necessary to carry a uniform temperature in all of the radiators or else shut one or more off completely. Ordinary low pressure steam heating is not particularly desirable in dwelling houses owing to the difficulty of regulating the temperature of the rooms in mild weather. The radiators are proportioned for the coldest weather, and with the usual arrangement, must be either steam filled and working at full capacity or else be entirely shut off.

Except for this, low-pressure steam has a number of advantages over both hot air and hot water. It is particularly adapted to large and rambling buildings and to cases where several adjacent buildings are heated from a single boiler or battery of boilers. Any room may be reached where it is possible to run steam pipes and there is no danger of pipes and radiators freezing when shut off, if properly drained. This is an especially desirable feature in buildings where only a part of the rooms are in constant use. Where the doors are mostly kept open a fairly uniform temperature may be maintained by shutting off a part of the radiators and allowing the surplus heat to pass from one room to another, thus tending to equalize the temperature throughout the house.

In recent years "vapor" and "vacuum" systems have been coming into quite general use, the former, in various forms, being especially adapted to dwelling house work. The principle advantage of the vapor system is the possibility of varying the heating capacity of individual radiators by means of fractional or graduated supply valves. A low steam pressure of two to five ounces is carried on the boiler, and the valve opened just enough to fill such a portion of the radiator with steam as may be necessary to give the required amount of heat. In the meantime the remainder of the radiator is filled with air and is therefore out of service. These are patented systems and have been greatly improved within recent years, so as to place steam heating practically on the same basis as hot air and hot water so far as regulation is concerned.

In the next article the method of computing heat losses will be given.

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Lighting the Home

By M. LUCKIESH

I.—The Potentiality of Lighting

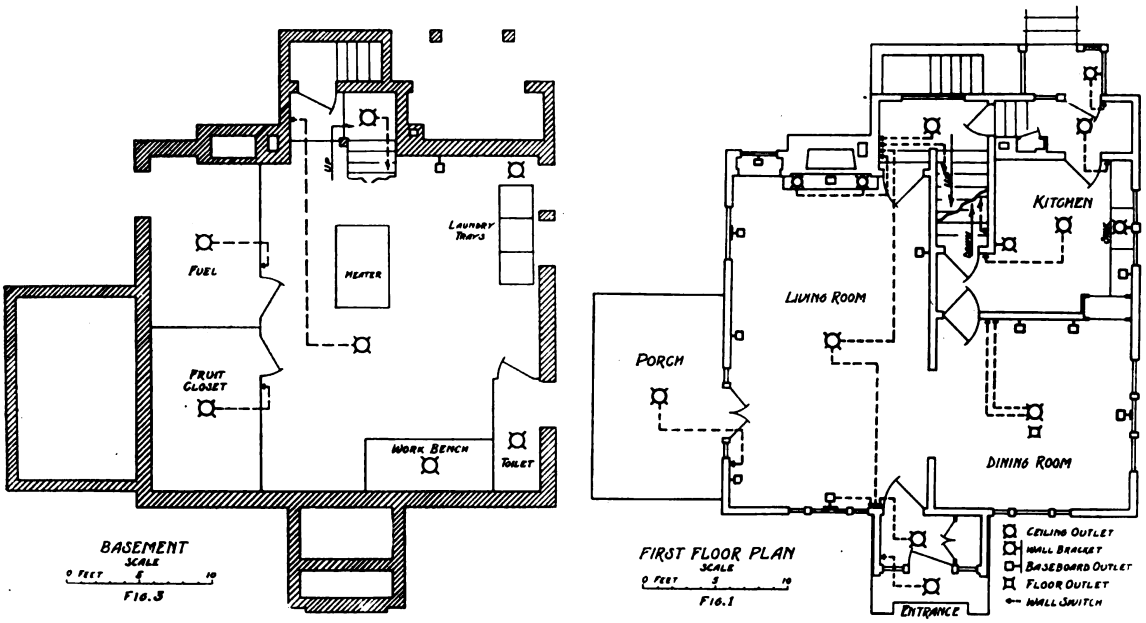
LIGHTING is one of the most important factors in making a home a "thing of joy," but unfortunately it is much neglected. The reasons for this neglect are manifold, but the chief one is that the householder does not appreciate the potentiality of lighting. Light in the home is usually considered as a utility notwithstanding the fact that its greatest possibilities lie in the æsthetic or more broadly the psychological effects. In the more pretentious rooms, such as the living room, the dining room, the library, the den and the bedchamber, lighting should be viewed chiefly from the æsthetic viewpoint, for utility will be a by-product.

The home is the theatre of life, full of various moods and occasions, hence the lighting of a home should be flexible. Controls, outlets and fixtures should conspire to provide this flexibility. Variety is the spice of lighting in the home. In fact, no other medium is so easily manipulated as lighting in changing the mood or expression of a room or in influencing the setting for an occasion.

THE EXPRESSIVENESS OF LIGHT

Unfortunately the householder has not been taught to consider *lighting effects.* The fixture dealer sells objects made of metal, glass, wood and textiles. He gives attention to period and style, but seldom to *lighting effects.* The fixture is merely a means to an end just as the concealed wires perform a similar function as a connecting link. But the fixtures are visible and should harmonize with the interior. However, the great function of the fixture is to diffuse, to direct and to distribute the light upon walls, ceiling and other areas. The lighting models objects and ornamental details, and produces a certain æsthetic effect or, more broadly, a definite expressiveness or mood which harmonizes with the aims of the decorations and furnishings.

Lighting effects, then, are the important results which wiring, switches, outlets and fixtures help to produce. The householder should give his attention first to lighting effects and should demand of the fixtures certain lighting effects in the various rooms in harmony with the schemes of decoration



ARRANGEMENT OF OUTLETS IN BASEMENT AND FIRST FLOOR FOR EFFICIENT LIGHTING

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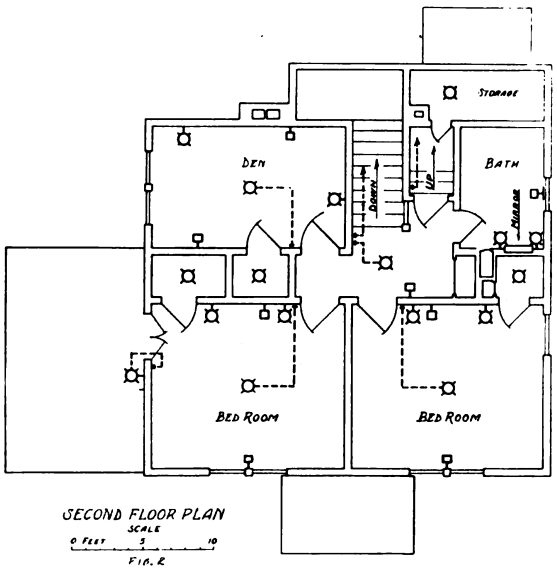
and furnishing. The grace of line, the period and the finish of fixtures is as easily decided upon as though they were ornamental bric-a-brac or bits of furniture.

The decorator obtains a certain expression or mood in a room by distributing his values and hues, but he needs light to make his decorations effective. Oddly enough, even the decorator gives most of his attention to lighting-fixtures as objects rather than distributors of light which may aid his decorative scheme in producing a certain mood, or which may tend to destroy the effect he has sought. Take the simple case of a room with light-colored ceiling and moderately shaded walls. If the light is thrown upward as in indirect and semi-indirect lighting, the distribution of brightness will be far different than if the light is directed downward. In the first case the ceiling will be many times brighter than in the second case. The two expressions or moods will differ greatly.



THE PROVISION OF ADEQUATE OUTLETS IS ESSENTIAL TO GOOD LIGHTING. THE ARRANGEMENT FOR THE SECOND FLOOR SHOWN ABOVE IS NOT EXTRAVAGANT IN THIS RESPECT

LIGHTING FIXTURES

Three general systems of lighting or types of fixtures are termed, respectively: direct, semi-indirect and indirect, but these terms are inadequate and sometimes misleading. A direct lighting system or fixture is one in which the light is predominantly directed downward upon the point or plane of interest. An indirect lighting system or fixture is one in which the light is predominantly directed upward against the ceiling and upper walls, finally reaching the place of interest by diffuse reflection. The semi-indirect system or fixture comprises a combination of the two. A suspended opaque bowl containing light sources is called an indirect unit. If the bowl consists of a translucent medium, it is called a semi-indirect unit. These terms are helpful but inadequate.

In choosing a fixture it is well to demand that the light sources be well shaded or diffused. The lighting effect of the fixture will best be visualized in terms of the proportions of upward and downward components of light. On this basis it will be seen that the innumerable lighting-fixtures which are available may be grouped into about a dozen classes of fixtures, although the classification should also include certain other very obvious distinguishing features. For example, a wall-bracket on the wall distributes light in the same manner that it would if the essential parts were hung in the same position from the ceiling. However, a wall-bracket is close to the wall and illuminates the adjacent area brightly; hence, it is a distinct type of unit. Wall-brackets may then be classified further in terms of direct and indirect components of light.

The foregoing is of great importance for the householder, decorator, architect and builder to bear in mind if the lighting is to fit into the general scheme. It is well to remember that a lighting-fixture is merely a means to an end. It may be elaborate or simple, but as an ornament it should be appropriate. When judging the lighting effect the *room* is looked at as a whole and not the fixture. A common error is to look at the fixture instead of the effect. Fixture dealers should exhibit the lighting effects from various fixtures instead of exhibiting objects. The wise householder, decorator, architect or others interested in lighting will visualize a lighting effect from a fixture or will demand that it be demonstrated. Let the reader try to visualize the lighting effects in a given small room from various fixtures such as wall-brackets, an indirect bowl, a shower, a semi-indirect unit, a pendant diffusing globe and portable lamps. By doing this a greater appreciation of the importance of lighting effects will be attained.

COST OF LIGHTING

No figures of cost will be given here because they vary with the locality and type of residence; however, they agree in one respect, namely, that good lighting is one of the least expensive commodities available. As a utility, light ranks with shelter, food and heat; as an artistic medium it is in the class with draperies, rugs, wall coverings, pictures and bric-à-brac. During the last score of years the cost of living has increased enormously, but the cost of light has decreased considerably. If the householder will visualize the function of artificial lighting in the home and will try to estimate

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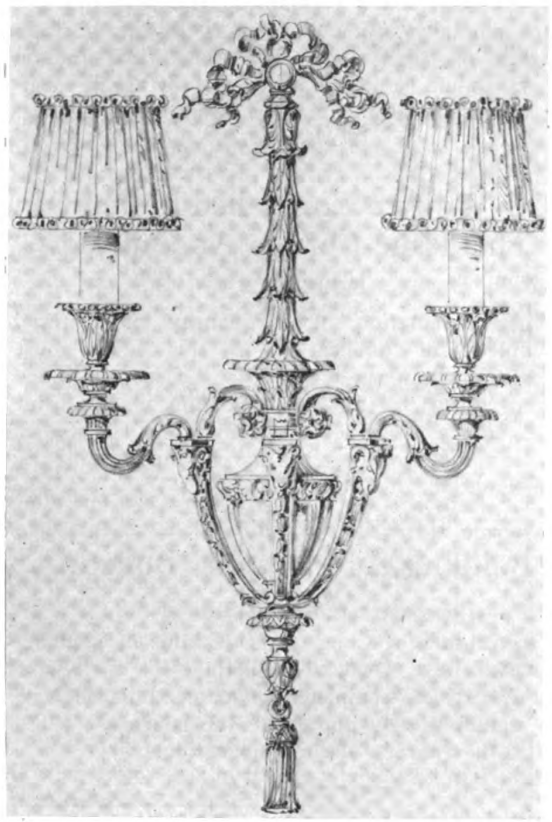
its importance he will conclude that lighting is very inexpensive.

Why will a householder appropriate only a hundred dollars for the fixtures in a $10,000 home when without artificial lighting his home would seldom function as a home? The same amount of money is invested in a single table, in the draperies for a



WALL BRACKETS OF ARTISTIC DESIGN LEND CHARM TO HOME ILLUMINATION

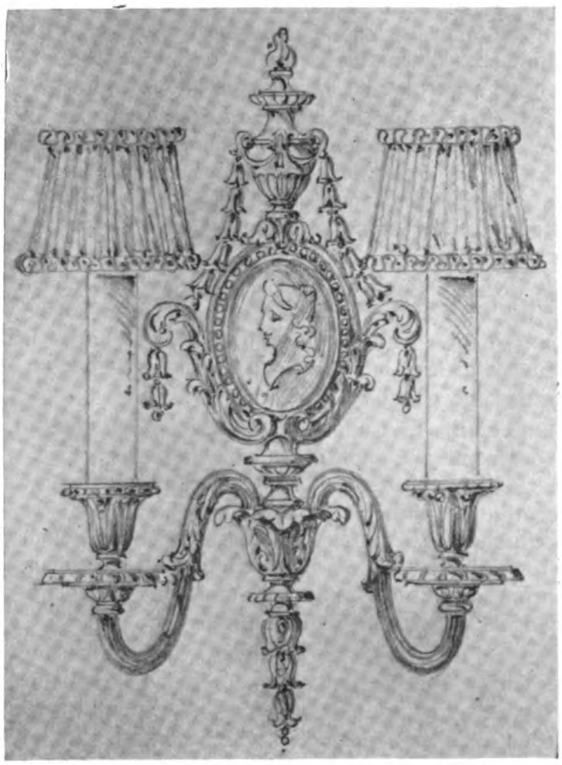
room or two, in pictures on the wall of a single room, or in a few ornaments. Are the dividends from any one of these investments comparable with those returned by lighting fixtures? A $25 picture on the wall costs $1.50 a year (at 6 per cent) to hang there. This will support any small decorative portable or ornamental bracket. Viewed in this manner, lighting becomes a magical medium, costing little but paying enormous dividends.

When considered from the standpoint of cost, good lighting can compete favorably with any factor in the home. But satisfaction in lighting depends not only upon the type of fixtures but also upon the wiring, controls, adequacy and distribution of outlets.

OUTLETS AND CONTROLS

In later articles more specific details pertaining to outlets will be discussed, but some general remarks apply to all houses of the middle and higher classes. Variety in lighting effects cannot be obtained without adequate outlets. In laying out the wiring for a house include first what you think are the bare necessities. Next add what you think would be adequate or even somewhat extravagant. Obtain two bids if you like and consider their difference in terms of the total cost of the investment. A few dollars may be saved by blighting the home with the inconvenience of insufficient switches and the inadequacy of outlets. The contractor or architect who talks the householder out of a switch here and an outlet there is not doing his client a favor by any means. These are too generally lacking in houses and apartments now.

No room in a house should be without a baseboard or wall receptacle. A reading-lamp or decorative portable is likely to be desired in any room. Besides, it is well to remember that these outlets are increasing in value as electric equipment for the home multiplies. To-day the middle-class homes may afford heaters, flat-irons, cooking apparatus,



ANOTHER TYPE OF ATTRACTIVE WALL BRACKET

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fans, vacuum cleaners, washing machines and other electrically operated apparatus. Even the upper hall should not be forgotten, for a small decorative portable lamp may add just the right touch, and besides, this baseboard outlet is ever-ready for attaching the vacuum cleaner. From this point various adjacent rooms may be cleaned without changing the connection.

The author built an eight-room house and laid out adequate wiring for it. The electrical contractor in looking over the plans in the course of estimating, recommended the elimination of about ten outlets and switches at a saving of about $15 at that time. He thought he was doing a favor, but he was not. Every one of the switches and outlets is in use and notwithstanding the seeming extravagance, several more are very much desired. A few doors away a $25,000 house was being built with only *one* baseboard receptacle in it! This is the result of indifference arising from a lack of appreciation of the possibilities of artificial lighting.

The laying out of the wiring for various rooms in a home is a simple matter if the furniture and equipment is indicated on the drawings. There are many glaring mistakes due to the lack of such a predetermination. For example, windows often are placed in a wrong position. In such rooms as the dining-room, bathroom, bedrooms and kitchen there will be one best arrangement of furniture and equipment. When this is determined upon, the outlets and controls may be located with certainty.

Switches should be handy to doorways and, of course, not *behind* doors, as is sometimes the case. A switch in a convenient place insures against the years of inconvenience of a dangling chain or of groping in the dark for the snap-switch on the socket.

It is well to consider wiring every room for ceiling outlets controlled by switches at the entrance. Some of these may not be used, as will be shown in a future article, but the small expense is good insurance for possible future needs.

One of the first aims of this series of articles is to overcome the indifference of those responsible for the lighting of the home. After possessing the incentive resulting from an appreciation of the potentiality, it is not difficult for the householder and architect to lay out the wiring and to purchase appropriate fixtures—appropriate as ornaments, but chiefly as dispensers of lighting effects.

Several drawings are included which illustrate the wiring specifications for a middle-class home (basement, first and second boors) which will insure adequate lighting and convenient control. Chief articles of furniture and equipment are indicated to illustrate the best manner of providing outlets.

The Kitchen

(*Continued from page 52.*)

cessories. There is a rack where the cook-book may stand without being handled and soiled, and numberless comfort-giving features which it is not possible to describe here. The illustration will show a few of these things.

In this connection the habit should be formed of more generally sitting to as much of the work as possible. A high stool with a low back, and on rollers, should be placed at the sink for use in washing dishes, and may also be used while ironing.

(*To be concluded*)

Why We Are Compelled to Omit in This Issue Certain Announced Features

The presentation of a quantity of material scheduled for publication in this issue must necessarily be postponed until succeeding issues due to the stringency now existing in the print paper supply. The second of Mr. Van Gaasbeek's articles on stair construction will appear in the June issue.

Building Age Dealers' Bulletin Wanted

The Library of Congress is desirous of securing BUILDING AGE Dealers' Bulletin, Vol. I. No. 1 July 2, 1917, to complete the set upon its shelves. We should greatly appreciate the courtesy of the gift to the Library of this publication.

There Are No Friends Like Old Friends

Mr. Frank Taflinger, of Sidell, Ill., writes us: "I have been a subscriber to BUILDING AGE since 1899 and I have all of the issues now. I have secured much valuable information from your paper and I wish you success. The building outlook here is fair considering the high prices of lumber and other materials."

* * *

Robert K. Stewart, of Natrona, Pa., in a recent communication, says in part: "I often wonder how many subscribers you have on your list who have read the *Carpenter and Builder*, later known as BUILDING AGE, for the last thirty-nine years, which is the length of time that I have been a subscriber. I would like to hear from some of these veteran readers through the columns of BUILDING AGE.

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Economical Designs of Plumbing

Comfort and Convenience for Guests Secured by Separating Bathroom Fixtures at Little Added Cost. The Advantage of Cloak Rooms Should Be Considered

By WILLIAM HUTTON

TO many people the extra bathroom in a home seems to indicate the passing from the simple life to the more pretentious. Yet who has not suffered inconvenience and perhaps distress through lack of sufficient sanitary conveniences in a house filled with guests?

An extra bathroom costs money, and possibly space that cannot well be afforded. Then the home builder decides that the convenience must be foregone and the architect too often lets it go at that.

There is a compromise which does not cost very much and which may easily solve the problem in the major number of cases. This is to make the bathroom serve as two separate apartments, a toilet room and a bathroom. But slight structural change is usually necessary to accomplish this purpose—an extra partition and a door are about all, provided the plan is adopted in time.

I will take as an illustration a small cottage residence which I recently saw. The plan, which is given to illustrate the arrangement, while perhaps not accurate in its dimensions (as I took no measurements), brings out the point nevertheless.

The idea is to make the water closet available at such times as the bathroom may be in use and vice versa.

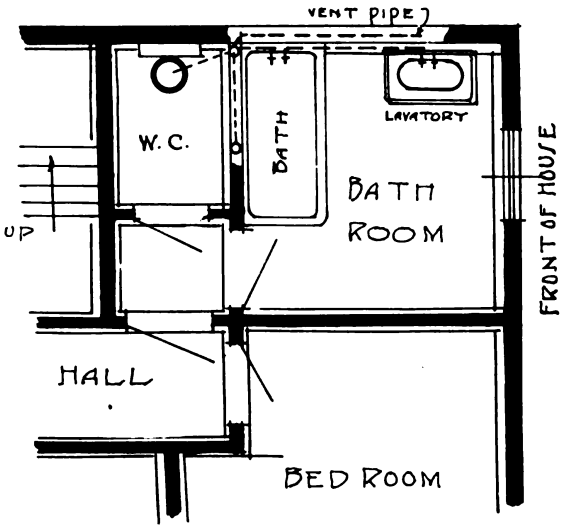
The man who built this home planned the two rooms so that they would serve for such occasions and also in such a way that when only his own immediate family required them, the closet to all intents and purposes was part of the bathroom. This was done by making a small entrance hall to the two rooms. The door to the hall was equipped with a self closing attachment but no bolt. The doors to the bathroom and the closet had the regular hardware used for such rooms. Thus one could pass from one room to the other with a certain amount of privacy.

It is obvious that this scheme could be adopted in almost any house by making slight alterations to the plans so as to secure the proper entrance to the apartments. The satisfaction obtained by the occupants will in every instance justify the slight additional expense.

Insofar as the arrangement relates to the plumbing it will be noted that the cost is the same. The fixtures have been arranged so that the same roughing plan is followed as if there were no partition between the bath and closet. The fact that there is a partition in some measure is an advantage, as it allows the use of a tub set into a corner and the use of concealed wall supply and waste fittings, with easy access from a panel in the water closet apartment. Thus an actual improvement in the layout is effected, leaving more floor space for dressing.

And going a little further—Why not have a cloak room?

One of the greatest conveniences a home can have



BATH AND WATER CLOSET PLACED IN SEPARATE COMPARTMENTS

is some small room on the first floor set apart for a cloak or combined cloak and toilet room. Here guests may be relieved of wet clothing and overshoes, find a place to hang them and a place to which they may retire without embarrassment. In the house already referred to, the cloak room was in the best possible location—entered from the stair hall.

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Such a location could not be found in every house; possibly it would not have been in this one, or at least the room might not have been so large had it been planned for a cloak room at first. The architect planned a den and this is what the room was used for at first. But the owner was of a sociable disposition and a den had little attraction for him. It was turned into a well appointed cloak room, greatly to the satisfaction of his friends and himself.

The fact that it was immediately under the bathroom made the cost of installing the plumbing fixtures low. All that was necessary was to cut into the soil and water supply lines for branches and extend a vent to the upper floor to connect with those from the bathroom. This fact is mentioned so that the possibility of using a common soil pipe for both floors may be kept in mind when locating the room.

I have seen a very acceptable toilet room constructed under a stair landing, but when in such a

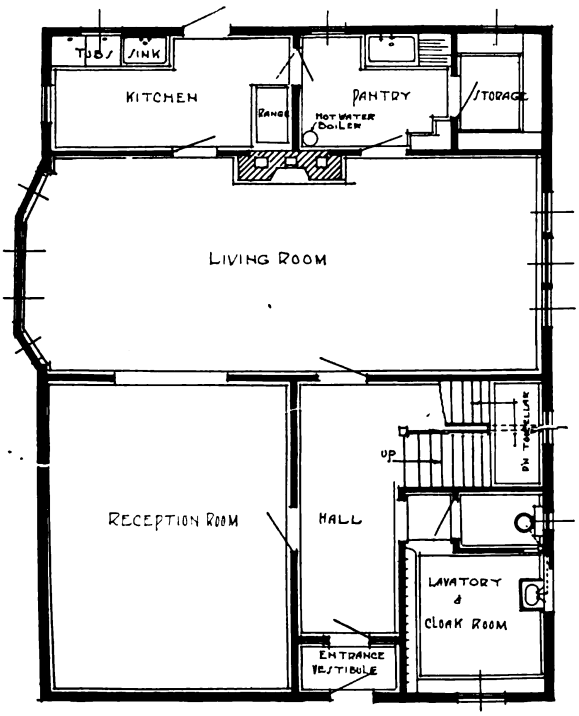

DIAGRAM OF FIRST FLOOR SHOWING CLOAK ROOM AND LAVATORY LOCATED ADJACENT TO THE ENTRANCE HALL

position adequate ventilation must be provided, preferably by a window. A small corner lavatory is sufficient for the purpose and a closet takes up very little space. Even a space three feet square can be utilized if the door can be swung outward, but it is seldom that better accommodations than this cannot be found when the architect is instructed to make the provision. In cramped quarters a closet using a flush valve instead of a tank will save valuable space.

These suggestions are made especially for the small home where the greatest possible service must be obtained from the plumbing equipment. Yet they are just as pertinent for the more elaborate home.

Kiln Drying Taught by Mail

The manufacturer who uses lumber as a raw material must give more attention to kiln drying than has hitherto been the common practice, or the resulting excessive waste and dissatisfied trade may cause embarrassment. The time has come when the average dry kiln operator must either improve his methods or give way to a more progressive man who has kept in touch with more modern methods.

The high cost of lumber and labor, a shortage of thoroughly air-dry stock, as well as a general movement for efficiency in production make better methods imperative. Losses due to inadequate methods of kiln drying, especially of stock which is not thoroughly air-dry, often run as high as 30 to 50 per cent, and occasionally even 100 per cent of the value of the lumber. A high percentage of loss is often taken more or less for granted and its seriousness not considered. Present conditions, however, will force the facts to the attention of the manufacturer. Improper kiln operation means not only a loss of lumber and time, but also poorer goods, fewer orders, less profits, and finally the loss of trade ot more alert and up-to-date competitors.

Kiln-drying of wood is not just a job. It is an art based upon exact knowledge. It requires an understanding of certain fundamental principles and their application in the daily operation of the kiln. To be efficient the operator must be up-to-date in his metohds relative to the best present practices.

Within recent years the principles underlying the successful kiln-drying of air-dry and green lumber have been worked out by the United States Forest Products Laboratory, which is maintained in cooperation with the University of Wisconsin.

The Wisconsin University Extension Division has arranged to disseminate some of this information by means of a ten-lesson correspondence-study course. The course is written in simple language, and the text is supplemented with numerous illustrations. It is open to anyone with a common school education.

For further information address the Extension Division, University of Wisconsin, Madison, Wis.

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A MASSACHUSETTS HOME BUILT IN 1782
DEMONSTRATES THE ENDURING PROPERTIES OF LUMBER THAT IS KEPT WELL PAINTED

Paint and Varnish

Their Function, Selection and Application

By HENRY A. GARDNER*

THERE are probably no materials so capable of improving the aspect of a building with so little expense as paint and varnish. These materials not only brighten the home within and without, but protect the materials covered. Practically all substances used in the construction of buildings are derived from the earth and when left unprotected from the elements for a long enough period of time they will invariably begin to disintegrate, thus returning to their original state.

True, some materials, such as stone or concrete, have greater endurance than others. The majority of exposed surfaces, however, are both preserved and benefited by the application of a good paint.

The Time to Paint

To many springtime and painting are more or less synonymous. There is no doubt that the majority of painting is done during the Spring season. This is probably due more to sentimental reasons and to be in keeping with nature than because such a time is the most logical in which to do painting. As a matter of fact, the dry period during the Fall months is considered by many who have studied the question as the best time for painting.

Irrespective of the season, the proper time to paint any given surface is before the old paint has ceased to act as a protective coating: in other words, when the surface requires painting.

* *Director, Scientific Section Educational Bureau of Paint Manufacturers' Association of the United States.*

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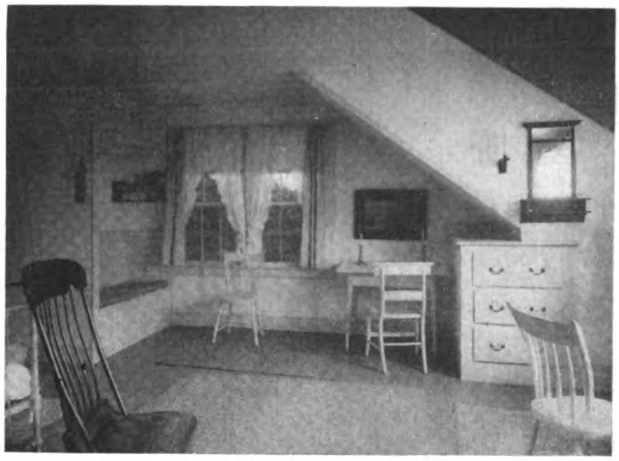


MUCH SPACE MAY BE MADE AVAILABLE IN HOMES BY PAINTING AND DECORATING THE ATTIC

One "Don't" to bear in mind is the following:

Don't paint the exterior of the building during rainy weather and expect the best results. Paint applied over a wet surface is liable to blister.

Painting of Timber

There has been considerable discussion as to the relative merits of different kinds of wood for the exterior walls of buildings. While the durability of different types of timber would manifest itself were the timber left unexposed, it is a fact that most kinds of wood will give satisfactory service if properly protected with paint. The long life of timber so protected is clearly manifested upon inspection of early Colonial residences, some of which have been standing for a century and a half and are still in first-class condition. These buildings have been periodically painted and this is probably the reason for the present excellent condition of the walls. In this connection note the illustration of the Massachusetts home built in 1782.

Wood examined under the microscope shows a porous structure. On standing timber the wood is well protected by the exterior bark, but after this is removed and the timber sawn in the mill, the surface is liable to decay. The application of paint closes the openings or pores of the wood, thus acting as a preservative and preventing the entrance of decay-producing organisms. It is safe to say that thoroughly seasoned wood will last indefinitely if kept well painted.

Timber containing excessive resin is likely to bleed during hot weather and thus destroy the paint covering in spots or localized areas as well as discoloring the woodwork. The treatment of such timber is described later.

Recommended Rules for Exterior Painting

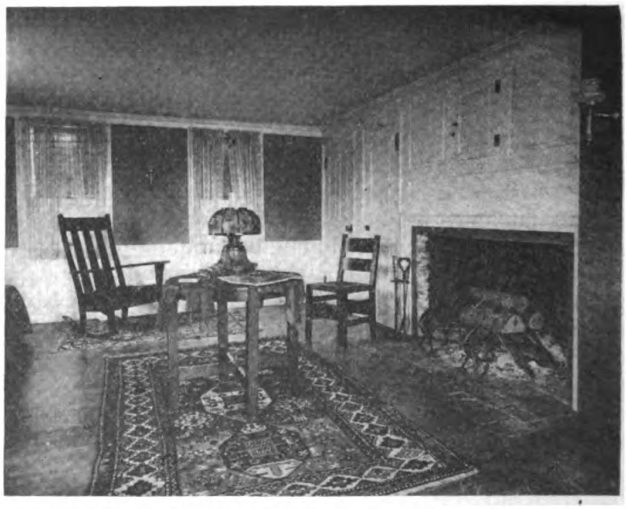
Wait until the interior plastering has thoroughly dried before painting the exterior. The reason for this is that when the plaster work is still damp the moisture is often drawn through the wood to the exterior, thus making this damp as well.

The surface of the wood should be free from moisture before the paint is applied. When painting over frame walls that have been previously painted be careful to remove all old loose paint by scraping or with a wire brush.

Wood that has not been previously painted should have all knots and sap streaks brush coated with turpentine not over an hour prior to the application of the first paint coat. Shellac should not be used for coating such knots.

The priming coat should be a high-grade prepared lead and zinc paint made by a reputable manufacturer. Two to three pints of benzol or turpentine should be added to each gallon of paint, and this thoroughly stirred. The mixture should then be applied and allowed to dry to a hard undercoating. At least one week of good dry weather should be allowed to elapse, if possible, before the application of further coats, thus allowing the paint to dry hard to a firm foundation for the succeeding coats.

After the priming coat has thoroughly dried all nail holes and other imperfections in the wood should be closed up with a good grade of putty, and



WHITE ENAMELED WOODWORK, TINTED WALLS AND VARNISHED FLOORS MAKE PLEASING CONTRASTS

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followed by the application of the second coat, used as it comes from the can. It will sometimes occur that paint taken direct from the can may be too heavy, in which case not over a pint of linseed oil should be added to a gallon of paint for thinning.

The second coat should be allowed to dry properly, after which the third coat should be applied, again using it as it comes from the can without thinning.

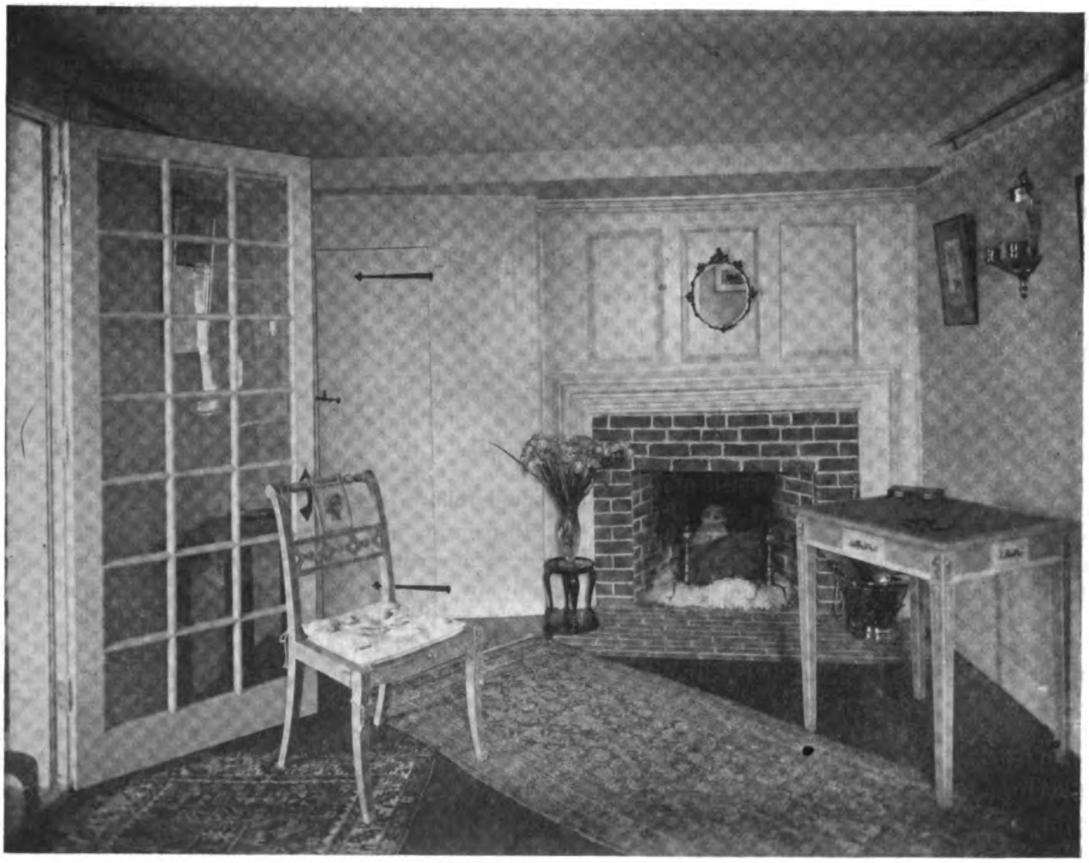
The Shingled Roof

Although according to a list gotten out by the National Board of Fire Underwriters, shingle roofs are prohibited in some ninety-one cities of the United States, this form of roof is still popular in many localities and when properly painted possesses a much smaller fire hazard than is popularly thought. In fact, shingles may be so painted that they are equally as fire-resisting as other types of roofing, excepting slate, cement tile, asbestos or similar materials. The shingles as manufactured have a somewhat rough fuzzy surface. The application of mineral paint to the shingle roof eliminates this feature and such paint will dry to a durable waterproof film, thus preserving the wood and also reducing the combustibility of the material. It will be noted that unpainted shingles curl at the edges. Proper painting acts as a preventive of this characteristic.

New shingles should be either brush coated or dipped and allowed to dry before being placed, after which an additional brush coat should be applied. It is preferable to have the priming coat put on the shingles at the mill, and this method is being followed by several manufacturers.

It is advisable to paint old shingle roofs which have become thoroughly dried out. Special fire-retardant paints are made for shingles, containing asbestine and other mineral pigments not reducible to metals. These are ground in linseed oil with thinner and drier.

The preservative qualities of shingle *stains* are well known. They are usually prepared of a high grade of creosote mixed with various colors and



SMALL ROOMS AND HALLS ARE MADE TO APPEAR MUCH LARGER THROUGH THE USE OF WHITE ENAMELS AND LIGHT COLORED WALL FINISHES

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ground in oil. Attractive finishes in many colors can thus be had.

Protection of Metal

The rapid corrosive action of the atmosphere on exposed bare metal is too well known to need further comment. It will be agreed to by all that such metal should be kept well painted, the difficulty being in the selection of a proper paint for the purpose. Such metal work as structural steel, iron railings, tin roofing, galvanized iron gutters, etc., should be painted with the best grade procurable. Cheap paint in such places will prove to be the most expensive in the end, since frequent repainting will be required. Structural steel should first receive a coat of paint containing a basic pigment, such as red lead, over which a high grade moisture-resisting paint of any color desired may be applied. For the tin roof a red oxide of iron paint has been found to give good results, provided all oil and grease are thoroughly removed prior to the application of the paint. This can be accomplished by rubbing with a cloth saturated with benzine.

Many unsatisfactory results have been observed in painting galvanized iron. The best results for coating such surfaces may be secured by first brush coating the surface with a solution of copper sulphate, chloride or acetate made by dissolving four ounces of any of these salts in a gallon of water. It will be found that the application of this solution roughens the galvanized coating to a slight extent without damaging it. An hour later the surface may be dusted and then painted with a high grade prepared metal paint. Galvanized iron, properly painted, is one of the most durable forms of metal construction, as it is not only protected by the paint but by the galvanizing as well.

Interior Work

Probably the largest consumption of varnish is in the production of interior paints. Practically 90 per cent of such paints contain varnish or treated oils of some type. Clear varnishes are also used extensively for interior finishes. While perhaps not so important from the standpoint of preservation as exterior painting, yet interior painting deserves important consideration since without its use a homelike aspect and one which is thoroughly pleasing and at the same time sanitary is hardly possible.

The first item to consider is the interior trim. This is both utilitarian and decorative in character, and should harmonize with the furnishings. The use of white is especially applicable in two rooms of the house—namely, the kitchen and bathroom. This affords to these rooms both a bright and sanitary appearance, and has met with much favor. An excellent finish can be obtained by the use of white or ivory zinc oxide enamel. Oil paints may also be used and are less expensive, as well as requiring less effort in application and also being easier to remove if a change of finish is desired. In high grade work, however, enamel finishes are generally used.

It should be borne in mind that enamel finishes require careful undercoating and rubbing in order to produce the proper results. Two to three coats of white paint must be applied to the woodwork prior to the application of the enamel, which will generally dry out to a very high, glossy surface. This may be rubbed to a dull surface if desired. Either oil paint or enamel finish, if properly cared for, will last many years.

Interior trim made of woods fairly free from resin possess non-staining properties, and will give the best results with white paint or enamel.

Interior trim to be finished in varnish or stains should generally consist of hardwood possessing an attractive grain.

Varnishes for exterior work are usually made on a Chinese wood oil base. This oil has now become one of the chief requisites of the varnish industry, and is extracted from nuts grown in Manchuria. Its varnish-making properties are excellent and it is used as a base for most of the water-resisting varnishes now manufactured. Varnishes containing high grade fossil resins are usually preferred for interior work where rubbing is necessary.

Painted walls are fast replacing the old style papered walls, and from the sanitary standpoint they are much superior. Many prepared paints are now manufactured for this purpose, giving finishes that dry either glossy or flat. The flat wall paint seems to be gaining rapidly in favor, as it presents a matte velvetlike surface practically devoid of glare. Almost any desired shade can be obtained. It is often desirable to first cover the walls with a size made of flat finish and oil, since this will reduce the suction. One or preferably two coats of paint should follow.

In painting newly plastered walls it is best to first reduce the paint with a little oil and drier and then apply in two-coat work. The plaster should be thoroughly dry before the application of the paint. Drying out of the plaster and the development of free lime is liable to cause a slight fading out of colors, especially when these are of the lighter shades. It is therefore more often desirable to apply a third coat of paint several months after the first two coats have been applied.

In selecting paints for interior wall finishes it is well to bear in mind that various colors differ in their light-reflecting properties. In other words,

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with a dark-colored wall and medium ceiling several times as much light is required to produce the same effects as with light-colored walls and ceiling.

This is due to the fact that in the former case a large quantity of the light produced is absorbed by the walls and ceiling, whereas in the latter it is reflected. The various reflective values of the colors usually used in interior work are given in the following table:

Color.	*Coefficient of Reflection.*
Light cream	66
Light pink	60
Light yellow	58
Light blue	55
Light greenish yellow	54
Light buff	52
Light green	42
Light terra cotta	41
Medium terra cotta	39
Light greenish blue	36
Medium blue	32
Warm green	19
Medium green	14
Red	12
Blue, dark	12
Green	11

Not only do the lighter colors give a more cheerful appearance to the room, but they also are economical from the standpoint of cost of artificial illumination.

In specifying the paint to be used for any particular location it is of the utmost importance that specifications fully cover the requirements. Such a specification clause as "A good grade of oil paint shall be used," etc., is meaningless. No good painter really desires to use cheap paint and only does so when forced to by competition. The cost of labor in its application is the same for either a good or poor grade of paint.

Building in March

The value of building contracts let during March showed an increase over January and February and was an amount larger than that of any month in the year 1919. March shows $328,000,000 as compared with $217,000,000 for February and $236,000,000 for January. The total figures for the first quarter amounted to $781,000,000 as against $275,000,000 for the first quarter of 1919.

About 35 per cent of the first quarter's total this year is allotted to the construction of industrial buildings and 20 per cent each goes to residential buildings and to public utilities. That is to say, the residential contracts are still below normal and far below where the needs—now so pressing—are likely to be relieved. The March contracts let in New England were twice the February figure. In New York and northern New Jersey, where there had been in February a falling off of almost half of the January figure, there was a gain which almost reached the January total.

Probably the most influential development during the winter is the success and the more and more wide application of what has been called the "Detroit Plan." Its aim is to provide money on the easiest possible terms to those people who wish to build a home. For this purpose a corporation is organized and financed by the employers of labor which shall be in no sense speculative—but neither is it benevolent. The project developed so satisfactorily in Detroit that it is being adopted to some extent in New York and in Chicago and undoubtedly it will become a fundamental part of the building program throughout the country, furnishing the necessary encouragement to the building of moderate cost homes.

Such a scheme provides, of course, the money with which people are to build and the encouragement to go ahead, but it does not provide the materials with which the contractor is to work. It is frequently difficult for the smaller firms to compete in the hunt for materials and in the handling of labor. Production generally throughout the country seems to be in a state of serious inefficiency, chiefly because there is no serious attempt on the part of organized labor to make the necessities which its individual members actually require to live.

Attention is directly concentrated upon the division of the profits and the work itself doesn't much count. At the present writing New York City is in a state of siege and the prices of food are soaring. The people who pay them think an ideal is at stake and don't complain. Just how long we shall continue as a people to look upon money and high wages as an ideal is another way of asking just how long our under-production of houses and of building materials is to continue.

In addition to the work contracted for, as given below, there are great quantities of construction being held up for more favorable conditions:

	Contracts let March, 1920	Contracts let February, 1920	Projected work March, 1920 first quarter
Minnesota, North and South Dakota	$11,038,000	6,017,000	$44,244,000
Middle West	89,727,000	78,082,000	681,032,000
Ohio, West Virginia and Western Pennsylvania	67,888,000	42,520,000	180,514,000
Eastern Pennsylvania, Southern New Jersey, District of Columbia, Delaware and Maryland	50,036,000	31,854,000	296,721,000
New York and Northern New Jersey	66,623,000	36,375,000	303,270,000
New England	42,584,000	21,814,000	193,804,000

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Roofing the Home

PART I.

Prepared or Rubber Roofing. The Asphalt Shingle and the Built Up Felt and Pitch Roof

NO feature so strongly marks the advance of civilization in any country as the type of shelter which its population constructs, and real shelter is not possible without a weathertight roof.

In earlier days (and as yet in some countries) steep roofs covered with crude overlapping units formed the common type of roof covering. Thatch and bark shingles have not entirely disappeared, but to-day the home builder does not consider them. Thatch may be admired for its picturesqueness, but it is hardly a dependable roof. Members of the A. E. F. can testify to this fact.

Of late years a type of roofing in which pitch and felt form the main elements has come into popularity, and the bituminous roofing industry has increased by leaps and bounds so that to-day products thus classified are used to cover a greater area of roof surface than the aggregate covered by all other types combined. Due to the recent origin of many such products we cannot know from the test of time whether they will give the service that slate, tile or other ancient roofing materials have, but present indications are that the better class of this type of roofing will give satisfactory service.

The roof slope has an important bearing on the choice of roofing material, the flatter the roof, the more severe the requirements for the roof surface. Shingles will shed water on a steep slope, but if used on a flat slope water, melting snow and ice will invariably back up under the shingles and leaks result. For the flat roof a continuous membraneous surface is essential. Metal with soldered seams has been used to good advantage, and its characteristics will be discussed in a later article.

To make clear what is meant by bituminous roofing it might be well to state that within this classification fall all prepared roofings in roll, sheet or shingle form and all built up felt and tar roof surfaces. Due to the lack of standard grading rules these products vary greatly, each manufacturer making such claims for his particular product as in his judgment are warranted. Extravagant claims, unsubstantiated by fact, are sometimes made to the detriment of the product as a whole. The bituminous roof in any form is a combination of roofing felt and pitch.

While the prime function of a roof is to shed water, yet when used for the country home with pitched roof it must also possess artistic merit, and readily harmonize with the architectural design. The built up roof of felt, tar and gravel or slag is only suitable for those portions of the home where flat roofs occur. The roofing pitch used in this industry is obtained either from native asphalt deposits cut in various oils, or occurs as a by-product from coal gas production, coke manufacture, water and oil gas production, tar by-products from vegetable oil refining and wood distilling processes. Heavy residuals from the distillation of oils having an asphalt or similar base are also used.

The felt used for roofing purposes is composed of various materials as follows: (1) Animal and vegetable fibers, as wool, cotton and linen, obtained from the maceration of rags and rope; (2) Old paper, jute, flax-tow, hemp, etc.; (3) Linters and mill fibers of the waste class; (4) Fibrous wood products obtained by the sulphite and soda process; (5) Mineral fibers, usually of the asbestos series, but sometimes blown slag, mostly non-absorbent.

Sometimes woven textiles and very rarely wires or wire mesh are used as reinforcement. Clay, powdered limestone and similar earthy materials are used as fillers. They add weight, absorb slight saturant and contribute no strength.

A good roofing felt will contain 50 to 75 per cent of cotton fiber, a very small percentage of wool, and old paper to but a limited extent.

Prepared Roofings—Roofing felt when saturated and afterward surfaced with bitumen is a waterproof roofing material, and is commonly termed "Prepared Roofing" when made up in rolls, and "Felt Base or Asphalt Shingles" when cut in shingle form.

Prepared roofings fall into two general classes, depending on the number of layers of felt used. In the first class but one layer is used, while in the second class, two or more layers are cemented together with pitch. These are designated as two ply, three ply, etc.

The single layer roofings are manufactured with either a smooth surface or mineral coated surface. In the former the bituminous coating forms the exposed wearing surface. These roofings have a finely ground soapstone or talc brushed over the

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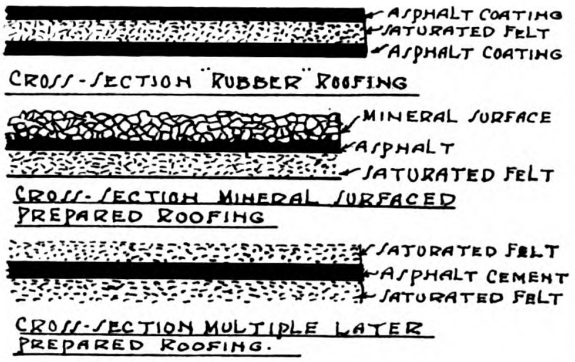
surface to prevent sticking in the roll. This gives the roofing a light colored appearance when unrolled which is often retained for a considerable period. The single layer prepared roofings are usually manufactured in three weights, standardized at 35 lb., 45 lb. and 55 lb. In trade terminology these are known as 1 ply, 2 ply and 3 ply, an entirely erroneous classification and one which it is hoped will shortly be discontinued. Another misnomer that has stuck is "Rubber Roofings," probably applied on account of the smooth, or rubber-like surface. No rubber is used in their manufacture—in fact it would be an unsuitable material for



PREPARED ROOFING

such use. The *quality* of these rubber roofings varies greatly. They come out under different trade names and vary in color, surface corrugations, etc. The different qualities produced by one manufacturer have varying appearances. To meet price competition some of the grades produced are below the standard required for a good grade roof, but there is a strong demand for a cheap grade roof for temporary structures, barns, outhouses, etc. The Government used a large quantity of prepared roofing during the war.

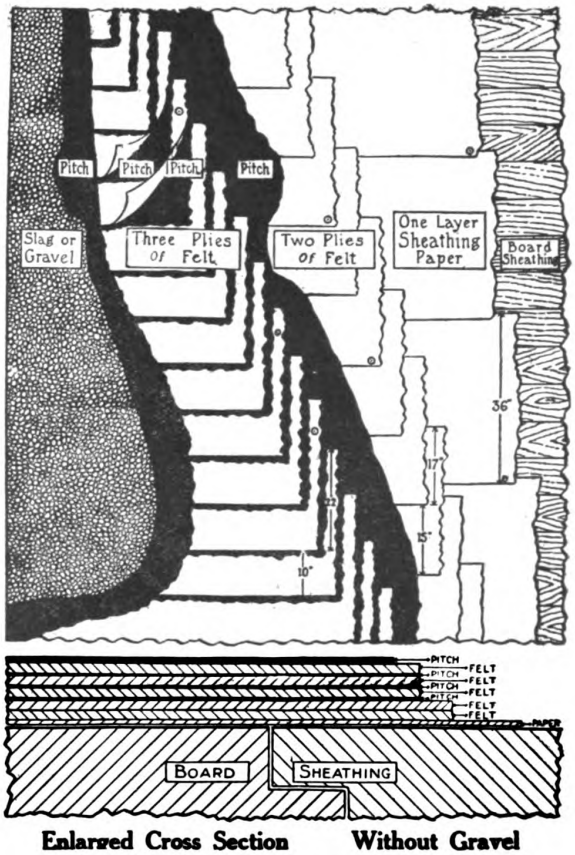
The mineral surfaced (single layer) prepared roofings are coated on the exposed surface with granular material such as crushed slate and were produced to supply the demand for a low-priced roofing of attractive appearance. They are generally made on the same base as is used for the 45 lb. (Trade term 2 ply) rubber roofing. The underside of the surface is generally left uncoated. Red and green crushed slate surfaces have become quite popular, a large quantity of slate now going into coatings for prepared roofing and asphalt shingles. Due to the color being a natural one it does not fade. The standard weight of such slate surfaced roofing is 80 to 85 lbs. to the square (100 square feet covered roof area).

Prepared roofings are usually put up in rolls that will cover 100 square feet of roof surface allowing a 2-inch lap.

Asphalt Shingles—The production of asphalt shingles on a felt base and surfaced with red or green crushed slate is a comparatively recent development, and was the first type of bituminous roofing produced which made up into a really attractive roof when laid. The "shingle" idea is well developed in the minds of the public, and thus by conforming to this idea in prepared roofing its use in home construction rapidly increased.

Such shingles either come in individual units or in twin or multiple strips. More roof surface can be covered in a given time by a roofer when using the strips. The single units measure 8"x12¾" and are laid 4" to the weather, so that due to lapping triple protection is provided. When furnished in 4 shingle strips they are made only 10" wide, thus affording double protection.

These shingles will form a serviceable roof for the country home with patched roof, provided the slope of the roof is not less than 4" rise to the foot. A greater slope is desirable in locations where ice and snow occurs.



BUILT-UP ROOFING

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Built Up Roofings—The built up type of roof is only suitable for flat roofs. It consists of alternate layers of felt and pitch. It is specified as 3 ply, 4 ply, 5 ply, etc., depending on the number of layers of felt used. Specifications have been developed, which, if strictly carried out, insure a serviceable roof. The standard weight of saturated felt for roofing purposes is 15 lb. to the 100 sq. ft., with an allowable variation of one pound either way. Approximately 60 per cent of this weight is saturant and 40 per cent felt, but these percentages vary, depending on the viscosity of the saturant and the absorbent qualities of the felt. There are several other weights of felt manufactured because of demand to meet competitive conditions, but there is no reason for any other weight than 15-lb. saturated felt for roofing purposes.

The built up roof is usually surfaced with gravel or slag and therefore is often called a gravel or slag roof. The purpose of such top surface is to permit the use of a greater quantity of pitch (75 lbs. to the square) over the top coat of felt, the gravel preventing the pitch flowing to the low points of the roof, and adding to the fire resistance of the roof covering.

When gravel roofs are applied on a concrete roof deck the standard practice is to coat the concrete with pitch and apply a complete coating of pitch over each layer of felt; when applied over a wooden roof deck, the first coating of pitch is applied over the second layer of felt and a coating of pitch provided with each succeeding layer of felt.

Gravel roofs are not generally adapted for roof inclines exceeding 2 in. fall to the foot horizontal, and an incline of from ¼ to ½ in. to the foot is better than an incline exceeding ½ in., for the reason that it makes more practical the use of the maximum permissible amount of pitch and gravel on the surface, and as the "built-up" method using saturated felt and pitch provides a surface that is watertight or will hold water, instead of being capable of simply shedding water, there are many practical reasons in favor of the roof deck having a minimum incline.

The important subject of flashings has not been here treated as it will be covered in a subsequent article.

In the Field of Industry

Consolidation of Hydraulic Pressed Steel Company's Interests

The Hydraulic Pressed Steel Company announces the consolidation of all its interests under the name of The Hydraulic Steel Company of Cleveland. The individual plants will be known as follows: The Hydraulic Pressed Steel Co., of the Hydraulic Steel Co., Cleveland; The Hydraulic Steelcraft Co., of the Hydraulic Steel Co., Cleveland; The Cleveland Welding & Mfg. Co., of the Hydraulic Steel Co., Cleveland; The Canton Sheet Steel Company, of the Hydraulic Steel Co., Canton.

The executive offices of the company are in the Illuminating Building, Cleveland, Ohio, with branch offices in New York, Chicago and Detroit.

F. C. Austin Company Increases Manufacturing Facilities

The F. C. Austin Company has combined with the Linderman Company, whose productive organization and enormous manufacturing facilities created such favorable comment during the war.

The combination of Austin and Linderman plants increases eight-fold the capacity of the present Austin output, and probably gives this new company the largest capacity for earth-loading and cement-working machinery in the United States.

The F. C. Austin Machinery Company is incorporated to take over the entire business of the F. C. Austin Company, Inc., the Municipal Engineering & Contracting Company and the Muskegon plants of the Linderman Steel & Machine Company, and retains the personnel of the companies whose combined efforts are directed towards supplying the demand for the Austin machines.

F. C. Austin retires from the active management and the president of the Linderman Company, Mr. B. A. Linderman, assumes control.

Offices of the combination will continue in the Railway Exchange Building, Chicago.

J. B. Johnston Gets New Post

Announcement is made that J. B. Johnston, formerly manager of the Ordnance Department of the Crucible Steel Company of America, Harrison, N. J., has been appointed general manager of the Standard Scale & Supply Company, Pittsburgh, Pa., manufacturers of "The Standard" concrete mixers and other equipment for the use of contractors.

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Housing the Motor Car

A Study of Possible Arrangements for the Garage

IF the city resident needs an automobile, then doubly so does his country cousin. In the city the problem of housing the car is solved by the convenient public garage, while in the suburbs the nearest such garage is usually at a distance, and the home owner prefers to house his car nearer home, where he can fuss over it during spare hours.

Three main schemes have been tried, each having its merits and disadvantages.

The first is to place a separate garage building on the same lot with the house, usually some distance to the rear. This is undoubtedly the most common method. The minimum size for a one-car garage is 10 feet by 20 feet and for a two-car garage 18 feet by 20 feet. For the latter 20 feet square or 20 feet by 22 feet will be found more advantageous. This arrangement is shown in Fig. 1. A side entrance



FIG. 1. GARAGE PLACED AT SERVICE ENTRANCE

door at least 2′ 6″ x 6′ 6″ should be provided, so that the opening of the large doors is unnecessary except when the car is to be taken in or out. Such a scheme requires the provision of a driveway from the main road to the garage. It is undoubtedly the most expensive plan, and has its disadvantages, especially during rainy weather, when one must traverse some distance to reach the garage from the house.

The next plan, which is coming into more and more favor, is to construct the garage as an extension or wing of the house proper. This plan adapts itself to several styles of architecture, the garage on one end balancing the sun parlor at the other. A metal covered door leads directly from the garage to the house, it thus being unnecessary for the occupants of the car to alight outdoors to enter the residence. In such construction the wall



FIG. 2. GARAGE BUILT AS WING OF HOUSE, BUT SET BACK SO AS TO PERMIT THE PROVISION OF WINDOWS IN SIDE WALL OF HOUSE PROPER

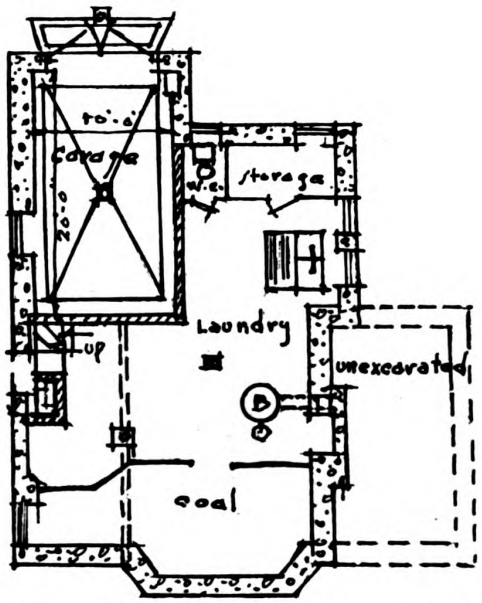

FIG. 4. GARAGE INCORPORATED IN HOUSE PROPER. SLOPING GROUND PERMITS GARAGE ENTRANCE AT REAR OF CELLAR

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between the garage and house should be made fire retarding. Portland cement plaster or wire lath, or plaster boards covered with metal over the wood studs, is suitable construction for a frame structure. The only real objection to this plan is the slight increase in fire insurance rates, but this is not a serious item.

Such an arrangement is shown in Fig. 2.

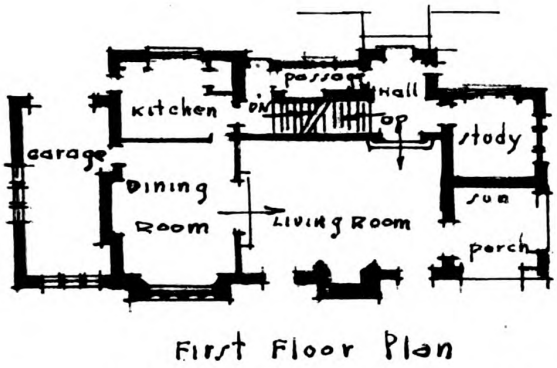

FIG. 3. ANOTHER ARRANGEMENT IN WHICH GARAGE IS PLANNED AS A BALANCING WING OF HOUSE

The third plan is to incorporate the garage directly in the house. This plan is used to best advantage when the grade of the property slopes considerably towards the rear. The garage can then be placed in the rear of the cellar, a side driveway leading thereto. The ceiling, partitions and doors enclosing the garage space should be made fire resisting. Such an arrangement is shown in Fig 4 and is usually the most economical, both as to space required and initial cost. However, it is not always possible to work out a satisfactory arrangement on this plan. Several variations of the arrangements described are possible and have been used successfully. For instance, when the house is situated on a terrace it is quite feasible to place the garage directly under the front of the residence.

The accompanying photographs and diagrams illustrate the schemes above set forth.



FIG. 5. AN ARTISTIC TYPE OF THE ISOLATED GARAGE

A New Development in Liquid Fuel

There has appeared on the fuel market a new source of energy—that is, a new combination of old sources in the form of a colloidal suspension of coal particles in fuel oil. This furnishes a readier and cheaper fuel and makes possible the use of the poorer coal veins for the coal content. It can be sealed against combustion, has a greater heat content per unit weight than either coal or oil, handles as simply and easily, is self-quenching in water, burns without ash, yet is capable of throwing up the densest of smoke screens by the proper manipulation of the air registers on the furnaces. This feature is of use in naval warfare.

It was developed by the Submarine Defense Association, a private concern, with the assistance of the United States Navy and the British Admiralty to combat the scarcity of fuel during the last year of the war.

Many failures had come from attempts of a similar nature for the same reason that lemon seeds fall to the bottom of a glass of lemonade—gravity. But Linden W. Bates by first pulverizing the coal to nearly molecular fineness and perfecting a suspending ingredient—a fixateur—was able to overcome gravity and keep the coal in suspension in a sort of colloidal form. It was tested just before the signing of the armistice and is now ready for commercial use.

It is well known that our oil fields are not inexhaustible and that while but few good coal veins still remain, there are vast quantities of coal in veins too lean to use alone. However, by putting this coal in combination with oil it is not only possible to burn it but also effects a great saving of oil. A series of mixtures is made for various uses about 1 per cent of the fixateur being put in each, and the powdered coal content running from 30 to 75 per cent.

The fuel will flow in pipes under pressure and will atomize readily in old equipment of nozzles. It will remain suspended for months and only needs a slight stirring at the end of that time.

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New Catalogs of Interest to the Trade

These catalogs may be secured direct from the manufacturer. If you prefer, write the date of this issue and the numbers, of any catalogs on a postal and mail it to "Building Age," 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.

97. 101 Reasons for the Smith Simplex Paving Mixer. T. L. Smith Company, Old Colony Building, Chicago, Ill.—Illustrated book describing the mixers manufactured by this company.

98. The Sharp Rotary Ash Receiver. The Sharp Rotary Ash Receiver Company, Inc., Binghamton, N. Y. —Catalog D illustrates and describes this ash receiver. Prices are given.

99. Sager Metal Weatherstrips. Sager Lock Company, North Chicago, Ill.—Illustrated booklet giving advantages of Sager metal weatherstrips.

100. Contractor's Atlas. The Atlas Portland Cement Company, New York City.—January issue contains some interesting data on concrete chimney construction, curb and gutter work, etc.

101. The "Standard" Checking Floor Hinge and Double Acting Floor Hinge. The Shelby Metal Products Company, Shelby, Ohio.—Illustrated folder describing these hinges. Prices given.

102. Tilex. Superior Tile Company, Pittsburgh, Pa. —Folder illustrating and describing these self-spacing, self-binding tiles, the first ever to be manufactured.

103. Standardized Metal Caging. Mitchell-Tappen Company, New York City.—Illustrated folder calling attention to the special features possessed by this metal caging. Directions for applying given.

104. Federal Traffic News. Federal Motor Truck Company, Detroit, Mich. January-February number contains some interesting facts regarding the trucks manufactured by this concern. Illustrations show the various uses to which these trucks are adapted.

105. Drop Forged Tools. The H. D. Smith & Company, Plantsville, Conn.—Catalog No. 25 illustrates and describes the various tools manufactured by this company.

106. The Heart of the Heating Plant. Minneapolis Heat Regulator Company, Minneapolis, Ill.—Illustrated circular describing the advantages of the Minneapolis heat regulator.

107. The Yellow Strand. Broderick & Bascom Rope Company, St. Louis, Mo.—Illustrated booklet giving advantages and uses of B. & B. rope.

108. Drawing Materials, Surveying Instruments, Measuring Tapes. Keuffel & Esser Company, Hoboken, N. J.—Thirty-fifth edition of catalog gives illustrations and descriptions of products manufactured by this company.

109. Novalux Street Lighting Units for Mazda Series Lamps. General Electric Company, Schenectady, N. Y. —Illustrated booklet describing these units which come in the pendant and bracket types.

110. Modern Furnace Heating. The Hess Warming & Ventilating Company, Chicago, Ill.—Handbook on furnace heating with a description of the Hess steel pipe furnaces, pipeless furnaces, and circulating room heaters, together with illustrations of registers, pipes and other fittings.

111. Johns-Manville Asbestos Shingles. H. W. Johns-Manville Company, New York City.—Handsomely illustrated booklet showing houses on which these shingles were used. Special emphasis is laid on "Colorblende"—the aristocrat of fire-safe roofings.

112. Ripolin. J. A. & W. Bird & Company, Boston, Mass.—Colored plate of an English country house where Ripolin, an imported enamel paint, was used.

113. Metaform. Metal Forms Corporation, Milwaukee, Wis.—Illustrated catalog describing Metaform outfits and the advantages gained by their use.

114. Fiberolitic Lighting Fixtures. National Fiberolitic Mfg. Company, Cincinnati, Ohio.—Illustrated booklet giving size and price of the various lighting fixtures manufactured by this company.

115. Architectural and Decorative Ornaments. The National Plastic Relief Company, Cincinnati, Ohio.— Illustrated catalog describing these various ornaments. Prices given.

116. The Story of Brick. American Face Brick Association, Chicago, Ill.—Extensively illustrated booklet showing attractive houses built with face brick.

117. Saws and Saw Tools. E. C. Atkins & Company, Indianapolis, Ind.—Catalog No. 18 illustrates and describes the various tools manufactured by this company.

118. The Adsco System of Atmospheric Steam Heating. American District Steam Company, North Tonawanda, N. Y.—Bulletin No. 150 describes the advantages derived from the use of this system of steam heating. Illustrations show buildings heated according to the "Adsco System."

119. Concrete Chimneys. Portland Cement Association, 111 West Washington St., Chicago, Ill.—Illustrated booklet showing photographs of several reinforced concrete chimneys. Testimonials are also given.

120. Early Spring Helps for the Beaver Board Dealer. The Beaver Board Companies, Buffalo, N. Y.— Illustrated folder describing Beaver board and the places where it can be advantageously used.

121. Heating Comfort. The Rybolt Heater Company, Ashland, Ohio.—Catalog B illustrates and describes the construction and special features of the Rybold heater.

122. Will You Listen to Reason? M. L. Schlueter, 225 W. Illinois St., Chicago, Ill.—Folder giving seven good reasons why every concrete or cement contractor should use the concrete clinch manufactured by this firm. Trial orders accepted.

123. Grimm's Corrugated Galvanized Wire Lathing. Buffalo Wire Works, Buffalo, N. Y.—Booklet 61-F illustrates and describes this wire lathing, which is especially adapted for stucco work.

124. Vitri-Flux for Concrete and Cement Products. The Granitex Company, New York City.—Literature describing this new and well demonstrated integral flux which by its chemical action produces a stronger, tougher and denser concrete. Vitri-flux is a liquid designed to harden and waterproof concrete.

125. Samson Spot Sash Cord. Samson Cordage Works, Boston, Mass.—Catalog describing and illustrating the sash cord manufactured by this company. Samples are given.

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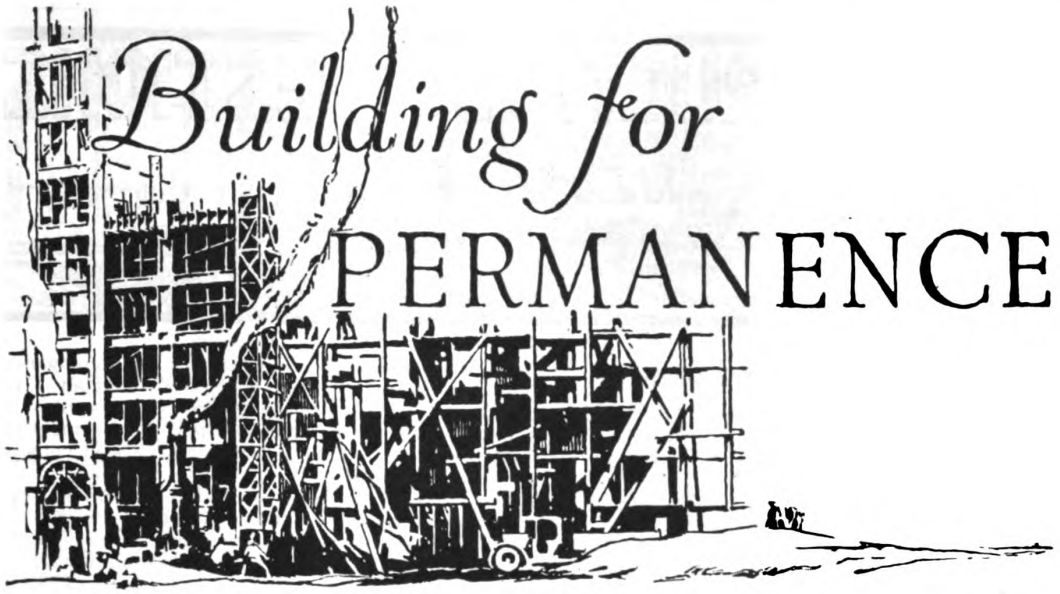
Building for PERMANENCE



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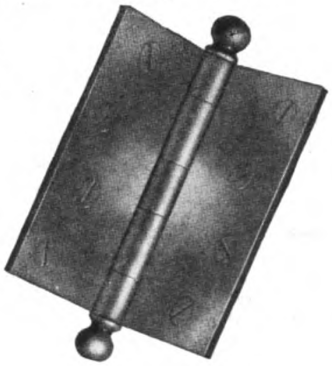

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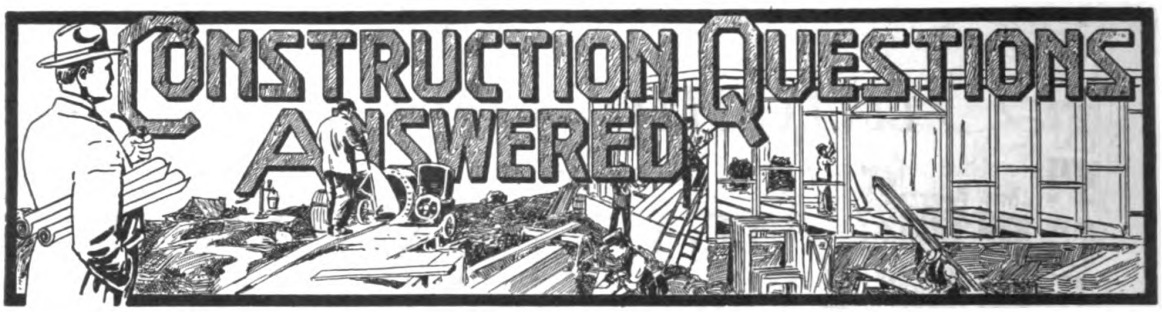
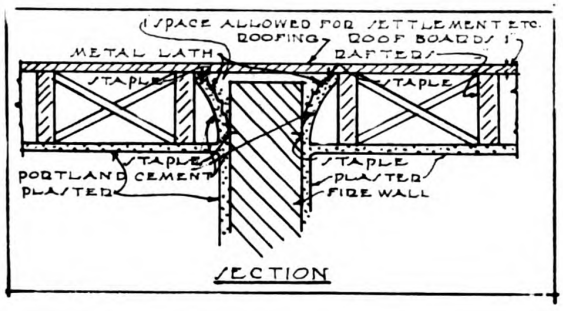


Fire Wall Construction and Sprinkler System

From H. F., Auburn, R. I.—I am planning to build a double cottage this summer, and there is to be a concrete fire wall running between the two sections. The building will be 40 ft. wide and two stories high, with a high pitched roof. The fire wall runs clear across the width and extends from below the cellar floor to just underneath the roof boards without a break or opening of any kind. It is not desired that the wall extend above the roof, hence its stopping directly beneath. In order to allow for shrinkage of bearing timbers, which would bring the roof boarding down hard against the wall, thus raising the boards up from the rafters, I am planning to keep the wall half an inch below the boards. As this space would remain open until the shrinkage brought the boards down and closed it, it would provide a dangerous fire passage. It is, therefore, absolutely necessary to fill up this space with some material that won't burn or perish, and is compressible. Inasmuch as this building is expected to stand for many years and house two families all the time, a good job is wanted. Can you tell me what material to use? Someone suggested that I use mineral or steel wool, but I think that rusts easily, and is soon reduced to dust and is, therefore, not serviceable.



I would also be pleased to know if it would be advisable to install an automatic sprinkler system in a double cottage, and how to estimate the cost of such a system.

Answer—I would advise that instead of attempting to place some compressible and incombustible material between the top of the fire wall and the under side of the roof boards, that you keep the wall an inch or so below the under side of the roof boards and run wire lath over the junction, as shown in the accompanying sketch. This should be plastered with about 1 inch of cement mortar, which will furnish an excellent fire retardant and at the same time permit of some settlement without in any way damaging the roof construction.

With respect to the second part of your inquiry, I would advise that while the automatic sprinkler system is an excellent fire extinguishing apparatus, it is hardly suitable for installation in dwellings, and the cost of installation would hardly warrant the expenditure. Such systems are more suitable to commercial buildings.

Exterior Finish for Second Story of "Aeroplane" Bungalow

From H. L. L., Rome, Ga.—I am building an aeroplane bungalow with one sleeping room on the second floor. The house on the first floor is to be veneered with rough texture brick, in a full range of colors, from a red to gun metal. It is impossible to build the small second story of brick. I am writing to ask the best finish for this story. We can get a wood panel marked off like brick, which we might paint to match the real brick, but it might be difficult to get the colors just right. We had thought, too, of using stucco on metal lath, the stucco to be colored a dark red to harmonize with the brick walls below.

Which of the two constructions is better, and which will look better? I am a reader of your magazine, and would appreciate an answer to this question.

I would like to have your suggestion regarding the use of beamed ceiling for the living room and dining room, the sizes being 24x16, and 19x15, respectively.

Answer—I would advise against trying to imitate brick by the use of other materials. In the first place, you will find it impossible to exactly duplicate in appearance the brickwork of the first story, and after a year or more exposure to the weather, the difference in appearance will become more marked. It would seem to me that finishing the second story in stucco on metal lath without attempting to color this to match the brickwork below would give you satisfactory results. The contrast of the two colors does not usually prove objectionable. A brick first story with stucco and half timber work in the second story makes a very attractive appearance. I am not able to determine from your question whether it is practicable to use any half timber work in the second story.

The beamed ceiling effect, so often used in the living room and also the dining room when the two open directly into each other, is becoming more popular and I feel that you would be satisfied with the effect produced. When the ceiling is not panelled in this man-

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Meets every requirement for thoroughly ventilating foundries, factories, etc., hospitals, schools, churches and other public buildings.

The Alpina Ventilator has unequalled capacity, is noiseless and rotates easily on brass ball bearings which are entirely enclosed and protected from the weather. There is no back draft where the Alpina Syphon Revolving Ventilator is used.

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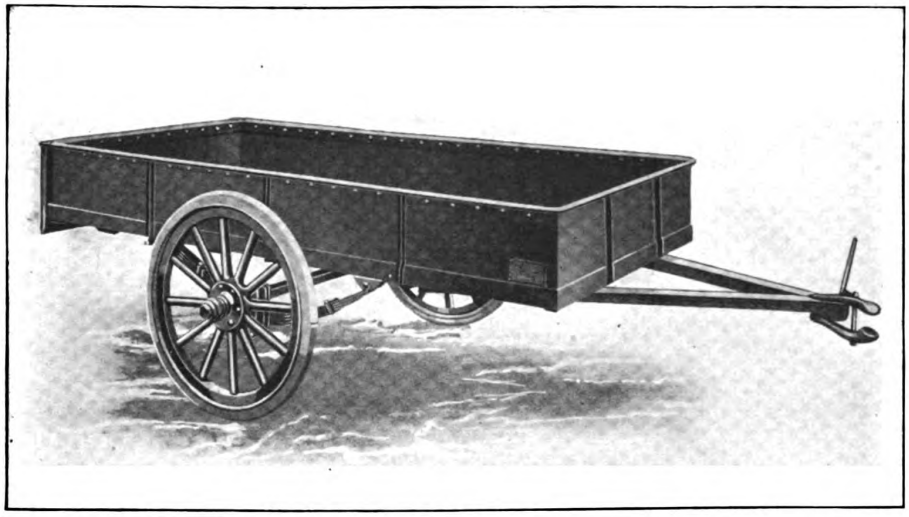

Capacity—2,000 pounds. Body—8 feet long, 46 inches wide, 12 inches high. Body and under frame built of open hearth steel. Axles—1½ inch square bed, special high carbon steel. Springs—Semi-elliptic, oil tempered and double heat treated. Bearings—Roller. Wheels—1½ inch spoke, artillery type, second growth hickory. Tires—32-2, solid rubber. Weight—534 lbs. Other models with gates at front; also extension tongue which permits carrying lumber, poles, ladders, etc., 30 feet long.

Write for Catalog A

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ROGERS BROTHERS COMPANY **Albion, Penna.**

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ner, two rooms of the size you state furnish a rather large unbroken expose of flat ceiling, which tends to give the room an appearance of an extra low ceiling. The use of the beamed ceiling tends to relieve this appearance.

Snow and Ice in Valley Backs Under Shingles

From J. K., Thompsonville, Conn.—What is the best remedy for a roof where the water backs up under the shingles in the valley only in winter when there are snow and ice on the roof which begin to melt?

Answer—The trouble you mention with the roof is not easily remedied. Wherever snow pockets are formed there is danger of this trouble occurring unless the sheet metal used in the valleys is made exceptionally wide. In open valleys, it is usual to use copper or galvanized sheet iron about 16 inches wide. This width is satisfactory on steep slopes and where the snow is not likely to accumulate. At the bottom of the valley, where a large amount of snow may stay for some time, melting on the under side due to the warmer temperature within the building, the sheet metal should be made wider. The only remedy that I could suggest would be to take up the shingles at the lower end, where I assume the snow and ice lodge, and run the metal of the valley a considerable distance on either side.

Balloon Framing and Stucco Waterproofing

From J. B. R., Bushnell, Ill.—Please advise which is the cheapest and strongest construction in a house two stories high,—cutting the studding at first story line and double plating, putting on second floor joists and plate and putting up second story studding, or let studding run full two stories and cut in 1x6 ribbon board for second floor joists to rest on? Also, is there any brand of stucco that will turn water or not let moisture through?

Answer—I would advise, that while it is possible to satisfactorily erect a frame building in either of the ways you mention, a more rigid type of construction and one that is usually erected in less time is to run the studs from the sill to the rafters and let in a ribbon board for the floor joists. This type, of course, is only possible where timbers 20 to 24 feet long can be secured. Such lengths can be obtained from the majority of lumber dealers.

Relative to the second item, the waterproofing qualities of stucco depend largely on its method of application. Stucco placed on wood or metal lath should be three-coat work, put on as dry as it is possible. The final coat should not be applied until the second coat has set thoroughly. There are several brands of integral waterproofing powders on the market, which can be mixed with the final coat to advantage. The committee on Portland cement stucco of the American Concrete Institute in its recent report is unable to state definitely whether such waterproofing materials add greatly to the durability of the stucco. The main item is to properly mix and place the material.

From W. D. T., Amityville, N. Y.—I would like to secure some information concerning the laying of double floors on the first floor. It is necessary to have a ½ inch space and paper between the rough floor and finished floor? I heard it mentioned here that if a warm floor was wanted in winter, an air space of from ¼ to ½ inch would have to be provided between the two floors.

Answer—The usual method of laying a double floor is to lay the under flooring diagonally, using ⅞ inch boards 6 inches wide, laying the finished T and G floor directly over this, running at right angles to the direction of the beams or sleepers, the flooring being blind-nailed. In order to improve the construction, building paper or similar material is often placed between the under and finished flooring.

There is, however, no need of trying to provide an air space, such as you mention, between these floorings. Hardwood floors, such as oak and maple, are milled so as to provide a slight air space, and this is all that is necessary.

There are quilted papers manufactured, somewhat more expensive but at the same time more efficient for laying between the floors. Do not use a tarred or roofing felt paper for this purpose.

From R. P. C., Charlotte, N. C.—Can you suggest some practical means of abating the heat on a flat metal roof. I have been asked this question by a local man, owner of a home where nurses live. The building is brick veneer, three stories high, with the roof sloping from the eaves to a deck on top. The third story is uncomfortably warm in summer due to the metal cover.

Answer—The usual method is to provide a hung ceiling in the top story, thereby providing a dead air space of from one to two feet between the roof and ceiling. The dead air acts as an insulator to some extent, and keeps the temperature in the rooms below what it would be were no air space provided.

The only suggestion I could make, outside of structural alterations, would be to paint the metal roof white or some other light color, thus reflecting as much heat as possible. It is a well-known fact that materials painted darker colors absorb almost all the heat, whereas those painted lighter colors reflect it.

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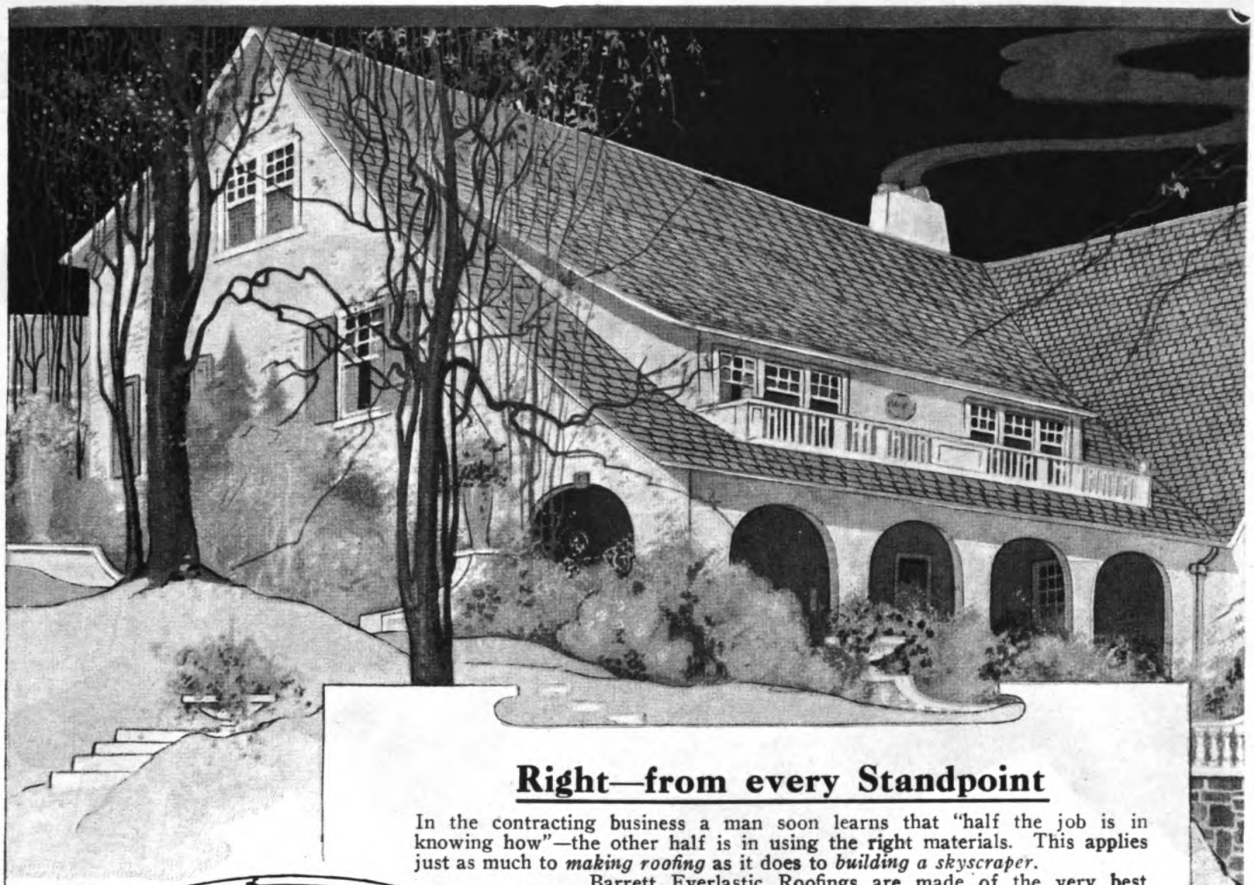

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Barrett Everlastic Roofings are made of the very best grade of waterproofing materials. And all the knowledge and skill we've gained in 60 years of manufacturing experience go into them.

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With two styles of shingles and two styles of roll roofing to choose from, you'll find Everlastic just the thing for every roofing job. Three of the four styles are surfaced with crushed slate in permanent rich color-tones of red or green. No roofings *at any price* are handsomer. Everlastic Roofs will prove good advertisements for you and good investments for your customers.

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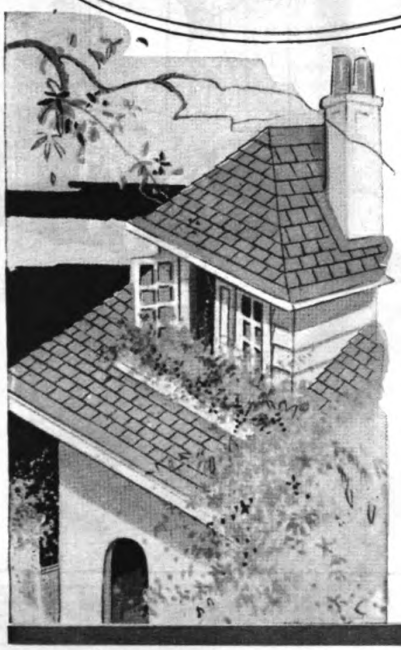

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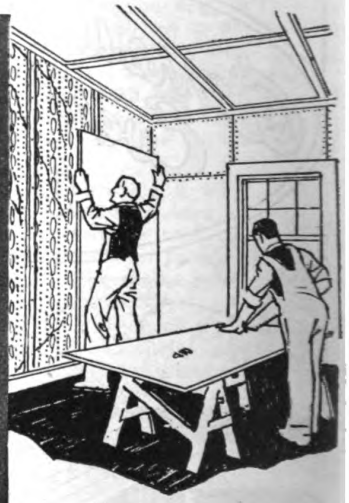

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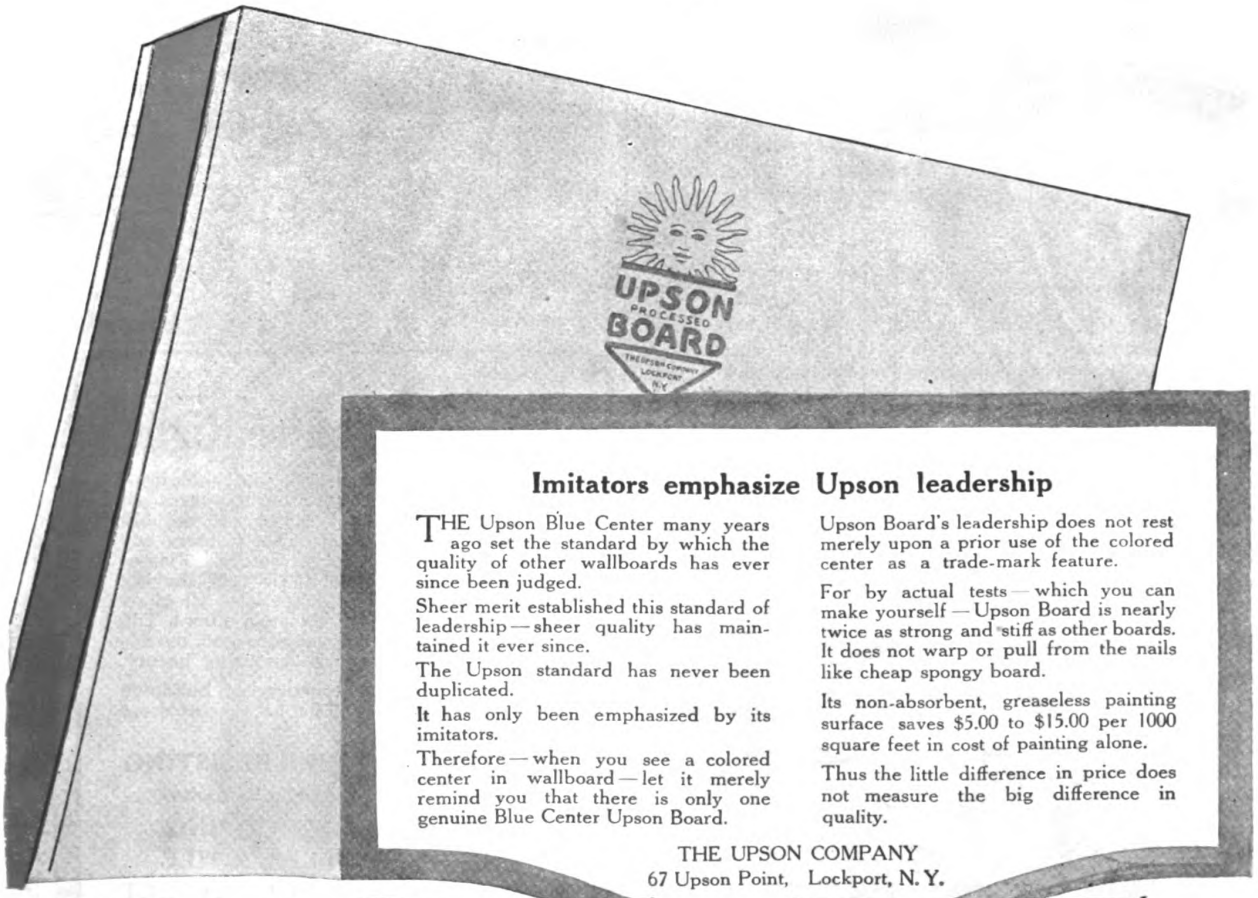

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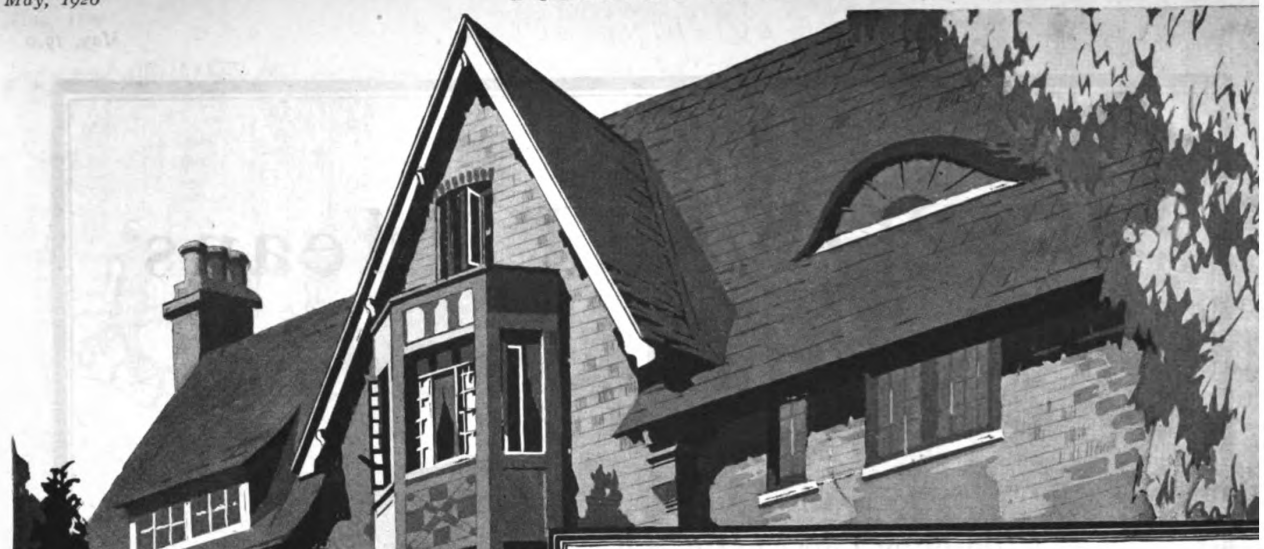



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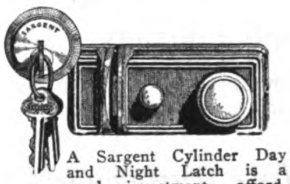
TO OFFSET the past four years of restricted building construction, a positive reaction is due. Building activity will be widespread and all-inclusive in character. Homes, apartments, office buildings and industrial plants must and will be erected.

This is going to be a big thing for your business. It is going to be a bigger thing if you use Sargent Hardware, by creating the good will that comes from identification with products of irreproachable quality.

We are doing our part. Timely advertisements are being run in the popular, widely-read magazines. "Put your own key in your own front door" has been the advice in this national advertising, now appearing everywhere. All who read see SARGENT Hardware. All who sell it and use it are partners in this boost for bigger business.



A Sargent Cylinder Day and Night Latch is a good investment, affording security for any outside or inside door that may not be fitted with a dependable lock. Various styles and finishes, three keys to each lock.

That back stair door, cellar door, storm door, lavatory or closet door would never be ajar with a Sargent Door Closer on guard. In home or office, public or private institutions, Sargent Door Closers will do their work faithfully and silently, and give quiet and dignity to their surroundings.



SARGENT & COMPANY
Hardware Manufacturers
53 Water Street
New Haven, Conn.

SARGENT
LOCKS AND HARDWARE

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NEPONSET Means Comfortable Buildings

Builders who use Neponset Black Waterproof Building Paper in the walls, between the floors, and underneath the roofing show both good building and good business judgment.

It is moisture-proof, air-proof, vermin-proof, and does not deteriorate.

The house sheathed with Neponset is easy to keep warm in winter, because the wind is kept out and so is the dampness. In summer the heat is resisted by this Building Paper, which acts as an insulating course.

Neponset Waterproof Building Paper is used in many other ways from temporary roofing to lining cellars.

All Neponset products are sold by hardware and lumber dealers. In case you cannot obtain stock locally, write to us direct.

Make your own test of NEPONSET'S waterproof qualities by immersing a sample in a pail of water.



BIRD & SON, inc., Dept. B, East Walpole, Mass.

(Established 1795)

CHICAGO NEW YORK

Canadian Office and Plant: HAMILTON, ONT.

Makers of the NEPONSET Twin Shingles, NEPONSET Roll Roofings and NEPONSET Board

BIRD NEPONSET PRODUCTS

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Works Like a "Big Mixer!"

That's the verdict of contractors everywhere who have used the

OSHKOSH **Eveready Mixer**

Designed, constructed and sold for the small concrete job, such as driveways, curb and gutter, and foundations, the Eveready soon demonstrates its value as a rapid, sturdy, consistent mixer.

But contractors have learned that Eveready performance can be used to advantage on larger work. Today, several of these small mixers will often be seen working on extensive construction projects in place of two or three big mixers.

The Eveready turns out 4 cubic feet of thoroughly mixed concrete in 45 seconds; discharges in 15 seconds. Average output of 8 to 9 cubic yards of concrete every hour.

Powered by a simple, dependable gas engine.

Truck mounted—easily and economically moved from one job to another. Weight of outfit, 1500 lbs.

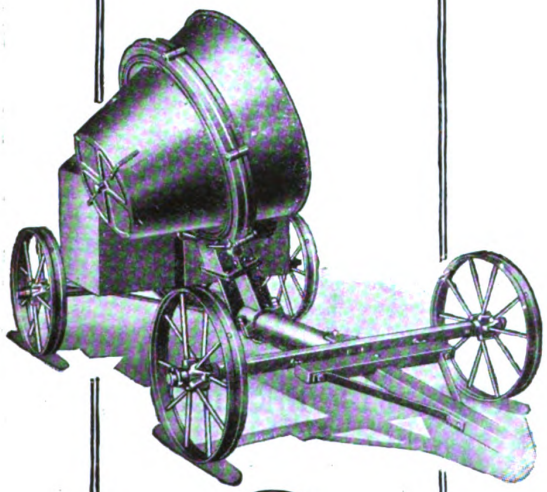
Send for our free booklet "Making Small Jobs Pay." It tells how the Eveready will increase your profits.

OSHKOSH MFG. CO.
802 Buck Street, Oshkosh, Wisconsin

New York Branch: 154 West 39th St., New York, N. Y.
R. H. Hyland & Co., 323 No. Wells St., Chicago, Ill.
Garfield & Co., Hearst Bldg., San Francisco, Cal.

Oshkosh Service

eliminates long, costly shutdowns. Any new part, or the service of an expert gas engine or mixer repairman over night—at the longest. Write for the address of your Service Station.



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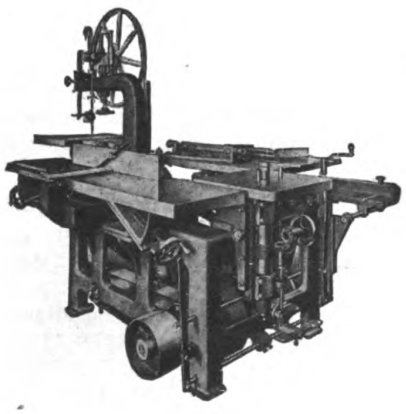
The Famous "31" Universal Woodworker

Enables you to increase your profits by assuring two vital factors—speeding up work and keeping down the payroll. The Famous Woodworker is a big help in solving the problem presented by the high cost of materials and labor. Besides reducing costs, it eliminates millwork delays.

Famous Woodworking machines enable you to handle a greater variety of jobs and pay dividends to you during dull seasons.

We shall be glad to mail you our interesting booklet on Woodworking Machinery. Write for it today.



The Sidney Machine Tool Co.
Sidney, O.

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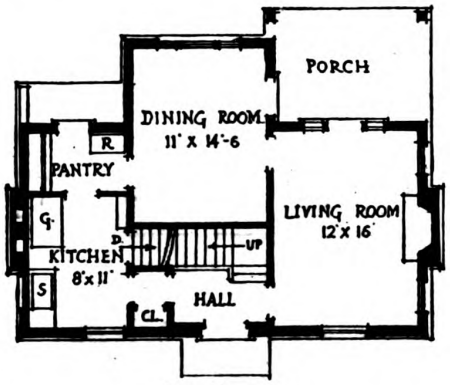
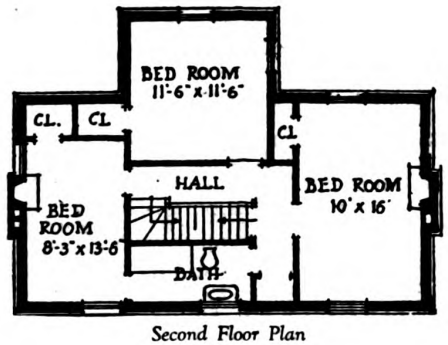
First Prize Design, in nationwide competition for Small Face Brick Homes, as awarded by Members of the American Institute of Architects

A Valuable Service *to* Home Builders



First Floor Plan



Second Floor Plan

FIFTY of the most desirable designs submitted have been compiled into book form for the convenience of architects, building contractors and home builders.

With this book, "The Home of Beauty," you can show prospective home builders the various charming designs, help them select the one best suited to their requirements, and thus secure more contracts.

The American Face Brick Association can supply complete working drawings, specifications and bills of material for any of the homes illustrated, at the very nominal fee of $25 a set.

IMPORTANT

"The Home of Beauty" will be sent free to architects, builders and material dealers, requesting it on their business stationery. Otherwise, fifty cents a copy will be charged. Address Dept. **B5.**

THE AMERICAN FACE BRICK ASSOCIATION

110 South Dearborn Street, Chicago

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Reduce Your Bids by Reducing Your Costs On Workmen's Compensation Insurance

If you would be interested in obtaining compensation protection *at cost*—

In carrying a form of policy which has regularly returned 30 per cent of the annual premiums—

Which includes an Accident Prevention Service that has reduced the insurance *rates* of its policyholders 20 to 50 per cent—

Then you will be interested in investigating the advantages of the Liberty Mutual Insurance Company.

The Liberty Mutual is a cooperative organization of over 4000 of the biggest and best-rated contracting, public-utility, and commercial concerns in the United States. It is managed by a board of directors elected from these associated concerns. All details of its actual insurance work are handled by expert insurance men, of long experience in compensation protection.

The Liberty Mutual furnishes compensation protection to its members *at cost*, paying back its profits each year. It has already paid back in cash dividends *over* $3,000,000, averaging 30 per cent of its yearly premiums.

Furthermore, through *accident-prevention*, the insurance rates of many of its policyholders have been reduced 20 to 50 per cent. Here is one typical instance:

NEW ENGLAND CONTRACTOR
RATE REDUCED 33.2%

1916, accidents on jobs reduced 22%
1917, accidents on jobs reduced 54%
1918, accidents on jobs reduced 66%

In *addition* to this 33.2 per cent rate reduction, this contractor received a *cash dividend* of 30 per cent of his premium. His insurance cost is now less than half what many other contractors are paying to stock companies that have stockholders' profits and agents' commissions to pay.

This accident-prevention service often effects, through reduced time-loss, a dollars-and-cents saving that exceeds the cost of the insurance.

* * *

Many prominent contractors are Liberty Mutual policyholders—such concerns as Fred T. Ley & Company, Inc.; Norcross Brothers; Roydhouse Arey Company; Hugh Nawn Contracting Company; McClintock-Marshall Company.

It will pay you to investigate *why* they buy their compensation protection in this strong New England Company.



STRONG

LIBERTY MUTUAL

Established 1912

INSURANCE COMPANY

HOME OFFICE · BOSTON

District Offices: NEW YORK 30 East 42nd St. · RICHMOND Mutual Bldg. · PHILADELPHIA 20 South 15th St. · CHICAGO 220 South State St.

Branch Offices in All Principal Cities

WORKMEN'S COMPENSATION, PUBLIC LIABILITY, AND AUTOMOBILE INSURANCE

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DUPLEX TRUCKS

BUILT FOR BUSINESS



The Duplex Limited

High Speed—Pneumatic Tired—Medium Capacity—Full Electrical Equipment —Here is a Truck That Does Its Work Economically

ONE of the significant developments of these times in the truck industry is the increasing tendency for men to *BUY* their trucks—and to let fewer and fewer be sold to them.

Look at the success of the Duplex Limited. Already it is an established success—with a steadily growing demand coming from all sections and from men in all lines of business.

If you contemplate buying a truck of medium capacity, look over the Duplex Limited. Have your local Duplex dealer show you the Limited. Note its wonderful ruggedness and mechanical superiority.

It is a Duplex through and through—and as such a very safe investment for all general hauling.



IT IS the principle of this lumber company, that there is nothing better in the lumber business than good stock, reasonable prices and intelligent service.

They have found that when a farmer can have his building material delivered promptly at the spot where he is working, a long step has been taken to overcome mail-order competition.

They have proven by their superior service that Duplex Four-Wheel Drive trucks enable the country yard to serve a larger scope of territory with better and quicker delivery.

CRAPO LUMBER COMPANY
Williamston, Mich.

Gentlemen:

We live in a town of 1,200 people, and are said to be the only lumber company in Michigan, in a town of this size, to operate three trucks. Be that as it may, we know we have been busy when other yards were idle, because we had the stock and could deliver it, at any distance by truck. During 1917 and 1918 when most yards were doing a very light business, we were pushed to the limit. We do commercial trucking and hauling, and have been able to write off our books, repairs, depreciation, gas and driver, while doing our own work, but at the same time deliver free to our customers, who took full loads, and lived within reasonable distances of us.

As to the Duplex Four-Wheel Drive truck, imagine a Kentucky thoroughbred with the pulling qualities of a Clydesdale, a motor that will purr like a contented kitten, or drown out the roar of an express train, that will switch cars, move buildings, and, given reasonable care and attention, will work for you night and day—that is a Duplex, the truck that took us out of the "Small Time" and put us in the "Grand Circuit."

Very truly,
CRAPO LUMBER CO.,
E. W. H.

This same quicker and cheaper service applies to city hauling as well. See the Duplex dealer and find out how to increase your lumber business and at the same time make a gilt-edged hauling investment.

DUPLEX BUILT FOR BUSINESS

Duplex Truck Company
Lansing · Michigan

One of the Oldest and Most Successful Truck Companies in America

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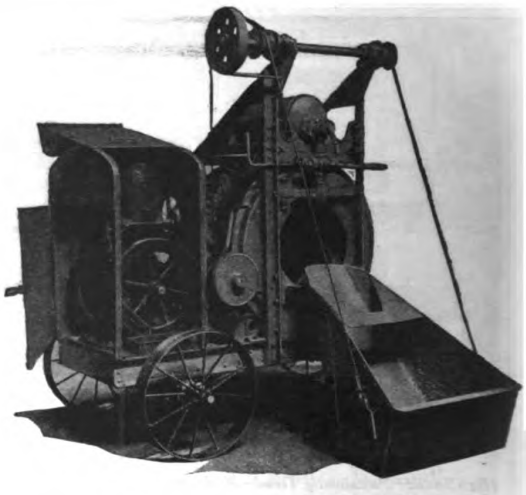
BOSS Labor Saving Construction Machinery

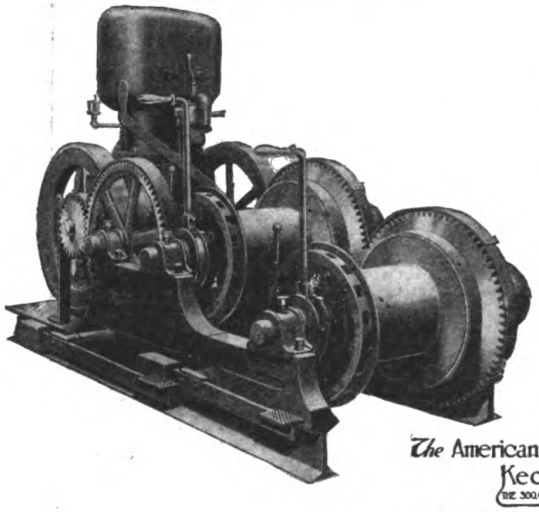
MIXERS

Fast Discharge

Boss Mixers are easily fed because the hopper doesn't clog and the drum opening is large. The mixed concrete is quickly discharged and the steel roller pinion drive, together with Hyatt Roller Bearings, makes the whole machine run smoothly, without break-downs, and with low power consumption. Investigate our famous *Low Charger* also.

Capacities—½, 1, 2, 3 and 4-bag batches.
Gasoline, steam or electric power.



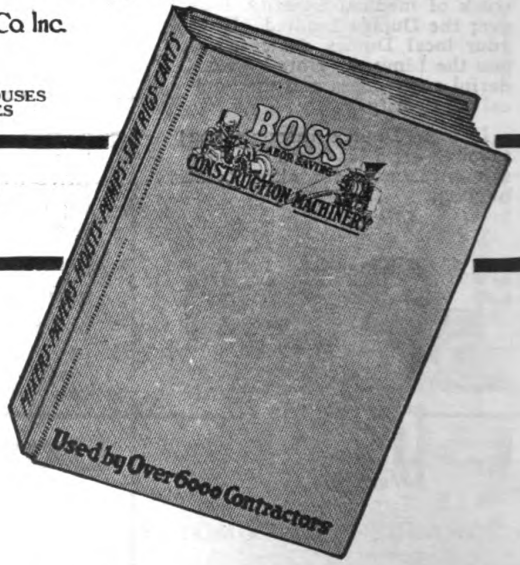


HOISTS

With Hyatt Roller Bearings

For hoisting concrete—for running material elevators—driving piles—excavating—back-filling—operating drag-line buckets, Boss gasoline and electric hoists are doing the trick with the least fuss and trouble. They have Hyatt Roller Bearings and S. K. F. Ball Bearings, and are built in seven sizes and three types. Look in the big Boss Catalog.

The American Cement Machine Co. Inc.
Keokuk Iowa
(BY 300,000 HP ELECTRIC CITY)
BRANCH OFFICES—WAREHOUSES
IN ALL PRINCIPAL CITIES



Get this Big Machinery Catalog and Keep It Handy!

$265.00 BUYS

our ½-bag, low charging, Boss mixer with Novo engine and that's just one of the bargains that you will find in the big Boss Catalog of labor-saving construction machinery—the kind that is used by over 6,000 contractors in America and abroad.

Get the Boss catalog today! Get it before you actually need your machinery. Go through it carefully and see how our prices compare with other manufacturers — quality for quality.

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As Tight As a Bottle



A glass bottle never leaks. Its seams are melted together so that it becomes one piece of glass.

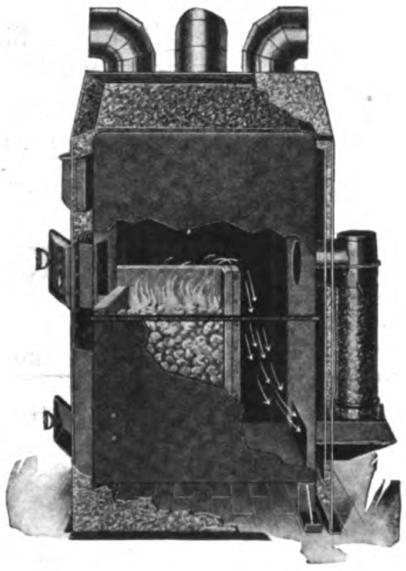
For exactly the same reason, the HESS WELDED STEEL FURNACES cannot leak gas, smoke, or dust. The steel plates of the radiator are riveted together and then they are *welded together* where they join, with a process of welding and melting which makes of them a continuous seamless body of steel.

The firebox, ash-pit, etc., are all inside of this steel radiator and are *fully enclosed* just as they are in the bottle. There are no cup nor sanded seams to open nor leak; no cemented joints in the entire radiator; no amount of expansion and contraction can ever make a leak in this furnace.

It Is Everlastingly Tight

This is only one of numerous features in the HESS WELDED STEEL FURNACE, that make it different and better than ordinary furnaces.

Our 48 page booklet will give you an idea of furnace construction of the best type, and this book we will send you free on request and we will send you also a small sample of steel showing the manner in which the plates are made seamless by welding. Ask for them.



We are making both

Pipe and Pipeless Furnaces

Our free planning service is at your disposal, without any obligation whatever on your part.

HESS WARMING & VENTILATING CO.

1201E TACOMA BUILDING **CHICAGO**

Special Rates to Contractors

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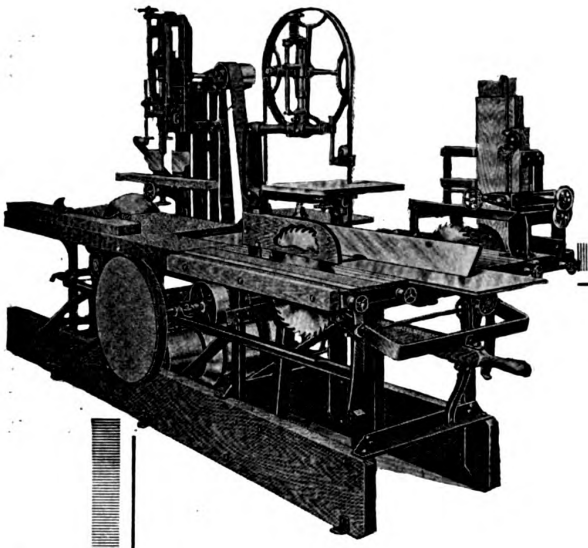


In the shop

The Parks Planing Mill Special produces everything required in modern carpentry. Eight machines in one, it does the work of a double-table circular rip and cross-cut saw, band saw, swing cut off saw, 12-inch jointer, tenoner, upright hollow chisel mortiser and borer, reversible spindle shaper and sanding machine. Shipping weight 1400 lbs. Floor space required, 4 ft. 10 in. by 9 ft. 6 in. Pulley to belt to 10 by 4 in. face tight and loose, 550 r. p. m. 5 h. p.

With Hatchet *and* Pocket Knife

How much work could you turn out without the use of a crosscut saw? You wouldn't like to get along with only a hatchet and a pocket knife for any length of time, would you? Your customers would soon decide that you were slow, inefficient and did unsatisfactory work, wouldn't they? It wouldn't take long for your profits to disappear. Well, that's just the way every carpenter and contractor feels about the use of his

Parks Woodworker

For him it saves three out of four days when in use. It saves the wages of from two to four carpenters. It saves lumber. It has quickly paid for itself and saves money in increased profits. It makes the work easier for all and what is more, does it better than by hand.

Parks machines are light, portable, clean cutting, durable. Always dependable, they lower expense, reduce delay, increase profits, volume of business and clients' satisfaction.

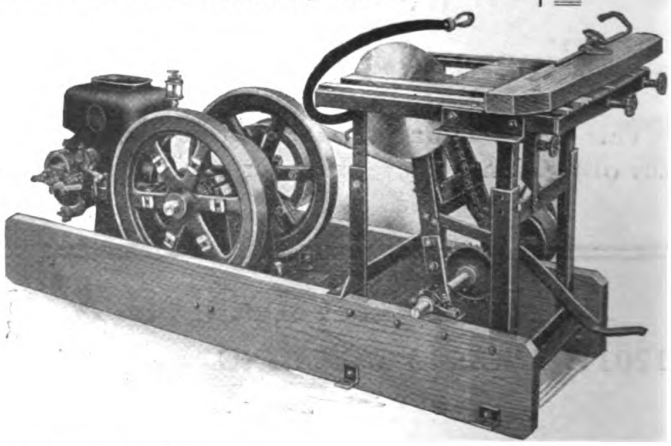
10-day free trial—10-year guarantee.

Write today for catalog and learn what a Parks can do for you.

THE PARKS BALL BEARING MACHINE COMPANY

Station A, Cincinnati, Ohio

Chicago Office and Showroom, 615 Machinery Hall



On the job

Parks Portable Framing Saw Rig speeds up the work. Table has adjustable side brackets for attaching extension when working long material. Adjustable for ripping any width up to 22 inches. Floor space 2 ft. 10 in. by 6 ft. Weight with engine 800 pounds.

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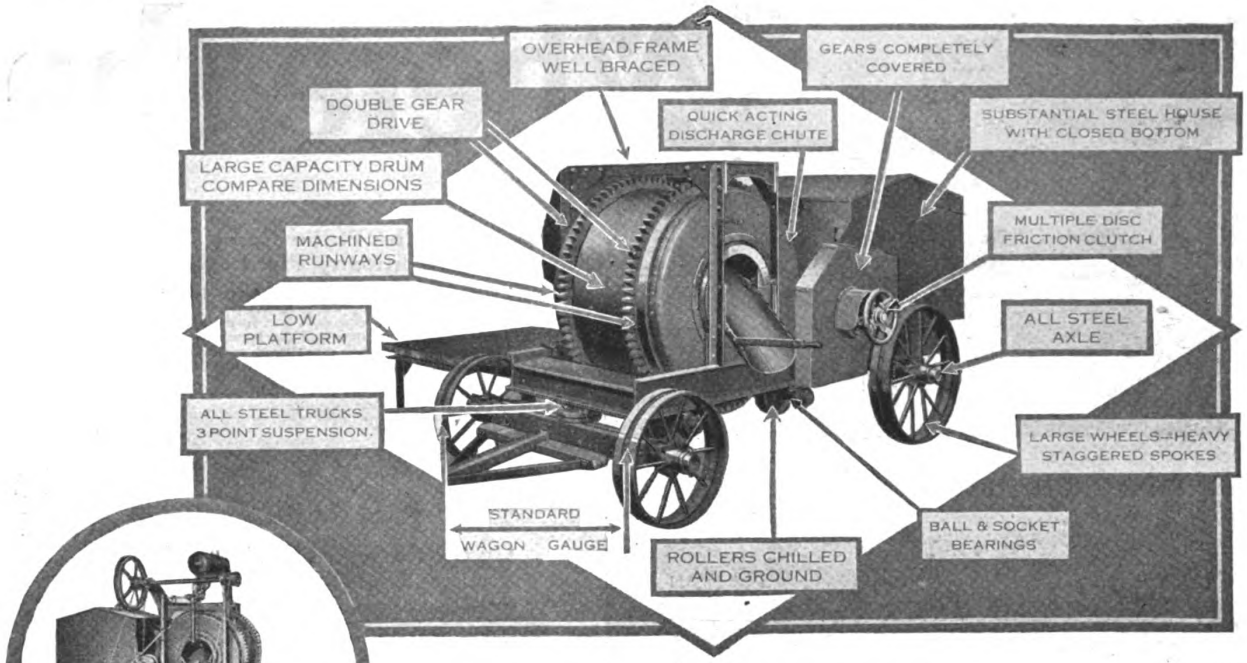

Study the Specifications!

KOEHRING DANDIE

The Big Value Light Mixer

BUILT for the man who measures economy by something more than the price tag.

A remarkable value—because the cost of its thoroughly high class construction is cut as low as big-quantity production in the largest mixer plant in America can cut it.

You can depend on it to stand up sturdily to its work day in and day out. Scientific design takes the place of weight, without the sacrifice of strength or dependability.

The Dandie is specially adapted for work on culverts, foundations, footings, etc. Fleets of them are used by large contractors who need several small machines distributed about one job or several smaller jobs.

Built in capacities of four and seven feet, wet batch rating. May be equipped with low charging platform, power charging skip, batch hopper, water measuring tank, and light duty hoist.



KOEHRING MACHINE CO.

MILWAUKEE WISCONSIN

Write for the Dandie catalog. Fill in the coupon or attach it to your letterhead.

Send Coupon Today

KOEHRING MACHINE CO.

Name.....

Address.....

City.....

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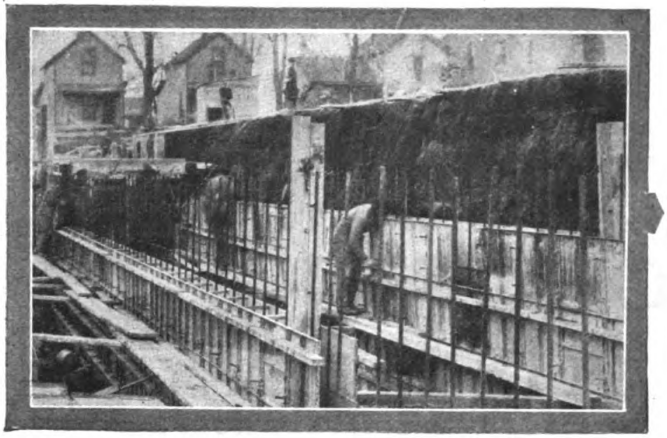
Where the

On the Philip Carey Company Plant

"I have saved about one third of the cost of the forms on this job by using Metaforms. Can safely say that I can also put in a yard of concrete in about one half the time with the Metaforms. They are great time and money savers and I am very well pleased with them."

(Signed) M. G. ROTH

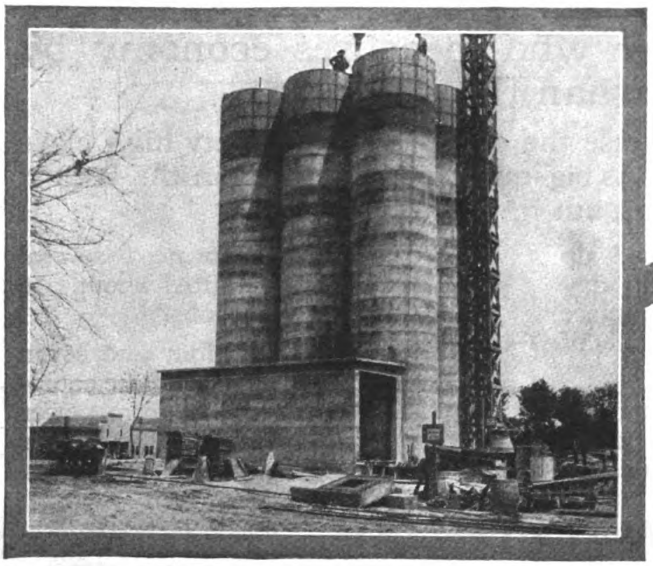


On the State Capitol Tunnel Des Moines

"This tunnel is 3100 feet in length, 9'-6" high and 8'-0" wide, inside measurements, 9" walls; and the construction is carried forward in 50-foot sections."

"We are using two sets of your metal forms (4000 sq. ft.) sufficient to permit uninterrupted operation, weather permitting. The forms have given entire satisfaction, saving time in erection, eliminating all waste of lumber, and insuring a perfect wall surface upon removal of the forms."

THOS. CAREY & SONS
(Signed) JNO. F. CAREY



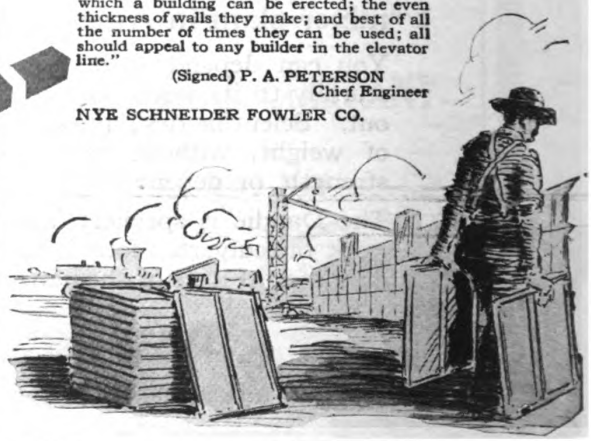
Circular Equipment on Grain Elevators

"We built our first elevator with them (a battery of nine Metaform circular outfits), at Colon, Nebraska, with men inexperienced in handling the forms, and I am glad to say they came fully up to our expectations, and really did more than you claimed they would."

"The features of your forms: that they can be used for any diameter bin; all being cast together, the ease and accuracy with which the reinforcing iron can be placed; the time in which a building can be erected; the even thickness of walls they make; and best of all the number of times they can be used; all should appeal to any builder in the elevator line."

(Signed) P. A. PETERSON
Chief Engineer

NYE SCHNEIDER FOWLER CO.



Metaform

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Evidence Centers

"really did more than you claimed they would", says the Chief Engineer of the Nye Schneider Fowler Company.

The letters reprinted here represent the usual testimony of Metaform-equipped contractors. Very often Metaform performance, to those unacquainted with Metaform speed and simplicity, is nothing short of sensational. Invariably the evidence of practical contractors who have observed Metaforms ***on the job*** substantiates every claim made for them.

Metaform

The claims, in brief, are these—and there is a pocket-book reason for investigating every one of them.

Metaforms ***cut labor costs***—unskilled laborers can set up the simple Metaform units faster than three times as many skilled form carpenters can build wood forms. Metaforms ***eliminate lumber costs,*** and the heavy wastage on each job. They ***speed up*** construction and they turn out a ***smoother, more uniform*** wall.

Regardless of how large or how small, how complicated or how simple your concrete job may be, Metaform equipment will cut your form costs and make every job more profitable.



Send today for the Metaform books—they are free, and their complete description of Metaform equipment will enable you to judge for yourself how well adapted Metaform methods are for your work. Write today.

Metal Forms Corporation

1436 Booth Street, Milwaukee, Wisconsin

Methods

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MURPHY BEDS

Standardizing On In-a-Dor Beds



The Gregg Realty Company finds that standardizing on Murphy In-a-Dor beds removes all doubt as to the success of their buildings.

They know that installation will be simple and inexpensive, that for each apartment they will save the cost of one or more rooms, and that the apartments will rent quickly and stay rented.

Murphy In-a-Dor beds are known factors with the experienced builder.

The apartment house illustrated at the left is one of twenty-seven built by the McCaules Investment Company for the Gregg Realty Company of Kansas City.

Of these one is an 80-unit apartment, seven are 12-unit apartments similar to the one illustrated, and nineteen are 6-unit, 5-room apartments — all equipped with Murphy In-a-Dor Beds.

TO INSTALL DRIVE EIGHT SCREWS

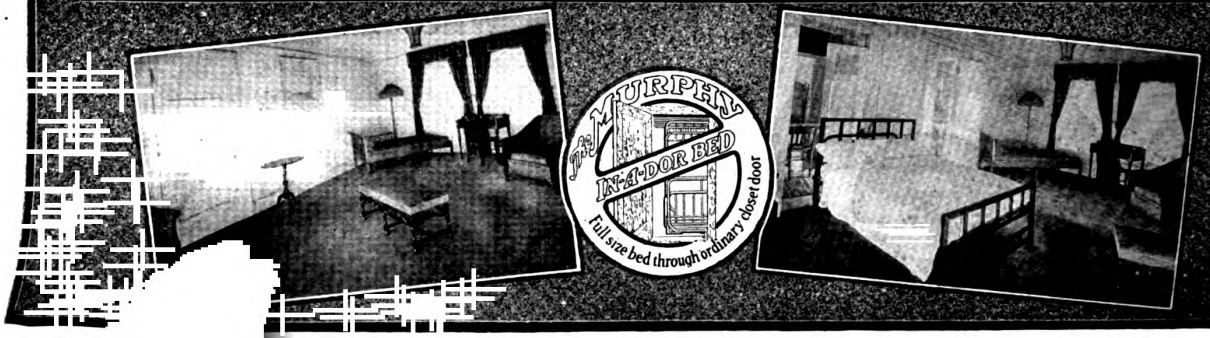
Write us for a catalog and suggestive layouts on apartment houses, bungalows, residences, hotels, hospitals, etc.

"There's Only One In-a-Door Bed— It's a Murphy"

MURPHY DOOR BED COMPANY

22 W. Monroe St., Chicago **Chemical Bldg., St. Louis**

469 Fifth Ave., New York 1103 First Ave., Seattle Wash. 1435 Blake St., Denver 659 Leader-News Bldg., Cleveland
912 Kresge Bldg., Detroit, Mich. 205 O'Connor St., Ottawa, Canada 305 City Club, Kansas City
111 Murphy St., Dallas, Tex. 204 Peach Tree Arcade, Atlanta, Ga.



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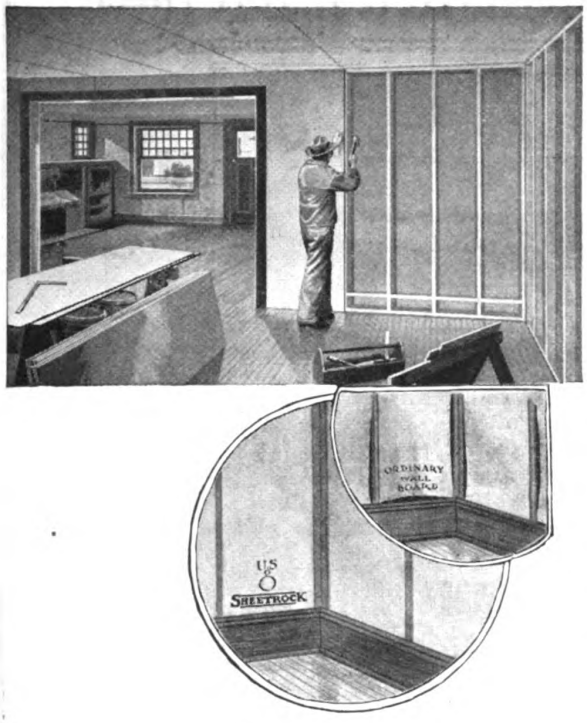
U S SHEETROCK



It Can't Warp—
It Stays Put

A sheet of pure gypsum rock, sheathed in a heavy protective covering, Sheetrock is the standard wall and ceiling material in unit form. It is fireproof. It cannot warp, shrink or buckle.

Sheetrock is rigid, tough and durable. It can be cut, sawed and nailed. It is quickly and inexpensively applied. It takes perfectly any form of decorative treatment.

Sheetrock jobs—new construction, additions and repairs — offer you good profits and a growing volume of highly desirable work.

Sheetrock national advertising, consisting of a series of striking double-page spreads in The Saturday Evening Post, is reaching many home owners right in your own community.

Inspect Sheetrock at your dealer's. Note particularly the U. S. G. Patented Reinforcement which insures extra strength in nailing, a tight-flush joint, and protection in handling.

Sheetrock comes in standard sizes: 3-8 in. thick, 32 or 48 in. wide and 6 to 10 ft. long

UNITED STATES GYPSUM COMPANY

World's Largest Producers of Gypsum Products

Dept. H., 205 W. Monroe St.

Chicago

Sales Offices in All Principal Cities

Please quote BUILDING AGE when writing to advertisers

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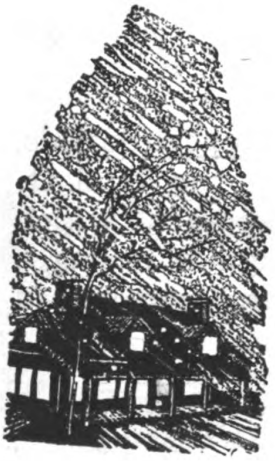
The HUMPHREY Radiantfire



The Most Highly Efficient Gas Heating Appliance in the World



Solves the Problem of the Unused Fireplace

This wonderful new radiant gas heater for the Fireplace, sets back in the chimney and floods the room with Radiant Heat and Firelight.

Saves coal money. Saves you lighting the furnace for two months in the fall and spring. On cold nights, when winter howls outside, you can bank the furnace and keep the living room comfortable with its warmth.

No fire danger with this new fire. No sparks or bursting coal and children can safely play around it. Burns without watching. You turn it on when you want heat and you turn it off again or low when room is warm enough.

General Gas Light Company

New York **Kalamazoo**

San Francisco Chicago Cincinnati Pittsburgh
Philadelphia Atlantic City Buffalo

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Explanation of the WALLACE IDEA

The Wallace Idea eliminates waste in production in the woodworking shop. It saves high-priced time consumed by making endless trips to the large machines; power wasted by running a large machine for a small job; expensive hand sawing and planing; belt expense and floor space.

Why it Cuts Cost and Speeds Production

The mechanical principle embodied in Wallace Bench Machines is **ECONOMY.** They are constructed so that the workman may do from 75% to 80% of his cabinet, pattern, fitting and assembling work **right at his bench.**

The workman's entire time can be concentrated on his work without the disturbing interruptions incident to old methods. The very speed and accuracy of the Wallace Bench Machines is contagious—he will do more and better work with less physical effort, thereby **cutting cost and speeding production.**

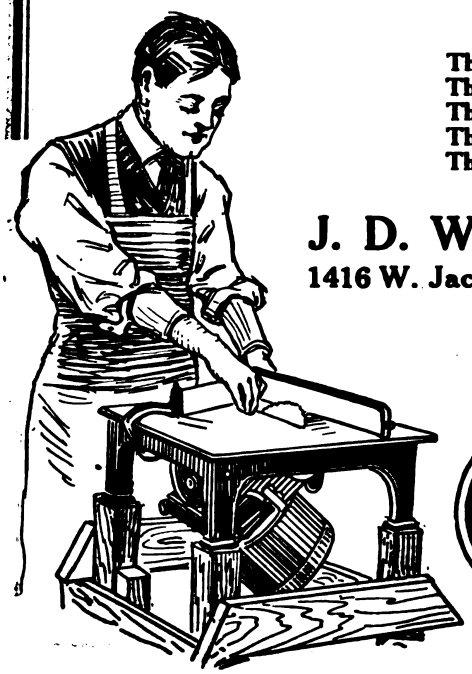
Over 10,586 Wallace Bench Machines in Use

at the present time and they are demonstrating the everyday serviceable and practical application of "The Wallace Idea."

Investigate for yourself. Cut out this advertisement, check the machines in which you are interested and we will send you complete information, also a list of representative users in various lines of industry.

Adopt The Wallace Idea

The Wallace 4" Bench Planer
The Wallace 6" Bench Jointer
The Wallace Universal Bench Saw
The Wallace Plain Bench Saw
The Wallace 14" Band Saw



J. D. WALLACE & COMPANY

1416 W. Jackson Blvd. Chicago, Ill.





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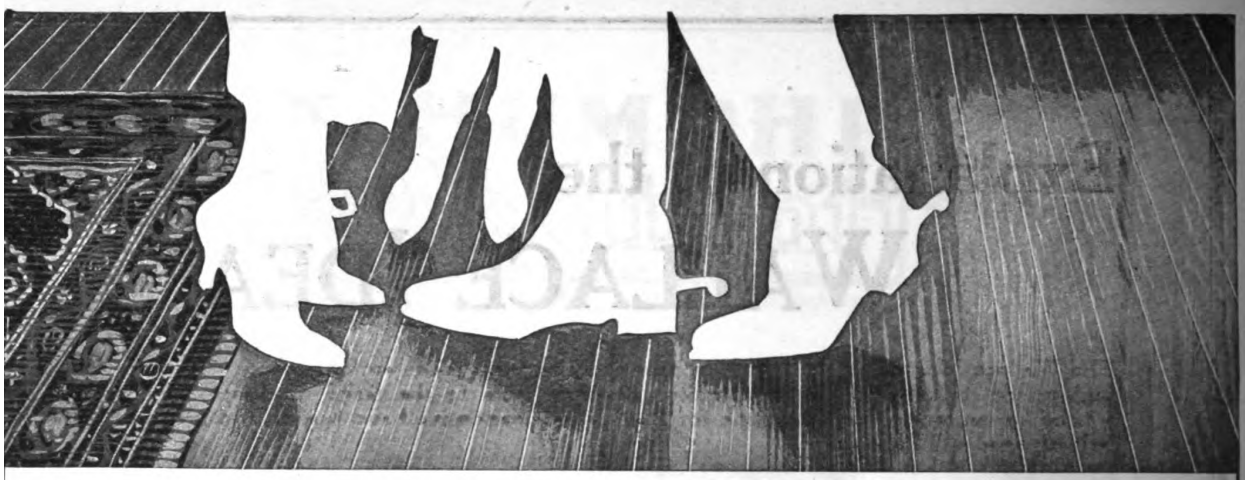

OAK FLOORING PROFITS

Businesslike carpenters and lumber dealers should stop to remember that very few people realize how *much* they can get for their money by laying 3/8-inch OAK FLOORS over their old floors. You'll find them surprised and pleased at the figures you can quote them, and our big National advertising campaign interests them in the good floors proposition. (OAK.)

This means that YOU, no matter where you do business, can pick up a lot of mighty profitable business for yourself by keeping your eyes open for the many chances to talk *"Oak Floors Over Old Floors."* Try it. Others are doing it with fine results. Some even give it their whole time with profit. We will send handsome printed matter to help if you will drop a line today.

OAK FLOORING MFRS. ASSOCIATION

1002 Ashland Block: Chicago:

OAK FLOORS OVER OLD FLOORS

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The marvelous color effects obtained with Ambler Asbestos Shingles increase the value of the house

In considering the great *durability* and the *fire-resisting* qualities of Ambler Asbestos Shingles do not overlook the commercial value of the *color* schemes they permit.

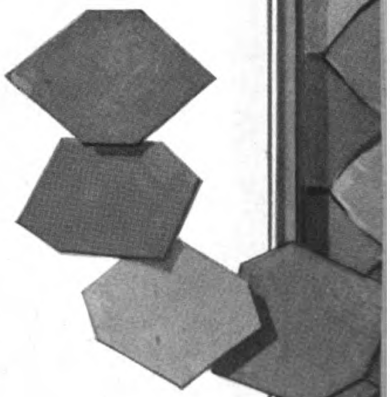
AMBLER ASBESTOS
BUILDING PRODUCTS

Ambler Asbestos Shingles are made in four non-fadeable tones, Newport grey, natural slate, red and green—the only green shingle that will not fade.

Many houses require color on the roof as a finishing touch. It is just that dash of color which gives the house character—which makes the favorable impression, which makes the house *command a better price.*

Ambler Asbestos Shingles are made from a scientifically accurate mixture of the best Portland cement obtainable and strong asbestos fiber. It is this combination of indestructible materials that gives to Ambler Asbestos Shingles their fire-resisting qualities and remarkable durability.

All architects and builders will be interested in seeing samples of the new shingle of everlasting green.



Send for samples showing color and construction

Asbestos Shingle, Slate and Sheathing Company
Ambler, Pa.

Factors: **KEASBEY & MATTISON COMPANY, AMBLER, PA.**

Branch Offices: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Minneapolis, New York, Philadelphia, Pittsburgh and Washington

Manufacturers of: Ambler Linabestos Wallboard, Ambler Asbestos Building Lumber, Ambler Asbestos (Century Brand) Shingles, Ambler Asbestos Corrugated Roofing and Siding, 85% Magnesia and Asbestos Pipe and Boiler Covering, Asbestos Textiles.

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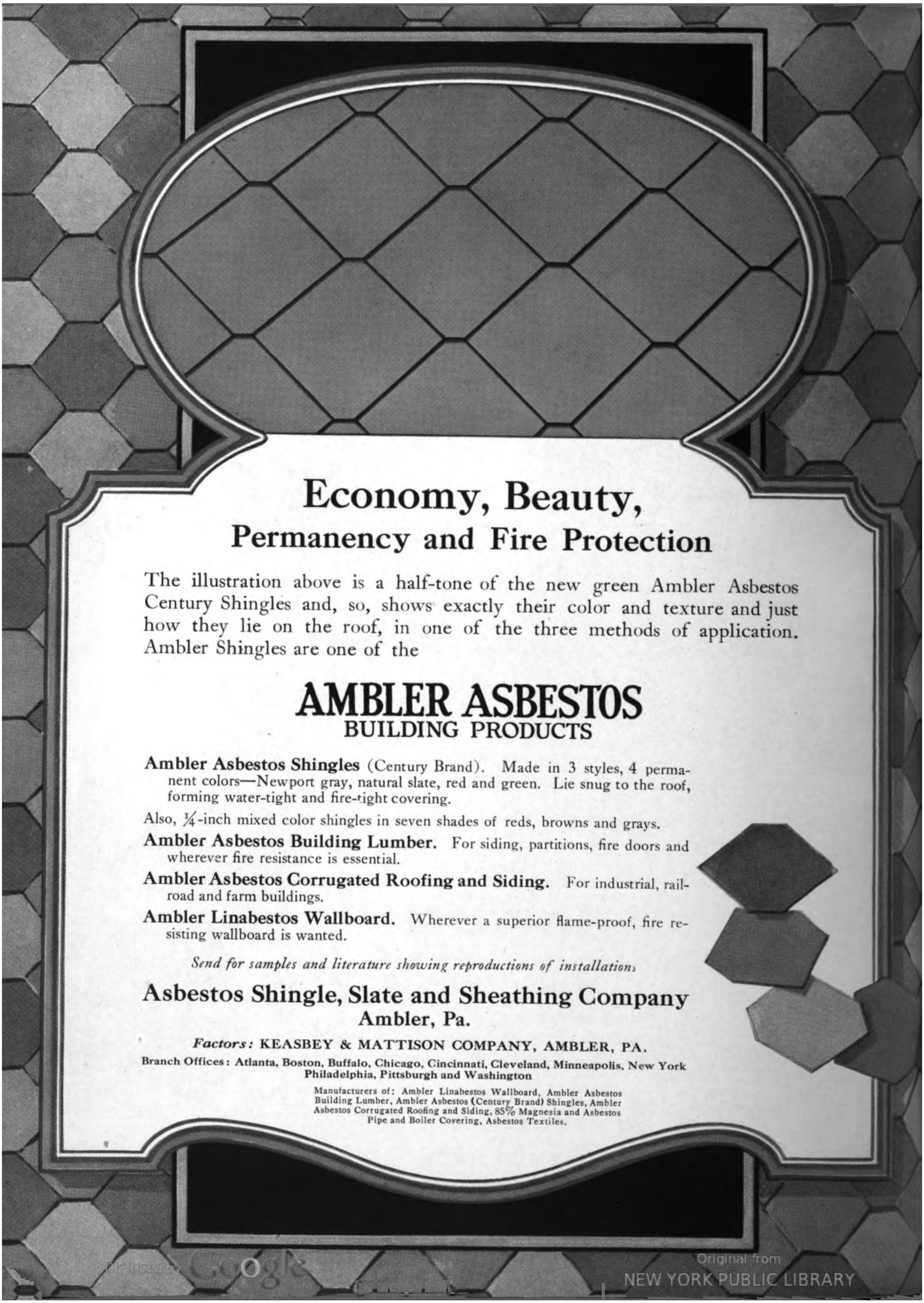

Economy, Beauty,
Permanency and Fire Protection

The illustration above is a half-tone of the new green Ambler Asbestos Century Shingles and, so, shows exactly their color and texture and just how they lie on the roof, in one of the three methods of application. Ambler Shingles are one of the

AMBLER ASBESTOS
BUILDING PRODUCTS

Ambler Asbestos Shingles (Century Brand). Made in 3 styles, 4 permanent colors—Newport gray, natural slate, red and green. Lie snug to the roof, forming water-tight and fire-tight covering.

Also, ¼-inch mixed color shingles in seven shades of reds, browns and grays.

Ambler Asbestos Building Lumber. For siding, partitions, fire doors and wherever fire resistance is essential.

Ambler Asbestos Corrugated Roofing and Siding. For industrial, railroad and farm buildings.

Ambler Linabestos Wallboard. Wherever a superior flame-proof, fire resisting wallboard is wanted.

Send for samples and literature showing reproductions of installations

Asbestos Shingle, Slate and Sheathing Company
Ambler, Pa.

Factors: KEASBEY & MATTISON COMPANY, AMBLER, PA.

Branch Offices: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Minneapolis, New York Philadelphia, Pittsburgh and Washington

Manufacturers of: Ambler Linabestos Wallboard, Ambler Asbestos Building Lumber, Ambler Asbestos (Century Brand) Shingles, Ambler Asbestos Corrugated Roofing and Siding, 85% Magnesia and Asbestos Pipe and Boiler Covering, Asbestos Textiles.

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The Best Stucco Work Is Done Over Metal Lath

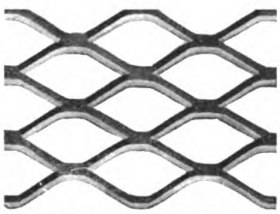
EXPERIENCED builders know that the strands of steel running in every direction reinforce and hold the plaster, preventing cracks and preserving the firm, smooth finish indefinitely.

They know, too, that by using KNO-BURN METAL LATH for the plastering of walls and ceilings they can secure a better job of interior decoration in *less time* and with less work.

Kno-Burn
Expanded Metal Lath

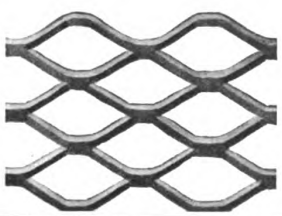
literally puts an unburnable *heart of steel* in each wall and ceiling. It is easy to place, quickly plastered, and the small mesh prevents waste of plastering materials. Let us tell you some of the fine jobs *right in your own state* that have been done over KNO-BURN, or write today for

Free Catalogue, "Fireproof Construction," and samples



North Western Expanded Metal Co.

904 Old Colony Bldg., Chicago



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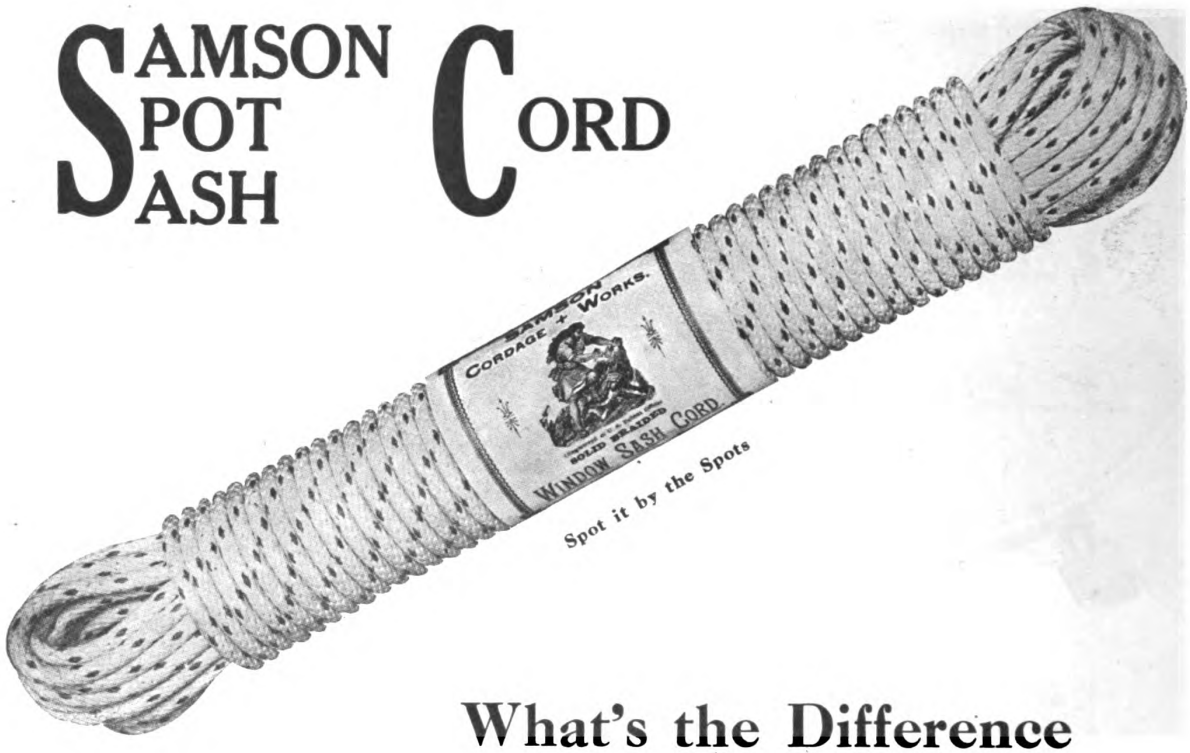
SAMSON SPOT SASH CORD



What's the Difference

between Samson Spot Sash Cord and ordinary cord? Just this!

Spot cord is made of extra quality cotton yarn, is firmly braided and smoothly finished and is all carefully inspected before being hanked or coiled. On the other hand, ordinary, cheap window cord is made of poor yarn, roughly braided and badly finished and not inspected.



Spot Cord will often wear twenty-five years and more while common cord at best will go ten to twelve years and oftentimes only a year. Spot Cord stands the wear and saves expensive replacements. It pays to use it.

Send for Sample Card
and Souvenir Pencil

SAMSON CORDAGE WORKS
BOSTON, MASS.

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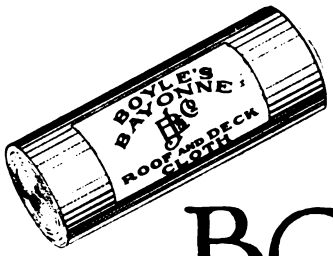

BOYLE'S BAYONNE
ROOF and DECK CLOTH

Is made of a special grade of Cotton Duck or Canvas, and is treated by an oiled process that makes it reliably waterproof and at the same time increases its tensile strength and wearing qualities.

Unlike other canvas roof coverings it is laid on dry boards, it needs no white lead bedding, yet lays flat and stays flat. Will not crack, peel, buckle or shrink. It is noiseless to the tread of feet and to the patter of rain.

Especially adapted for the roofs and decks of piazzas, sleeping porches, sun parlors, conservatories, etc., and for low pitched and flat roofs.

It has years of service and the experience of architects and builders the country over to recommend it.

Write to the manufacturers for sample book "R" which also contains prices and specifications for laying.

JOHN BOYLE & COMPANY, Inc.
112-114 Duane St.—New York—70-72 Reade St.
Branch Office: 202-204 Market St., St. Louis, Mo.

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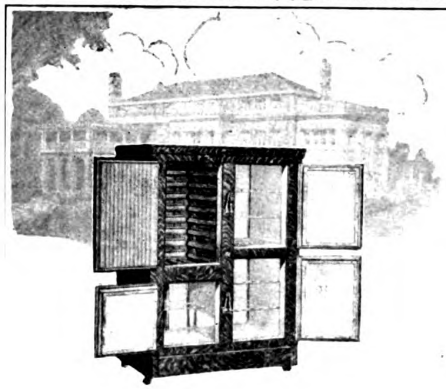
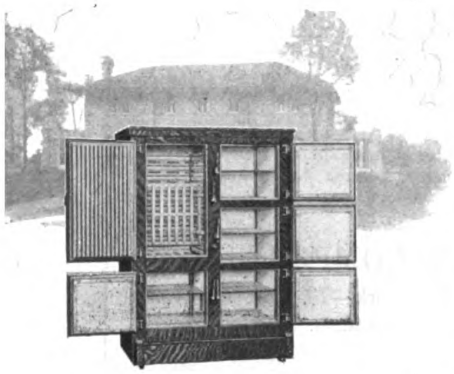


McCRAY
REFRIGERATORS FOR ALL PURPOSES



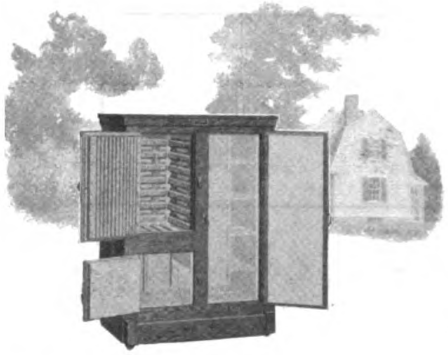
IT IS our particular desire to impress the *Architects of America* with the fact that McCray builds refrigerators for all purposes. Thousands of fine houses, hotels, clubs, restaurants, factory cafeterias, hospitals, stores and markets depend on McCrays for efficient, economical refrigerator service.

Thirty years of continuous development have resulted in the perfected McCray System—by which fresh, cold air is kept in constant circulation through the storage chambers. Only in the McCray is the purchaser certain to obtain years and years of satisfactory refrigerator service. Our position of leadership is a tribute to McCray quality.



Iceless refrigeration is a subject in which many architects are interested. In this connection it may well be borne in mind that all McCray Refrigerators are arranged for either ice or mechanical refrigeration. Another point of interest to architects is the fact that any McCray residence refrigerator can be arranged for icing from a side or rear porch.

Let Us Make Blue Prints and send detailed specifications for including the McCray Refrigerator in your plans. Our Service Department is always available for your use; simply send us a rough sketch and our draftsmen will prepare plans and estimates. There will be no charge.



Put Our New Catalogs in Your Files—They are yours for the asking—No. 95 for Houses; 52 for Hotels, Restaurants, Clubs, Hospitals and Institutions; No. 71 for Stores and Markets; No. 74 for Florists.

McCRAY REFRIGERATOR CO.

3064 LAKE STREET KENDALLVILLE, INDIANA

Salesrooms in All Principal Cities



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Roofing Bearing This Label Says: *"I Will Not Fade!"*

WITHOUT this label, roofing is—"maybe" roofing. Maybe it's surfaced with genuine slate; maybe not. Maybe the slate will fade; maybe not.

But when your customers see this Sta-so label on the slate-surfaced roofing you sell, they identify it at once as roofing they can safely buy.

For they have been learning from Sta-so's national advertising that the Sta-so label carries a two-edged guarantee which protects them as well as you.

First, the Sta-so label is a guarantee that the roofing is surfaced with genuine slate—not some stone or mineral masquerading as slate.

Second, the Sta-so label is a guarantee that the color of the slate will not fade. Some slates, as you know, sail under false colors; they soon turn to a muddy brown or dirty black.

But the beautiful colors of Sta-so laminated slate, those rich colors of deep Indian red or cool sage green, will never fade—even under the bleaching rays of the summer sun.

You and your customers are entitled to the protection the Sta-so label gives. See that your customers get this protection. Get this protection yourself by insisting that your stock of slate-surfaced roofing bear the Sta-so label. Insist upon finding it on the slate-surfaced products of the following manufacturers, who purchased enough Sta-so last year to surface over 350,000 buildings.

Amalgamated Roofing Co.....Chicago, Ill.	Ford Mfg. Co.....St. Louis, Mo.	H. H. Robertson Co.....Pittsburgh, Pa.
Barber Asphalt Paving Co.....Philadelphia, Pa.	The Heppes Rfg. Division, The Richardson Paper Co. .....Chicago, Ill.	Richardson Paper Co.....Cincinnati, Ohio
Barrett Co. .....New York, N. Y.	Keystone Roofing Mfg. Co.....York, Pa.	Safepack Paper Mills.....Boston, Mass.
Beckman-Dawson Rfg. Co.....Chicago, Ill.	McHenry Millhouse Mfg. Co....South Bend, Ind.	Si Fo Products Co.....St. Paul, Minn.
B. F. Belson Mfg. Co.....Minneapolis, Minn.	National Asbestos Mfg. Co....Jersey City, N. J.	Standard Paint Co.....New York, N. Y.
Bird & Son, Ltd.....Hamilton Ont., Can.	National Rfg. Co.....Tonawanda, N. Y.	Usona Mfg. Co.....Aurora, Ill.
Bird & Son, Inc.....East Walpole, Mass.	Pioneer Paper Co.....Los Angeles, Cal.	H. F. Watson Co.....Erie, Pa.
Philip Carey Mfg. Co.....Cincinnati, Ohio	Reynolds Shingle Co.....Grand Rapids, Mich.	A. H. White Rfg. Co.....New Orleans, La.
Flintkote Co.....Boston, Mass.		Wilberite Rfg. Co.....Cleveland, Ohio

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Federal two-ton truck operated by the Western Contractors Supply Company, Chicago, Ill.

There's Perfect Satisfaction in Every Federal



This is the sign of the Tenth Year Federal, a sign significant of ten years of success in every field of truck transportation.

Contractors and builders are never selfish in their praise of the Federal. The fact that they are always so eager to recommend them to friends and competitors is proof positive that Federal's conscientious and honest service has won permanent favor in the minds of these business men.

This is the Western Contractors Supply Co's., recommendation of their Federal.

"Our Federal Truck is giving us very good service. We have averaged fifty miles a day since December 1st, and have purchased nothing but gas and oil, and we find it very economical. While we have been too busy to figure what mileage we get out of a gallon of gasoline, we are perfectly satisfied. If we hear of anyone interested in a truck we would recommend the Federal highly."

"Traffic News"—A magazine of haulage will be sent on request

FEDERAL MOTOR TRUCK COMPANY
39 FEDERAL STREET DETROIT, MICH.

Another FEDERAL

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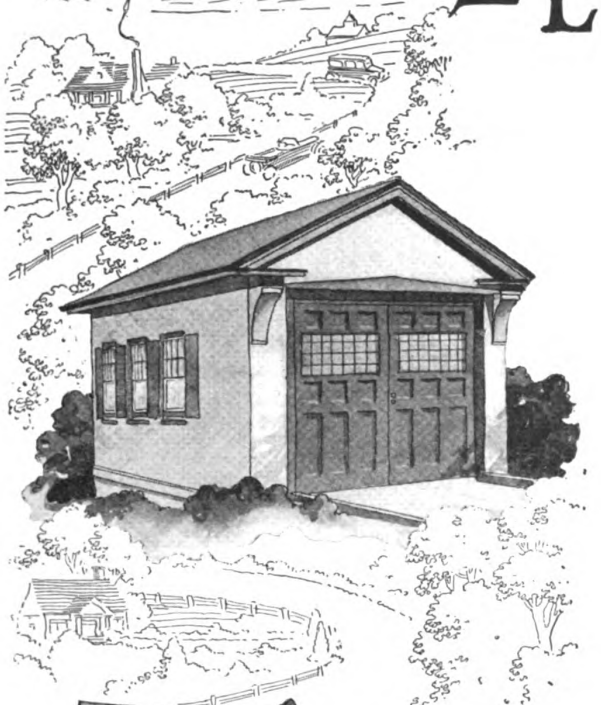
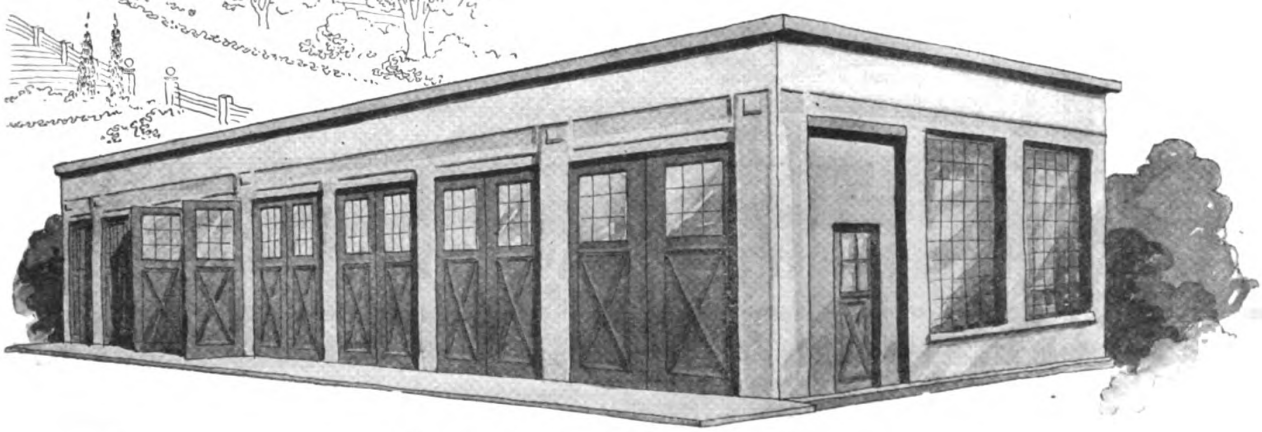
Suggestions on Garages —Large and Small







Make your garage a permanent, fireproof structure. You will save in paint, repairs and insurance, and there are really great possibilities in concrete construction in appearance as well as in permanence and low upkeep.

We have recently compiled a well-illustrated special Bulletin on the subject of garages, showing photographic views and sketches of a number of distinctive types, also giving practical hints on construction.

Still more recently we have prepared an additional Service Sheet showing a unit type of garage construction well adapted to the needs of individuals or business concerns having a number of cars in use. Ask for this material if you are interested.

Alpha Service Sheets or Bulletins are also available on the following concrete improvements:

Workingmen's Homes
Walkways and Driveways
Concrete Roads
Bridges and Culverts
Foundation and Hatchway
Gutter and Curb
Storage Cellar
Small Warehouses
Spring House
Small Dam
Milk House
Ice House
Manure Pit
Septic Tank
Oil Storage Tank
Tennis Court
Inclosure Walls
Barn and Silo
Corn Crib
Storage House
Smoke House
Hog House
Poultry House
Dipping Vat
Tanks and Troughs
Piers for Small Boats
Garden Furniture
Greenhouse
Coal Pocket
Posts and Walls
Walls, Sills and Lintels
Garages and Runways
Overcoating of Old Dwellings
Porch, Cellar and Stable Floors
Warm-Weather Concreting

Ask for the Sheet or Bulletin that interests you most, also for a copy of the Alpha 96-page Handbook on concrete construction if you don't already own a copy. This Handbook is not forwarded unless specifically asked for. All sent free of cost or obligation if you live east of the Mississippi. We are obliged to ask inquirers out of our sales field to send fifty cents to cover the printing and mailing expense of this material.

ALPHA PORTLAND CEMENT COMPANY

General Offices: Easton, Pa.

Branch Offices: New York Boston Philadelphia Pittsburgh Baltimore Savannah

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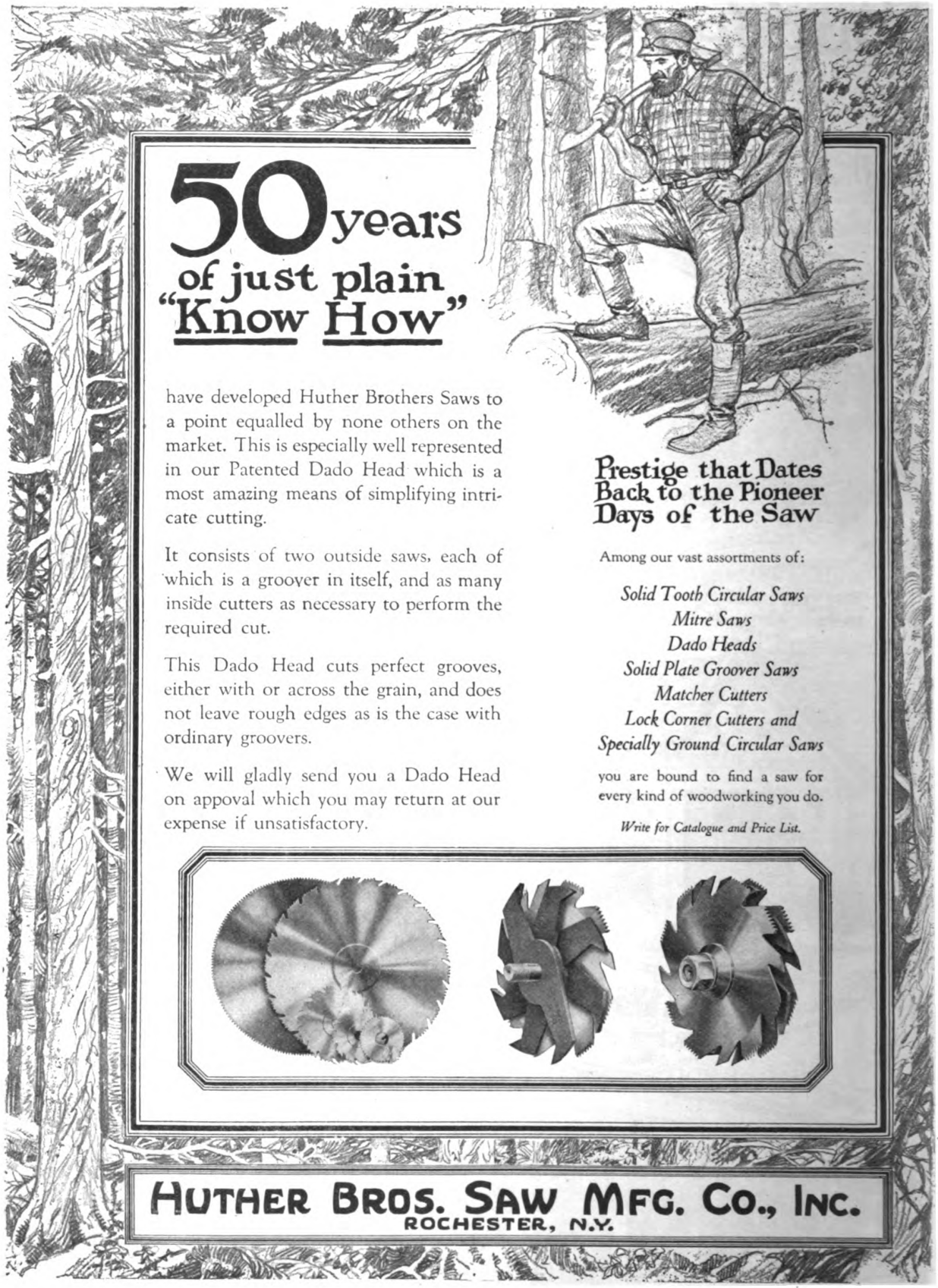

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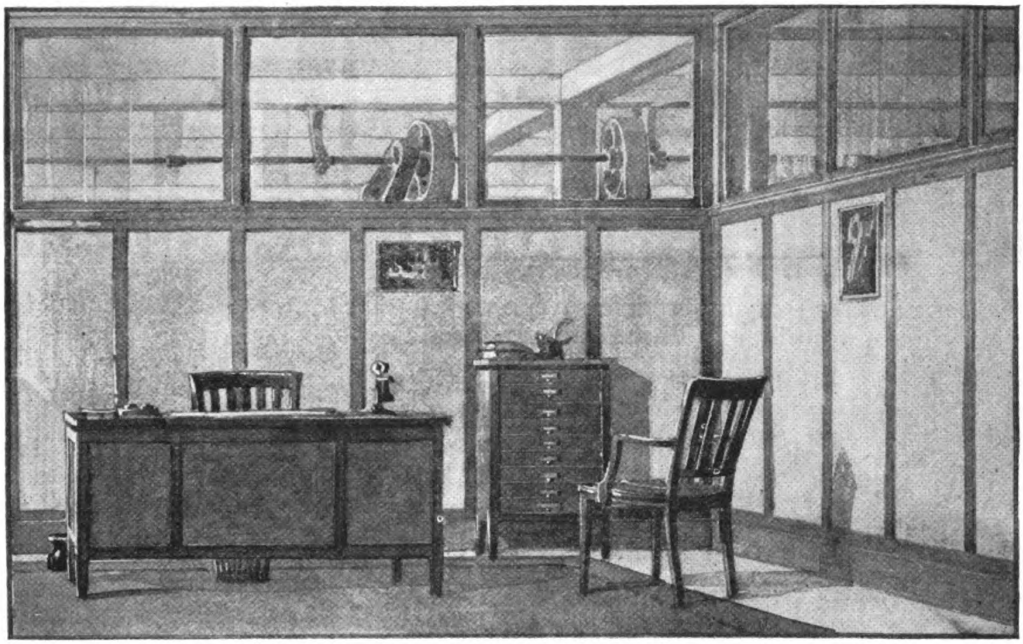

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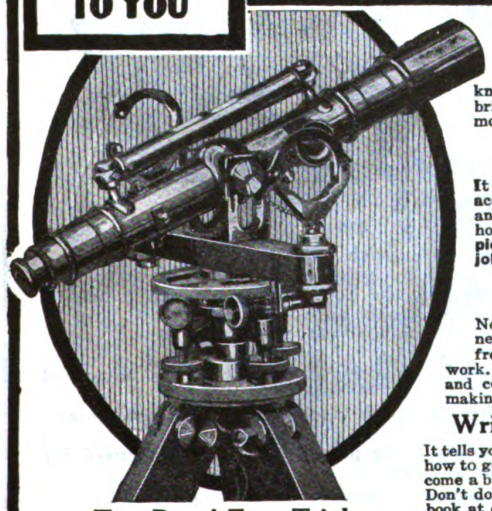

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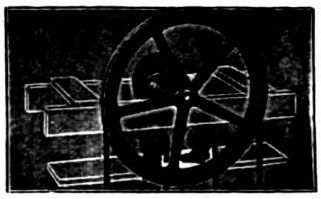

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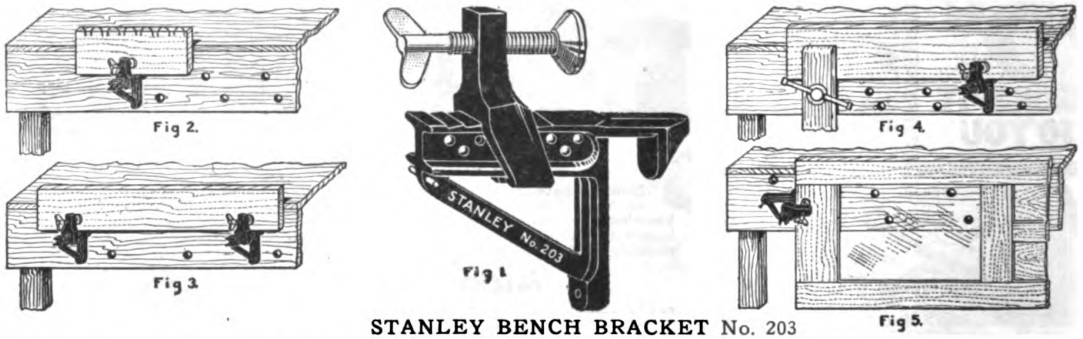

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Fig. 4. For use in connection with a bench vise.

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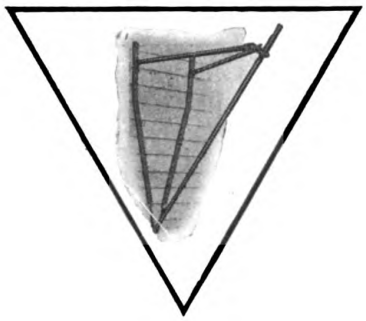

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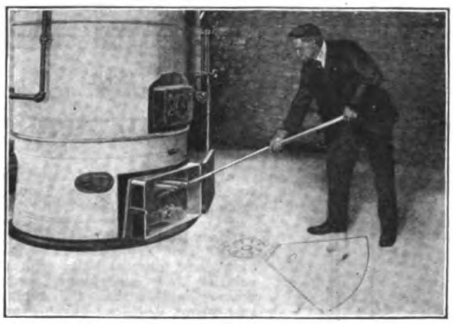

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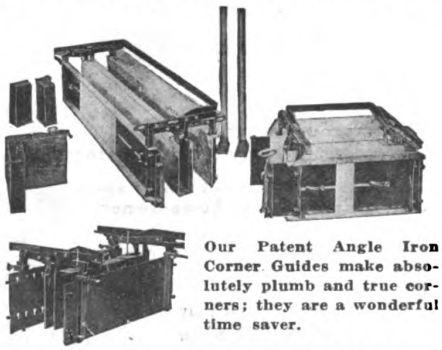

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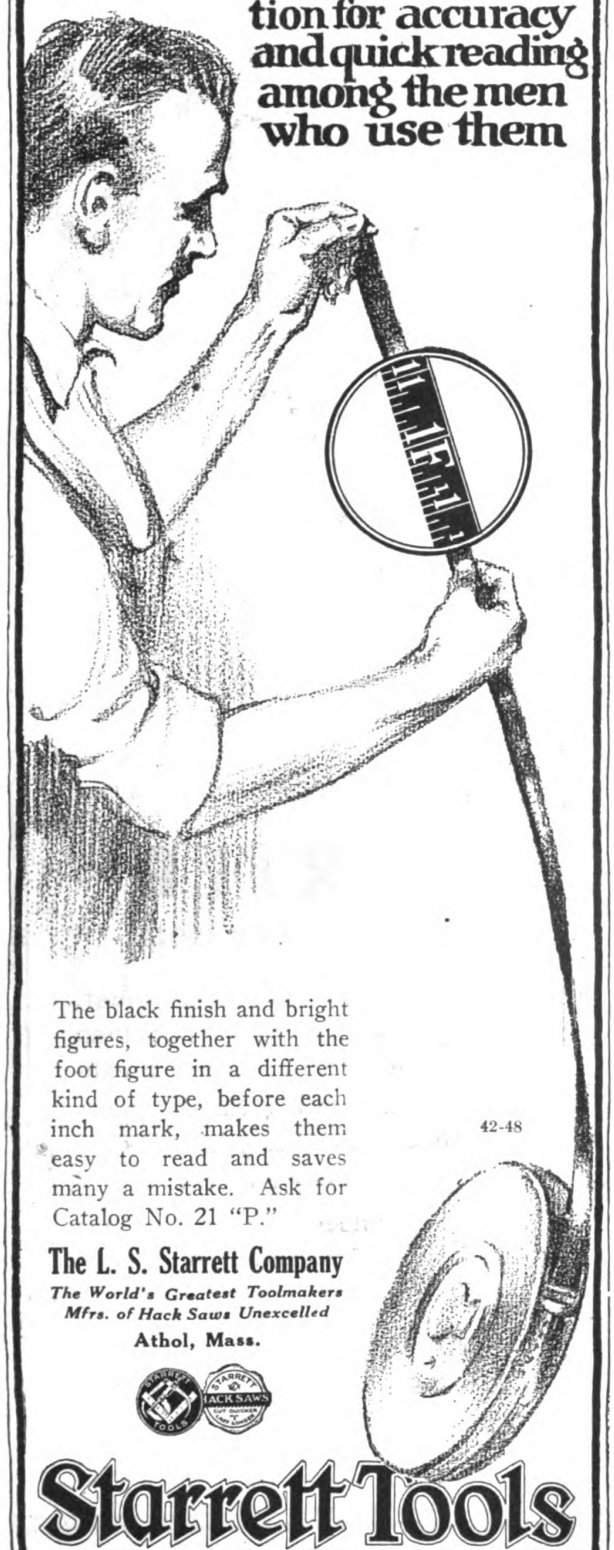

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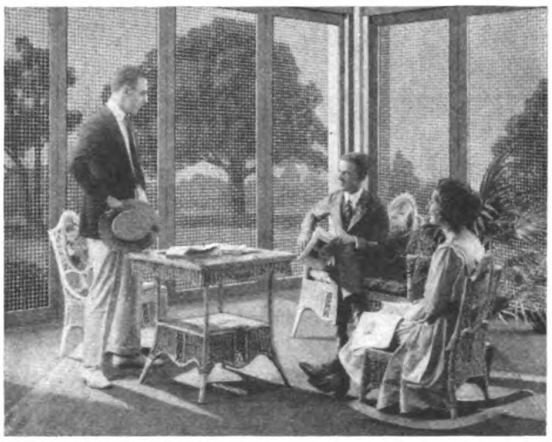

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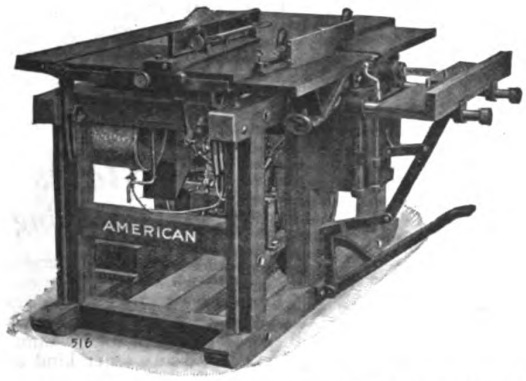

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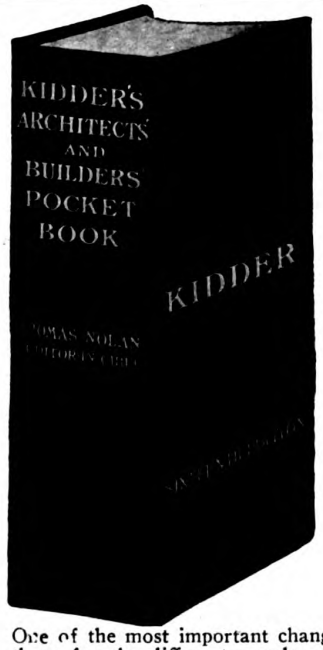

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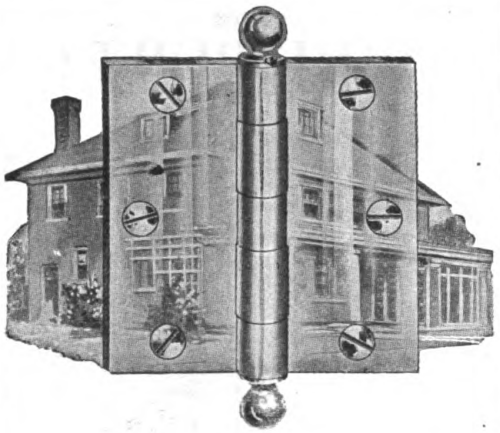

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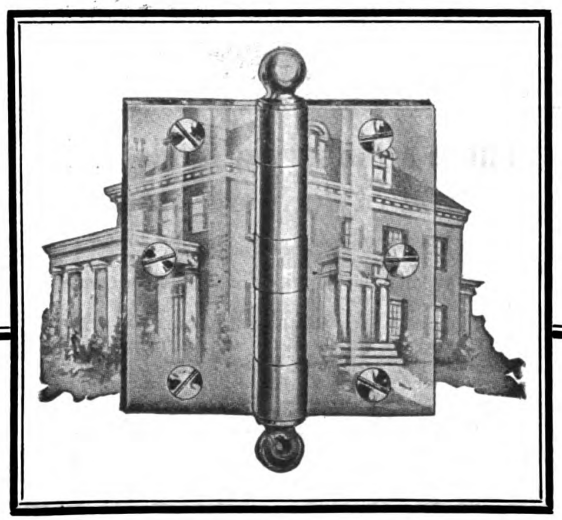

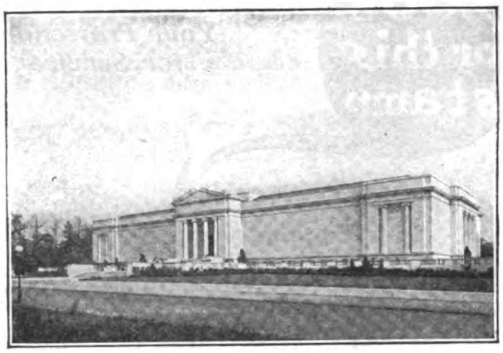

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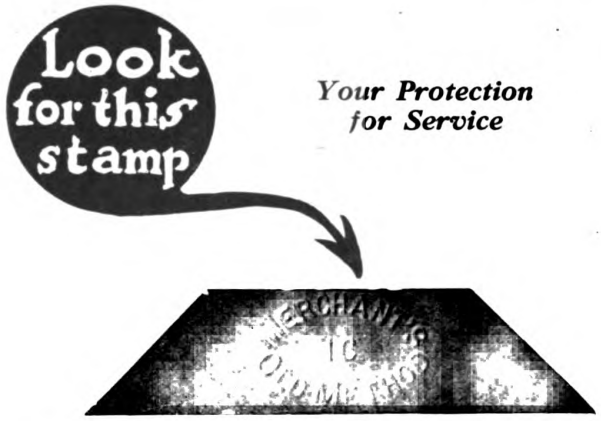

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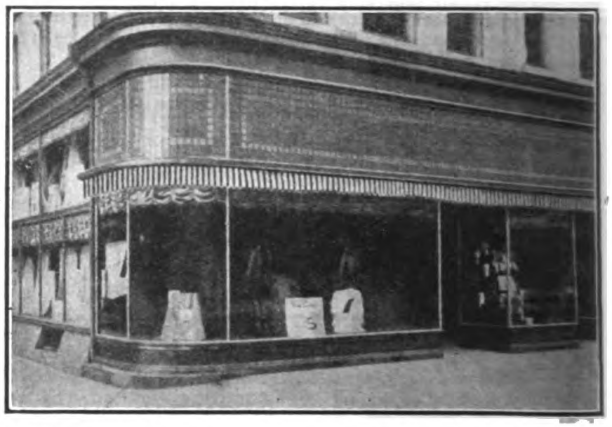

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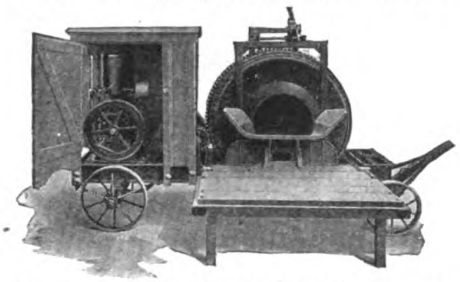

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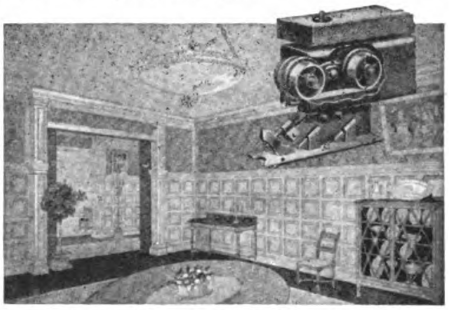

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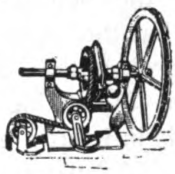
hand belt  or electric

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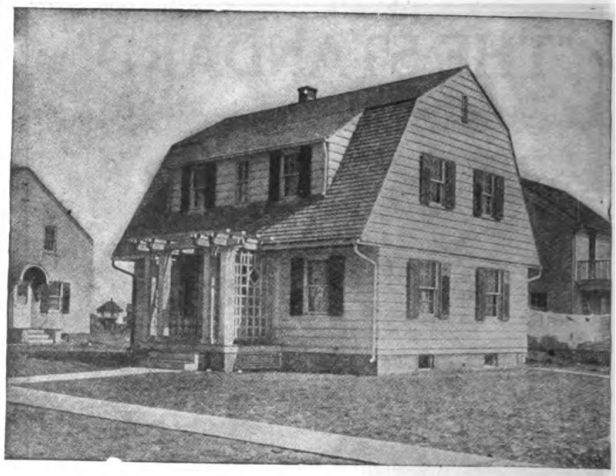

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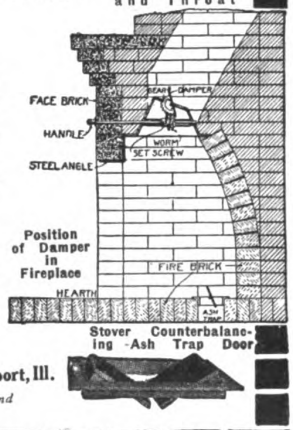

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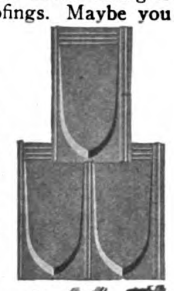

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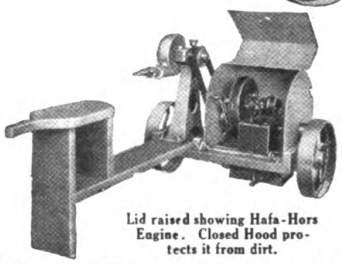

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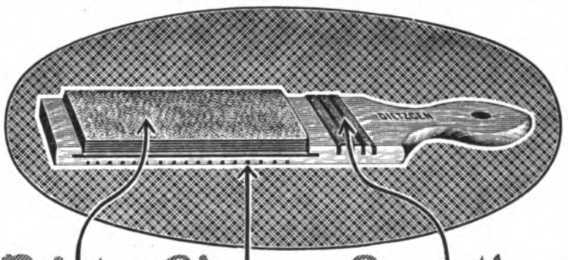

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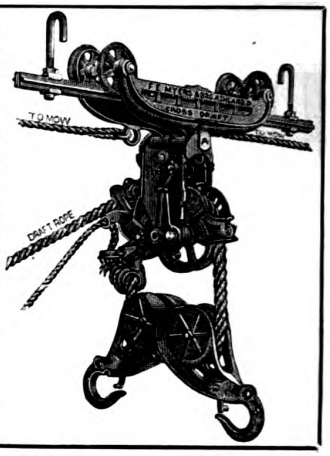

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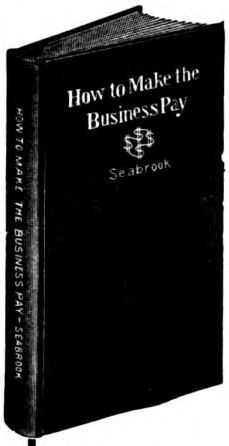

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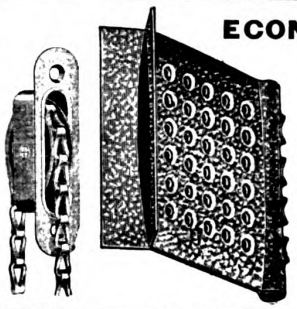

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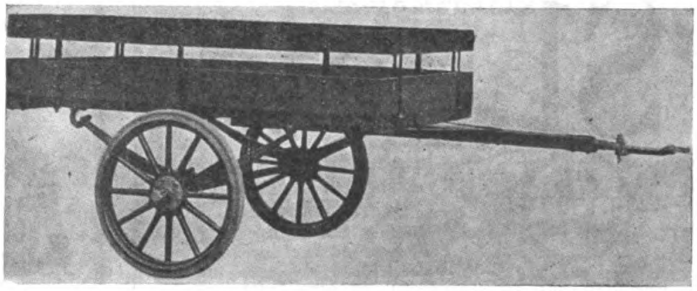

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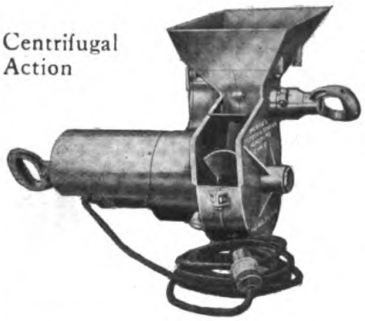

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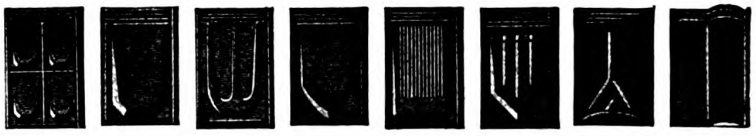

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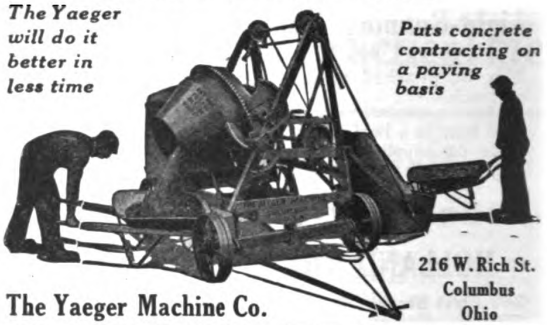

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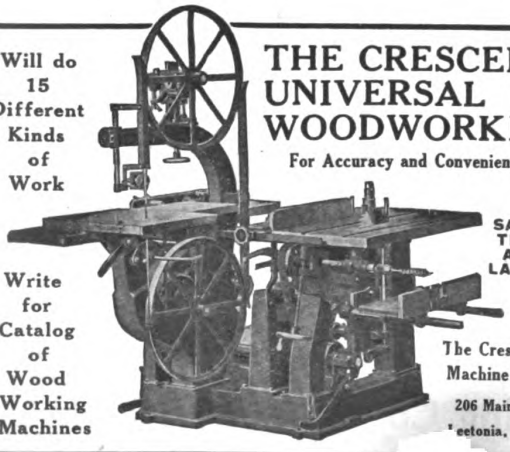

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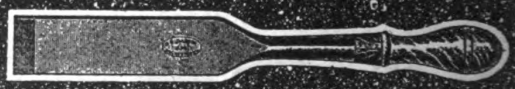

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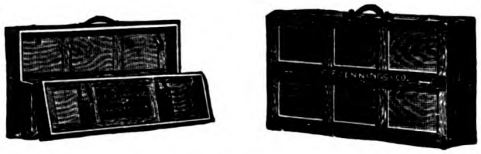

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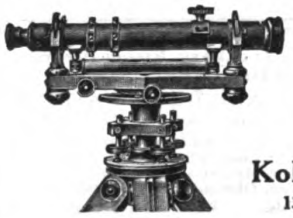

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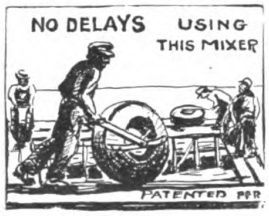

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of Building Age, published monthly at New York, N. Y., for April 1, 1920.

State of New York } ss.
County of New York }

Before me, a Notary Public, in and for the State and county aforesaid, personally appeared FRED S. SLY, who, having been duly sworn according to law, deposes and says that he is the Business Manager of BUILDING AGE, and that the following is to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editors, managing editor and business manager are:
Publisher—The Architectural and Building Press, Inc., 243 West 39th Street, New York City.
Editors—Edward F. Hammel, Wm. H. Crocker, E. H. Ries, 243 West 39th Street, New York, N. Y.
Managing Editor—Edward F. Hammel, 243 West 39th Street, New York, N. Y.
Business Manager—Fred S. Sly, 243 West 39th Street, New York, N. Y.

2. That the owners are:
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3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of the total amount of bonds, mortgages, or other securities are: United Publishers Corporation, 243 West 39th Street, New York, N. Y.

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 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.

FRED S. SLY, Business Manager.

Sworn to and subscribed before me this 31st day of March, 1920.

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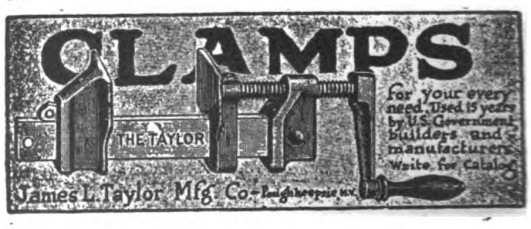

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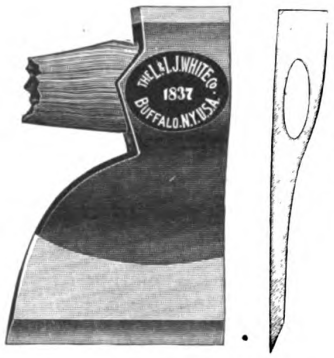

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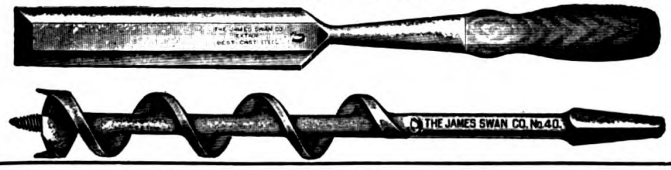

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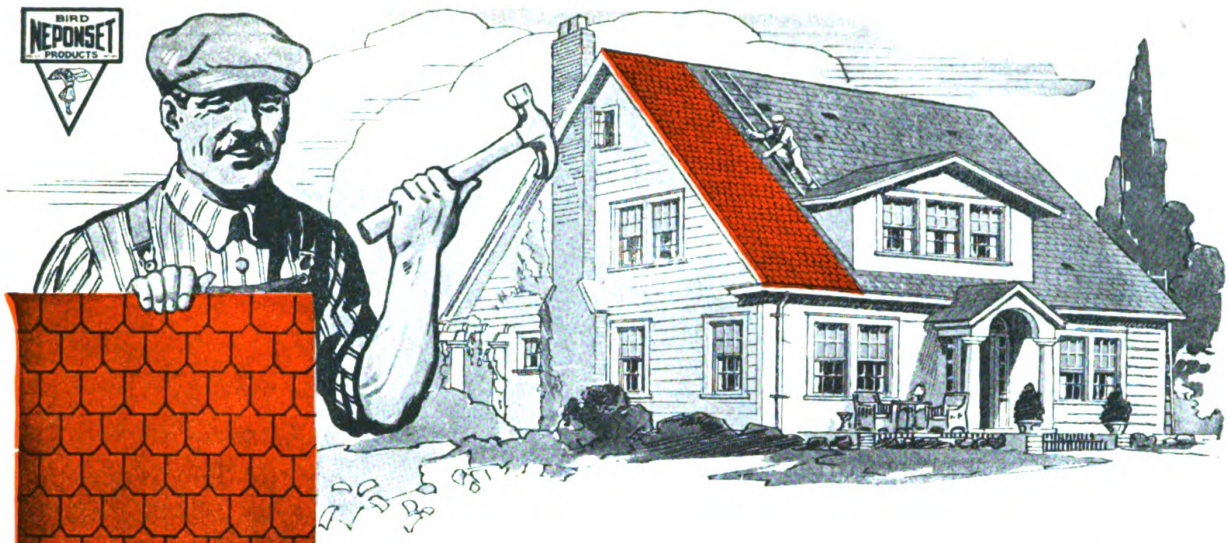

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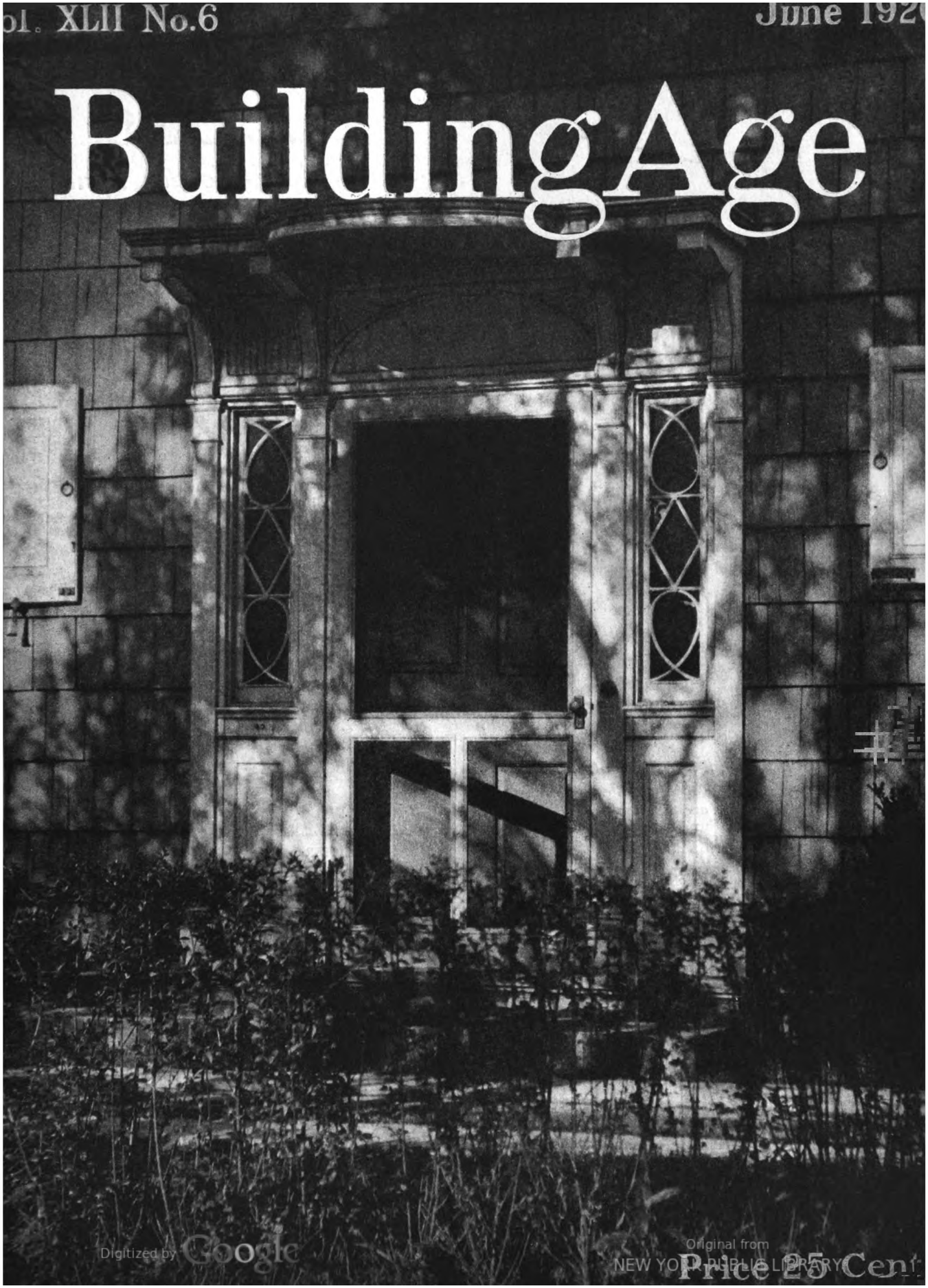

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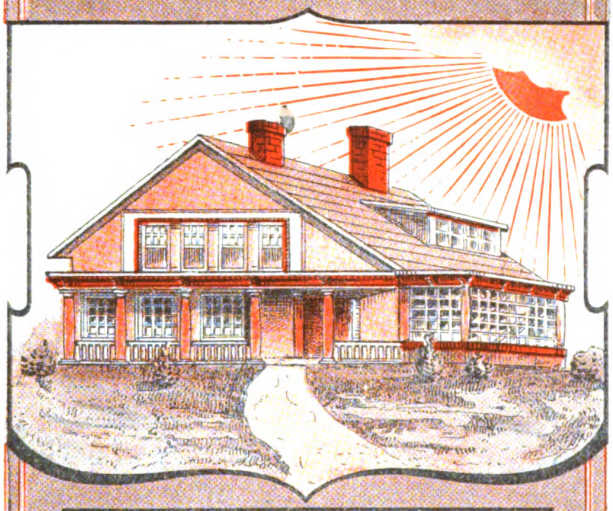

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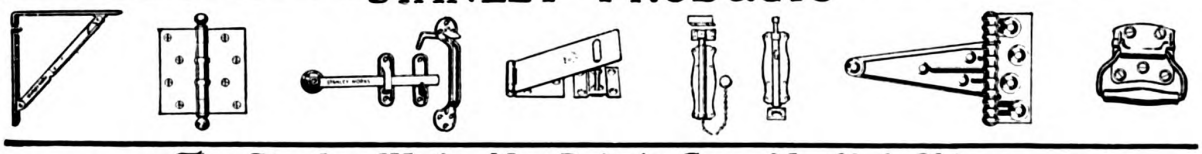

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Formerly Carpentry and Building, Founded 1879

June, 1920 Vol. XLII. No. 6

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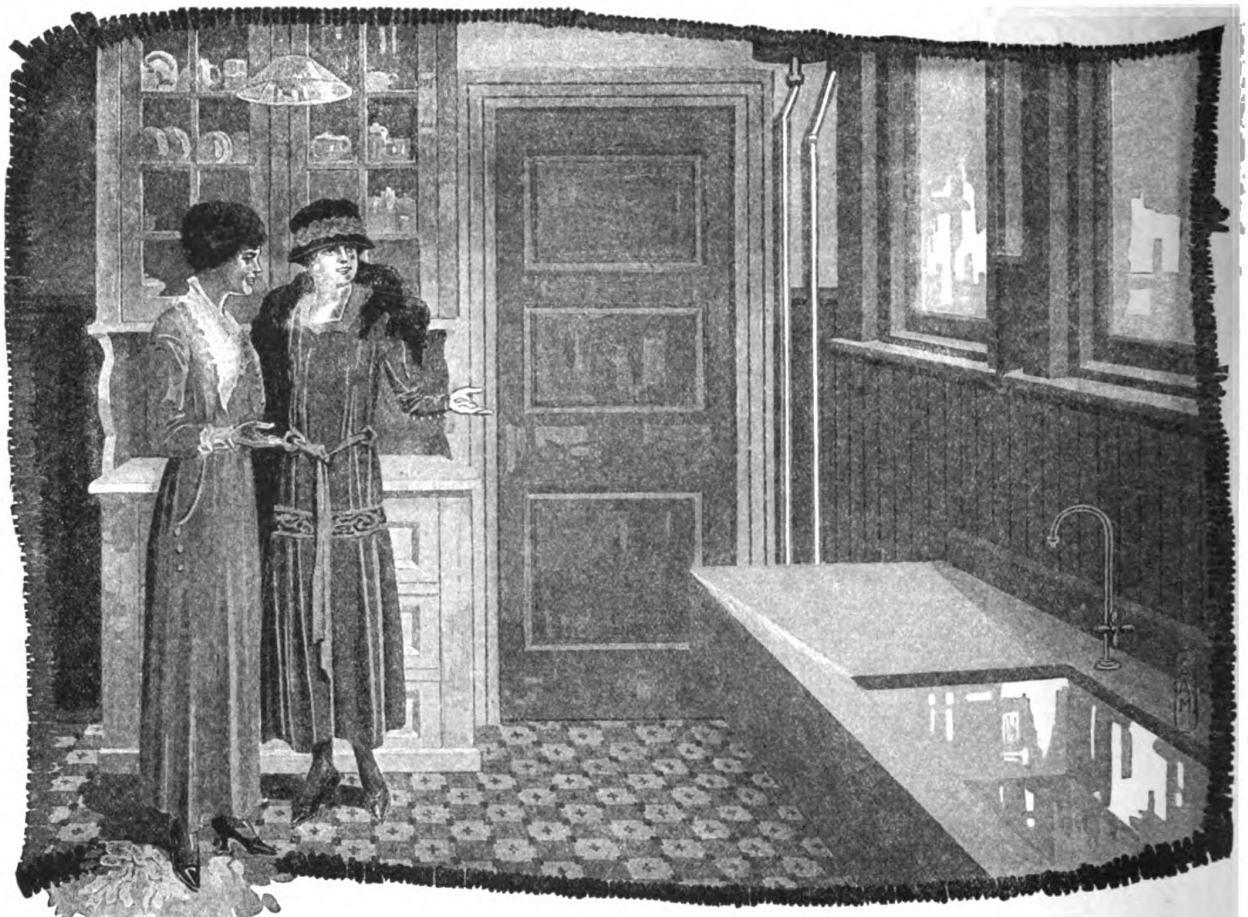

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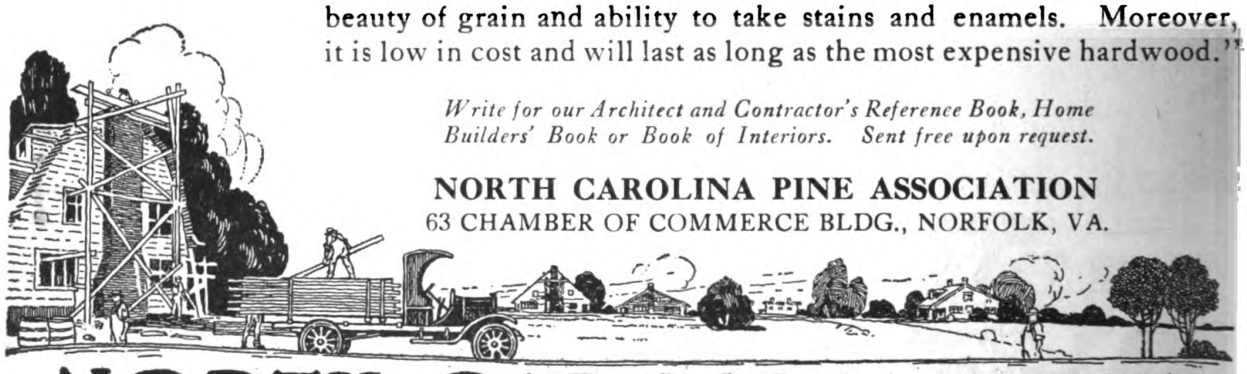

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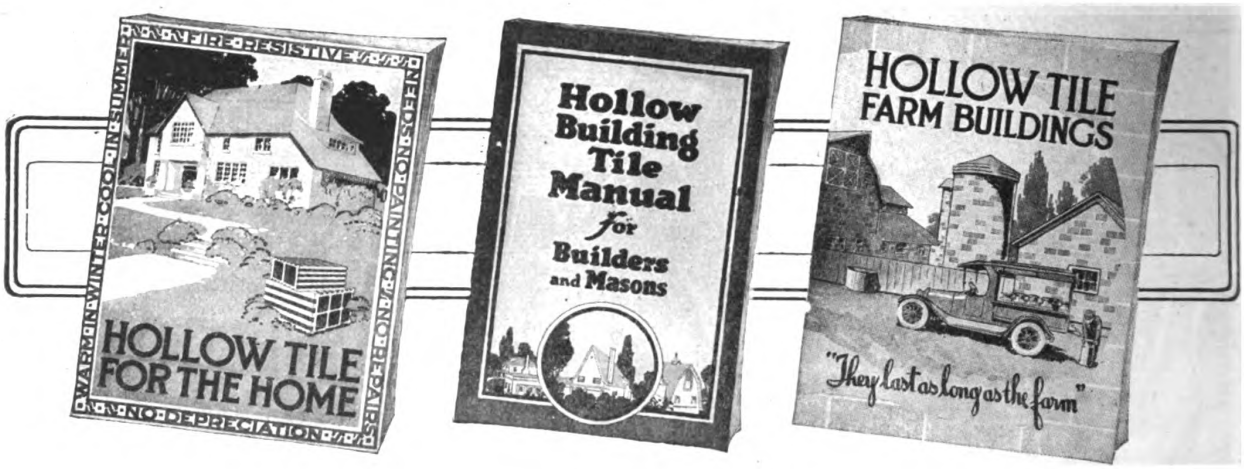

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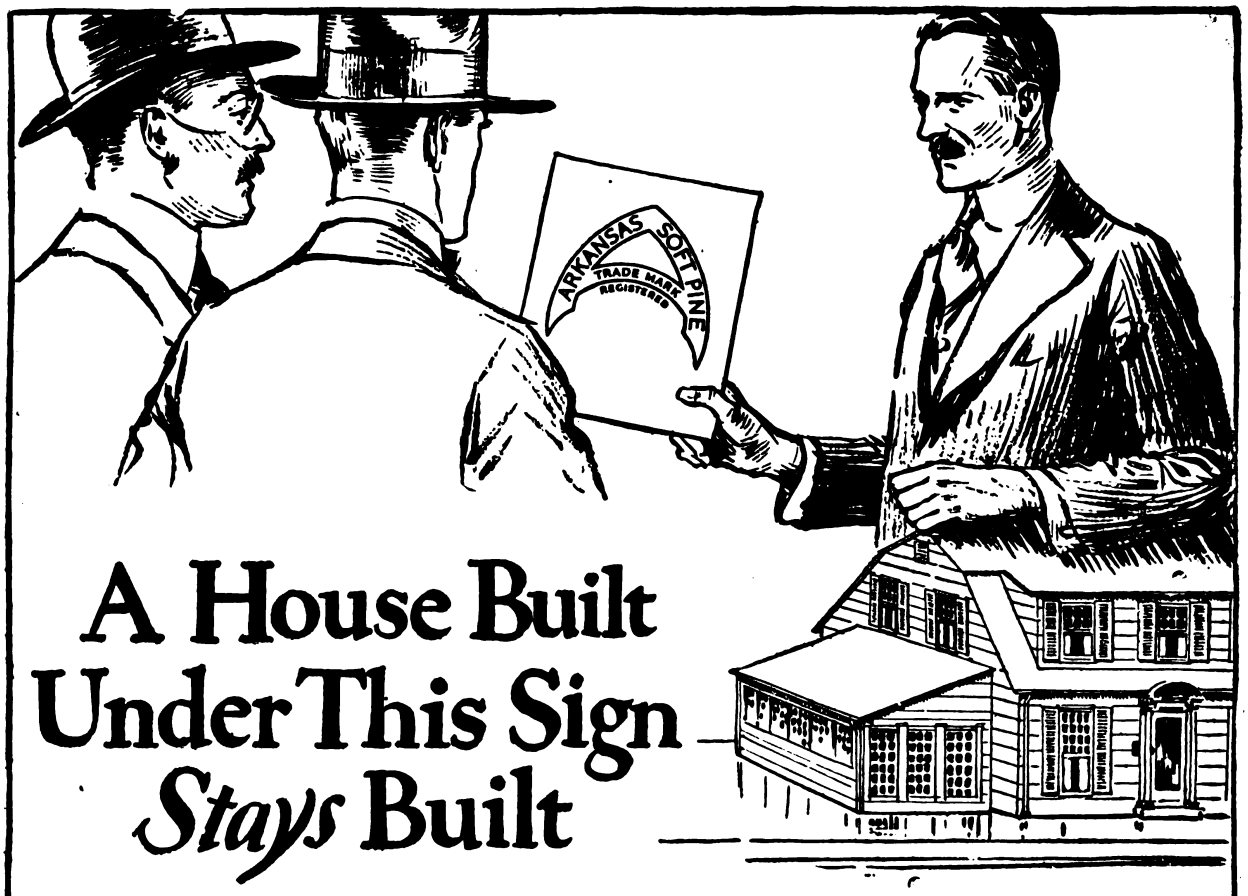

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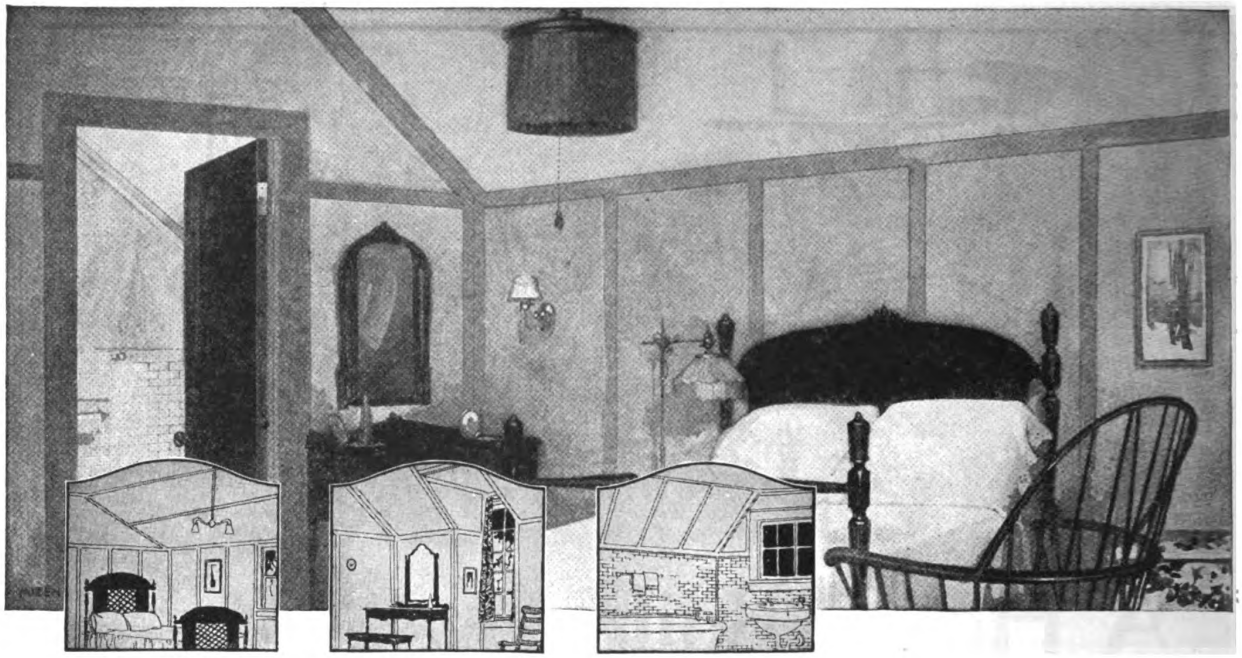

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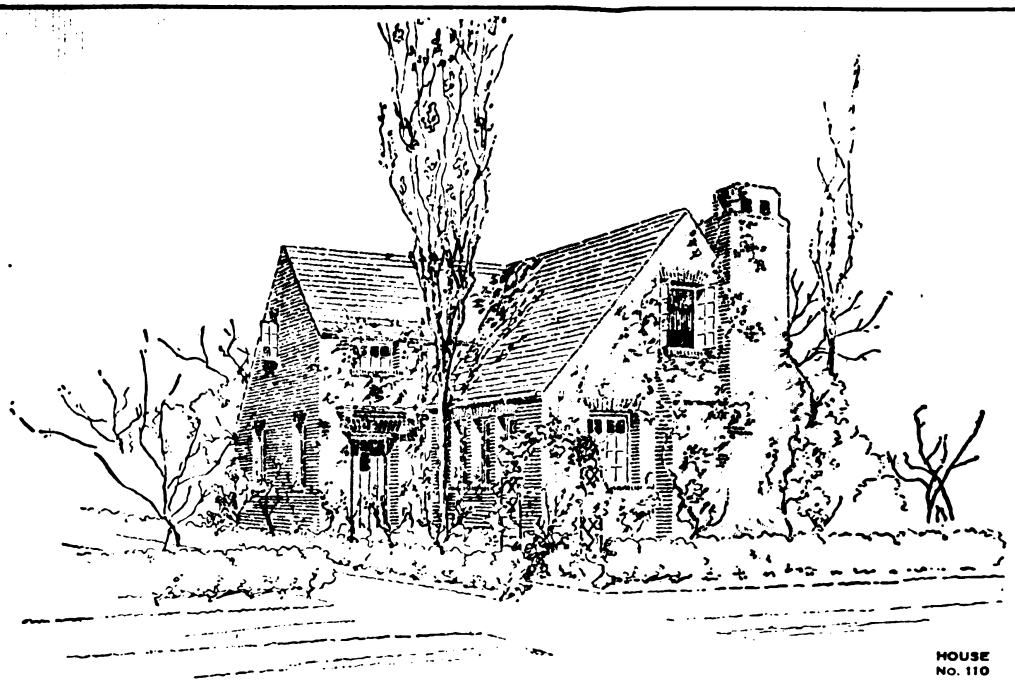

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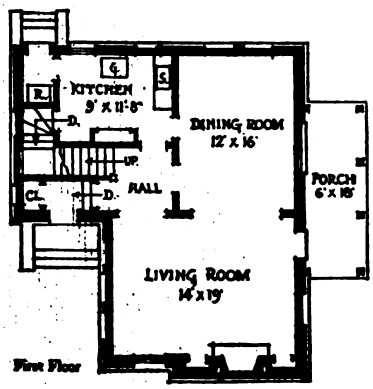

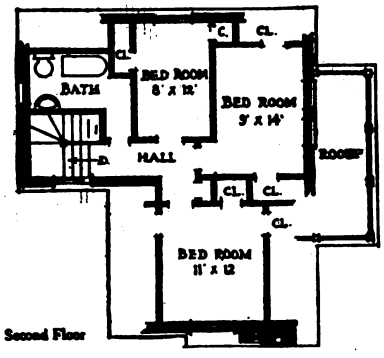

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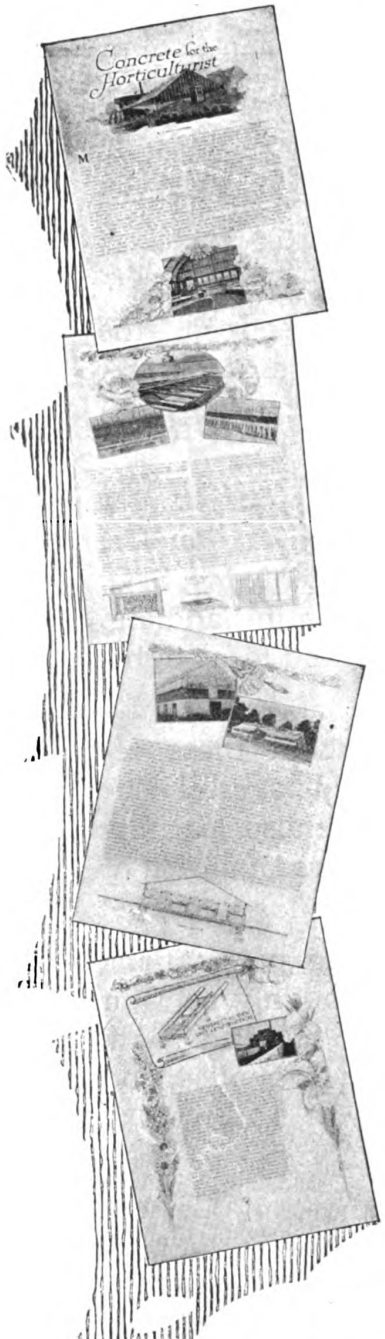

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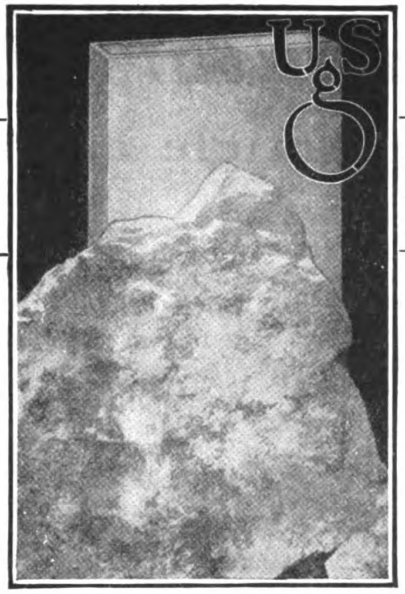

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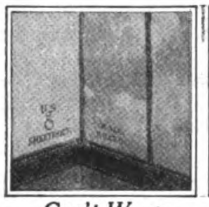

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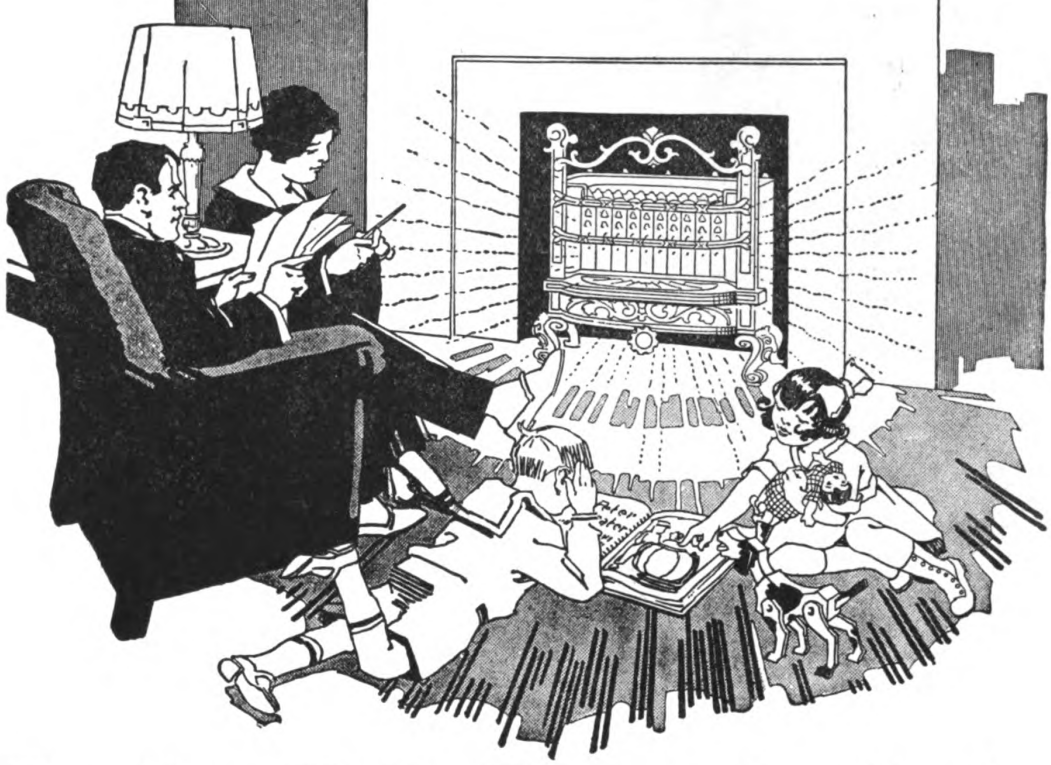
The HUMPHREY Radiantfire



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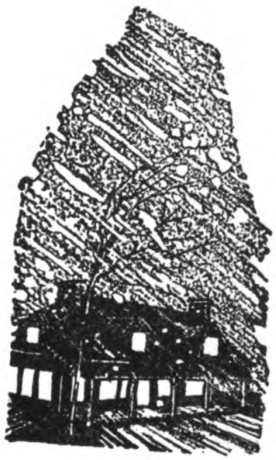

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Saves coal money. Saves you lighting the furnace for two months in the fall and spring. On cold nights, when winter howls outside, you can bank the furnace and keep the living room comfortable with its warmth.

No fire danger with this new fire. No sparks or bursting coal and children can safely play around it. Burns without watching. You turn it on when you want heat and you turn it off again or low when room is warm enough.

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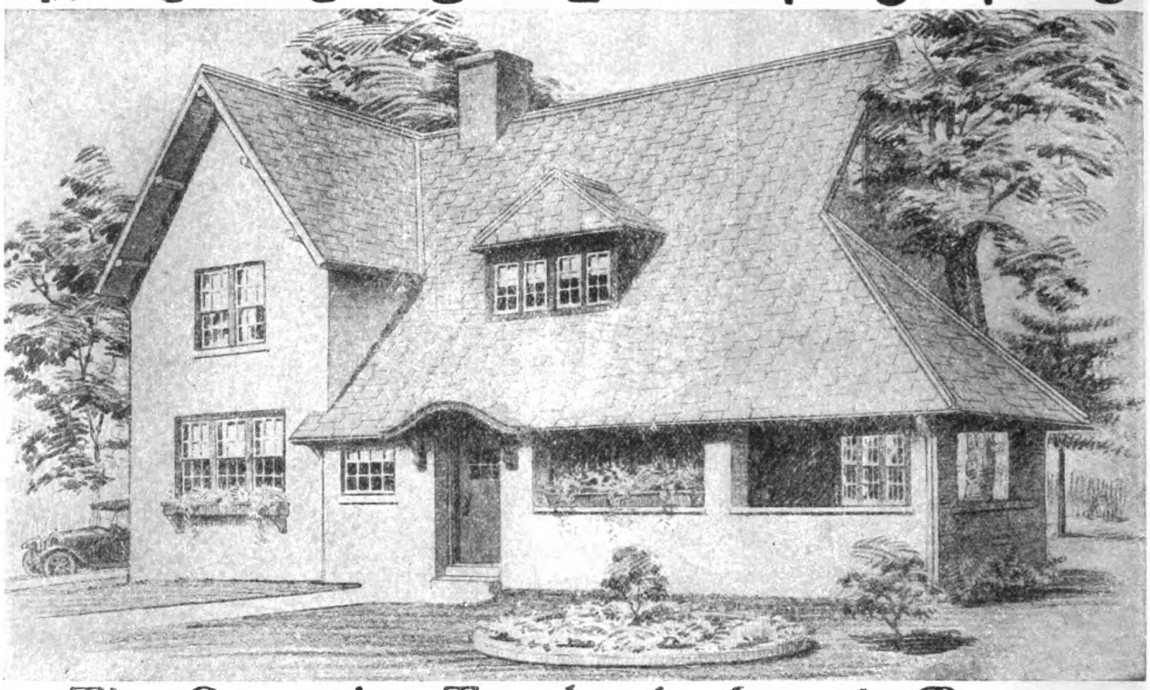
FLEX-A-TILE
HOUSE TOPS



The Crowning Touch of Artistic Beauty

is added to the residential structure when Flex-A-Tile Wide Space Shingles are used. The roof is truly the "crown" of the home. You may be sure of having a house-top of real attractiveness—symmetrical, graceful and distinctive when you specify

FLEX-A-TILE
WIDE SPACE SHINGLES

And not only is architectural charm enhanced, but the practical values are assured. Such a house-top is permanent, and durable and represents true economical service; gives protection against weather and fire; carries the snug comfort of complete *shelter* in all that the word means.

The Patent Method of Applying
Flex-A-Tile Wide Space Shingles are 9 inches wide by 14 inches long—an unusual size. The method of laying is patented: 9 inch dimension is placed at the bottom, shingles are spaced six inches apart with 4 inch exposure to the weather. Each shingle thus has an overlap of 1½ inches on its neighbor at either side. The gentle curve which develops in each shingle soon after the roof is in place results in the tightest union of the various parts and gives a decidedly individual appearance to the Flex-A-Tile roof.



Colors
Wide space shingles are made in beautiful shades of red and green—colors adaptable to any architectural or decorative requirement.

Extra Strength
The resistance of the reverse curves described above gives extra strength.

Quickly and Easily Laid
Only 240 shingles required for one square. Flex-A-Tile Wide Space Shingles are popular with workmen, being quickly and easily laid.

Wide space shingles represent only one member of the Flex-A-Tile House Top family. Complete information about the entire line will be sent on request.

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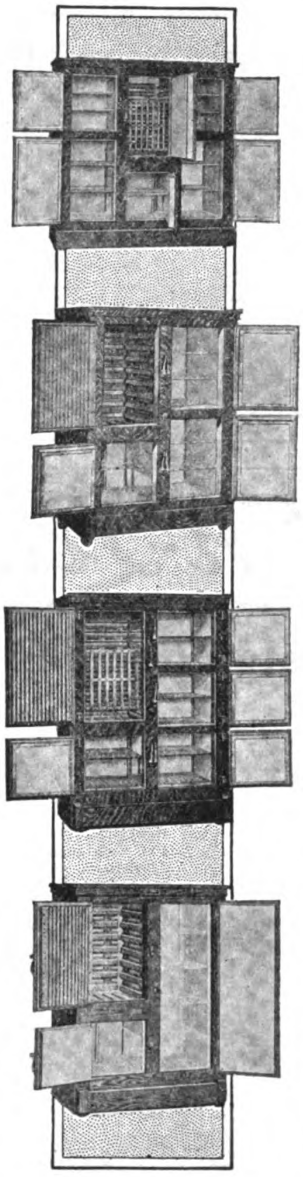

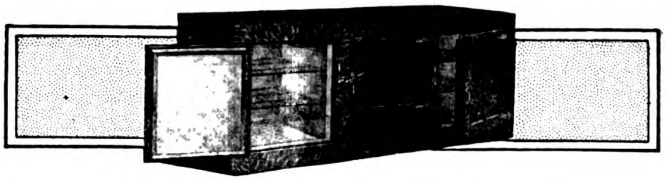

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Prentice Sanger, Architect, New York.

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Meets the big demand for a roofing that combines distinctive appearance with permanence.

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Section of Outside Wall of House, Showing Wool Between Studding.

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Section of Sound-Proof and Fire-Proof Partition. Can be used for outside walls also.

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BUILDING AGE

NEW YORK, JUNE, 1920



A GROUP OF STANDARD-PLAN CONCRETE HOUSES AT HIGH LAKE, ILL., A SUBURB OF CHICAGO. THESE HOUSES ARE FOR THE GREATER PART SIMILAR IN PLAN. THE EXTERIOR IS CHANGED SLIGHTLY TO LEND VARIETY TO THE STREET SCENE

Standardized Small Houses*

By MILTON DANA MORRILL, *Architect*

BY standardizing, house building can be made economical, and this same principle holds whether we apply it to the dwelling of the unskilled workman or to the houses occupied by those higher up in the wage scale.

Modern manufacturing methods can be applied to house building. The principle which Mr. Henry Ford has so successfully applied to the production of automobiles can be worked out for the home-builder. The tendency for years has been toward the completion of more and more of the work in the shop where machine methods can be employed.

The writer was born in a house where all of the white pine finish was made up by hand. It took a force of carpenters one entire winter to get out the finish and put it up; that was only two generations ago. Methods have so changed that such a building plan would not be considered today. Labor is too valuable.

More efficient methods have come in to save labor. The time is not far distant when the use of a rip saw on the job, or even the cutting off saw will be a thing of the past. It will not mean that carpenters will be out of work. Houses are in demand and high priced, notwithstanding the millions of automobiles which are being made yearly; the carpenters will find their work less laborious, hoists will be rigged to do the heavy lifting on the job and much of the structure will come finished, ready to be put into place.

Without doubt, there will still be those who want their own ideas in their houses and are willing to pay for them. But in a few years the built to order house will be the exception rather than the rule.

Wholesale house building is on the increase, and we have gained some valuable lessons in this line from our war-time house building.

One drawback to group house building in the past has been that house designs were not made with this in mind. Quite often for a row, the builder will copy some house design which he has seen and which may have been all right for one house, but

*For additional illustrations see pages 41, 42 and 43.

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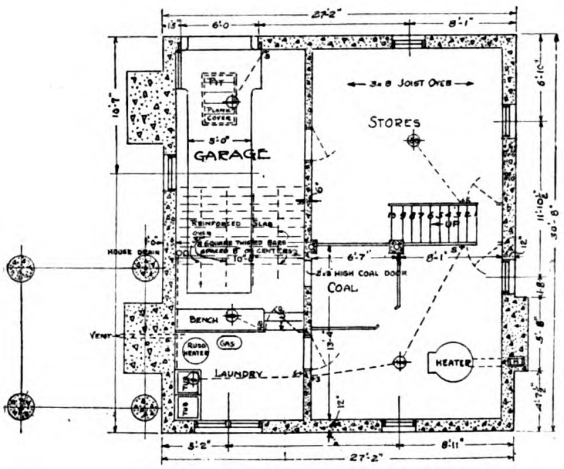
when we get a whole row all alike, the appearance of the group is quite a different matter; the street scene becomes monotonous. He may try for variety by change of color, making one house red, the next yellow and the next white; the street scene then becomes like a "crazy quilt," disturbing to the eye.

Group house building calls for group design, with proper relation of form and color scheme in the adjoining houses. House groups can be made extremely attractive in appearance where an orderly and well conceived general plan is developed. In such a group plan each house forms a part of the general street design. Just enough variety can be given each house so that it will be attractive and different from its neighbors and still no one house will stand out like a sore thumb.

Good architectural effect, as well as economy in construction, can be obtained by planning six or eight houses built together into a group with concrete



BASEMENT PLAN

party walls between. The general appearance is the same as that of one large residence. A house that would look too high and narrow by itself looks much better when built in a solid group.

The planning of small low cost houses requires the skill of the architect fully as much as does the designing of large buildings. Economy is here the watchword. Every inch of space must be made to count and if it can do double duty so much the better.

The simple square or rectangular plan is the best. This shape makes a compact convenient house, requires the least exterior wall to enclose a given space; is therefore economical in buildings in upkeep and repair, in heating and in housework.

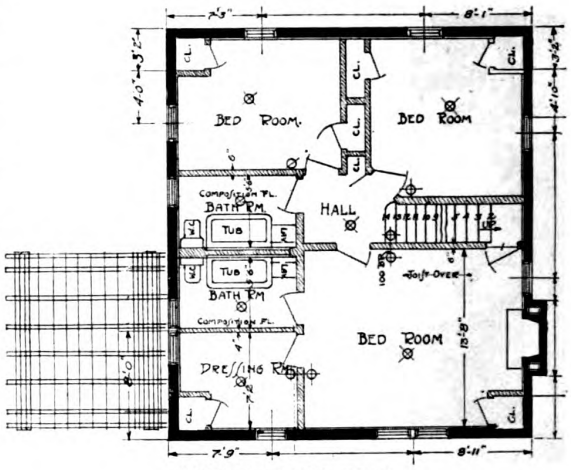
The following may be put down as a few of the essentials in the economical house plan:

One chimney should serve one house, and in twins or rows should serve two.

One plumbing stack and sewer line should reach all fixtures, or in twins or rows, should connect with two dwellings.

One staircase only with minimum hall space.

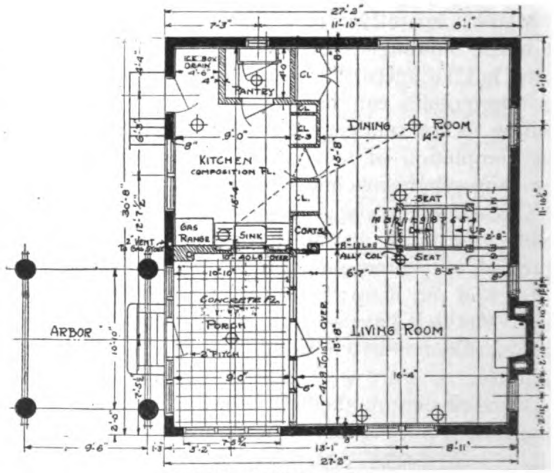
Roof should be simple and not cut up by dormer



SECOND FLOOR PLAN

windows; ceilings 8′ 0″ to 8′ 6″ in the clear are coming to be the accepted rule.

The reader will note that the standard plan houses here illustrated are designed along the most economic lines; the artistic effect is obtained by simple proportions and roof lines and an attractive general color scheme. For each standard house plan several different exterior designs are shown; in this way an entire block might be built up with these standard plan houses without monotony.



FIRST FLOOR PLAN

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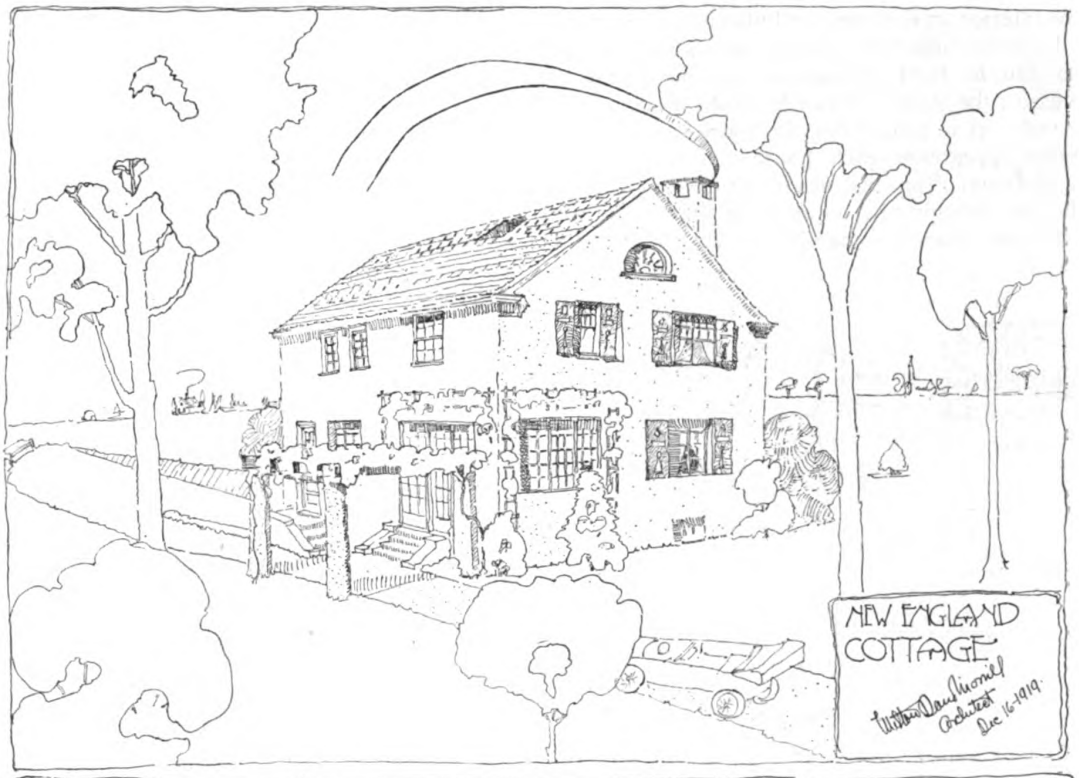

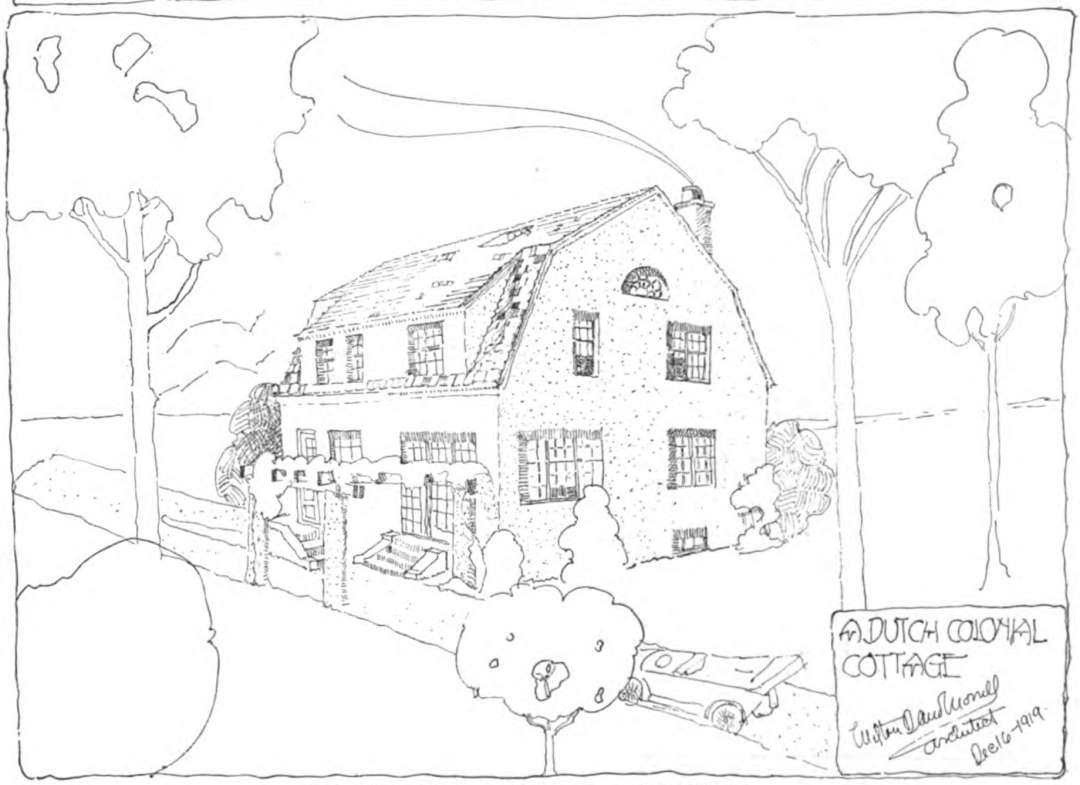

MILTON DANA MORRILL, *ARCHITECT*

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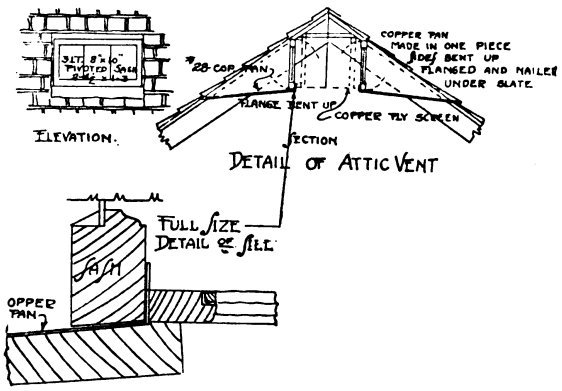
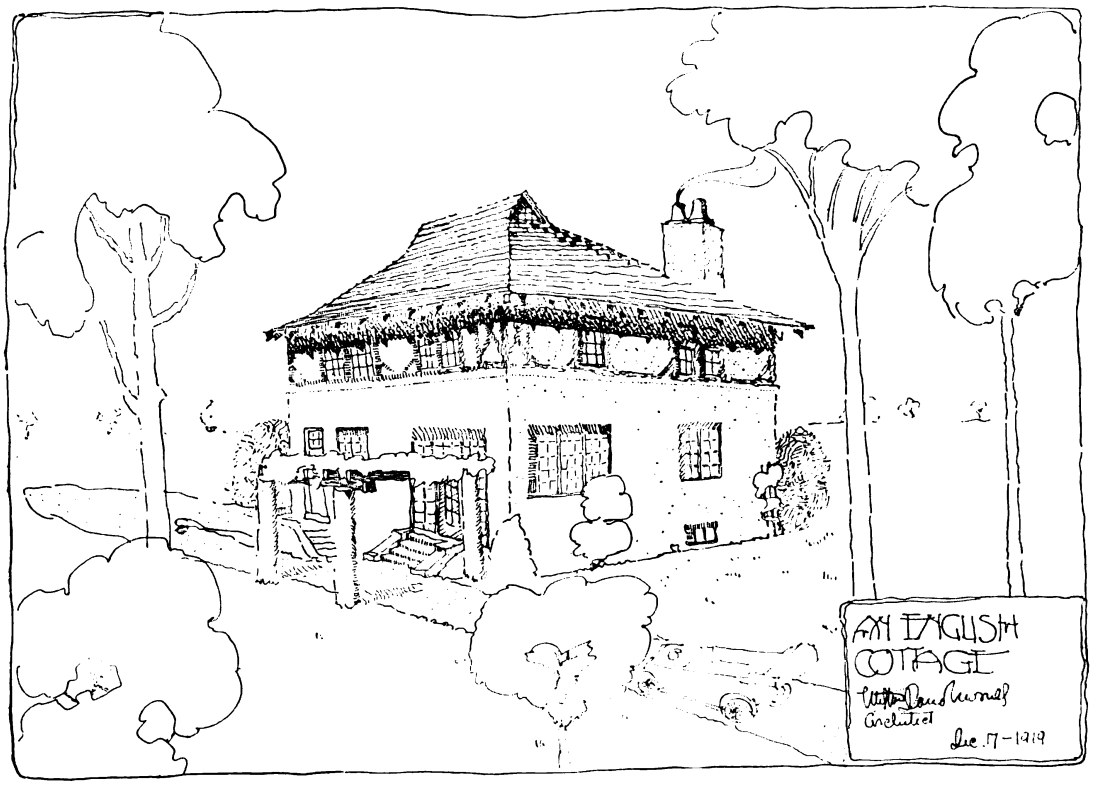
The interior arrangement and plan in such a group can be made identical; thus stock windows and doors can be used throughout and purchased at wholesale; the staircases can be made up complete, only to be set in place when the house is ready. In exterior appearance each house can be made to look different from its neighbor; this is accomplished by changing the location on the lot; by use of different shaped roofs; by variety in tones of stucco finish and by change in the planting and walks.



For the construction of these standard plan houses reinforced concrete has been adopted; in most locations the materials for making concrete can be found close at hand. The permanence and fireproof qualities of this construction make it valuable as a means of building house walls. For the economic building of these houses it was found necessary to get away from the high cost and waste in the use of wood forming; this was accomplished by the development of a system of steel forms which can be used over and over again on house after house. The first cost of such a steel form outfit requires a considerable investment and varies from $500 to $1,000, according to size, but the great saving in labor, as well as material, makes the use of some method of steel forms necessary in the building of concrete houses.

At the conference on concrete house construction held in Chicago in February, 1920, recommendations were made that a 6 inch reinforced concrete wall should be considered ample construction in house work and that clean coal cinders could be safely used in the moulding of light house walls. In this



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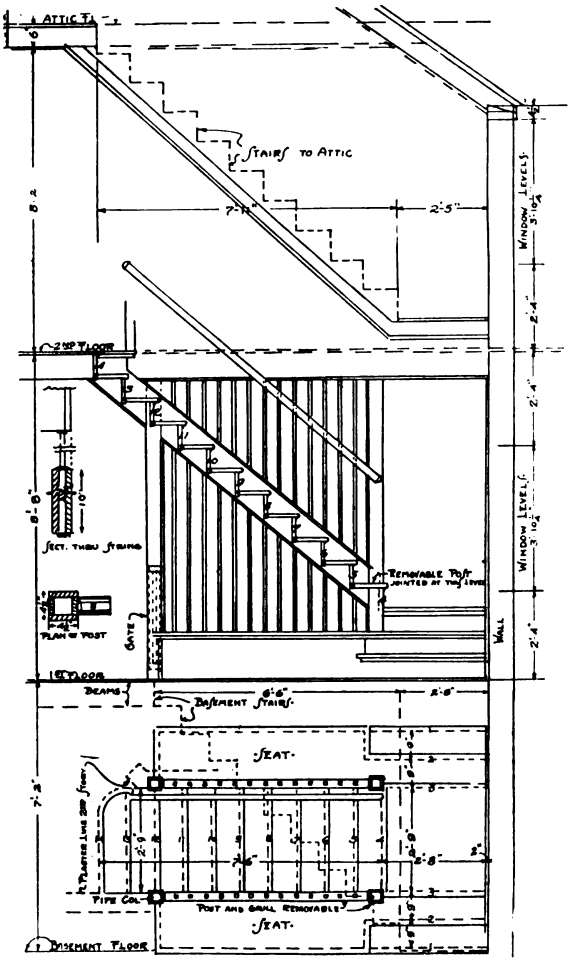
way much of the waste from our steam plants could be utilized in house building. We all realize that the frame house is expensive construction when upkeep, paint and repair is taken into account; heretofore the first cost of building concrete houses has been somewhat of a drawback in its general adoption, but today, with the present high cost of lumber, the standard concrete houses can be produced at the same cost, and under favorable conditions at a cost slightly less than for our usual house of wood.

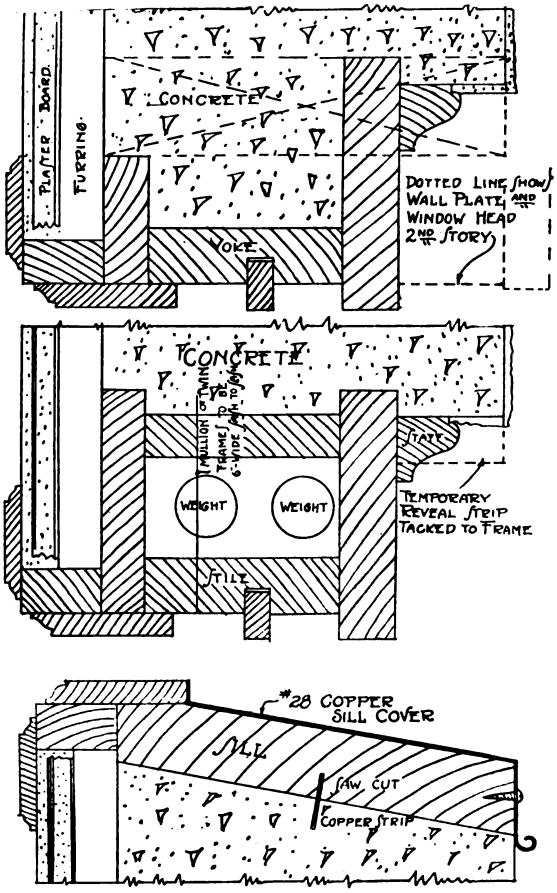


DETAIL OF THE OPEN STAIRCASE

This is treated much like a piece of furniture, so that the Living Room and Dining Room open together and count somewhat as one spacious room. There are built-in seats on both the Living Room and the Dining Room sides.

One of the designs illustrated on page 20 has been called the "Easy-to-keep" house on account of its new features which have been developed in order to fill a need for families where help is difficult to obtain. The kitchen of the "Easy-to-keep" house is planned to save steps; almost everything is within reach from the spice-box to the broom. There are sliding racks in the space between the kitchen and the dining room in which to set dishes; these are rinsed with scalding water after washing, and are allowed to drain and to dry as is the custom in hotels. The dish rack slides through into the dining room for ease in setting the table. Human labor in the home is not cheap; time saving devices and efficient methods have been considered in this house plan to remove as far as possible the drudgery of the housewife.

There is a swinging seat under the table; there is an air cooled closet in the pantry to save ice during the fall and winter months; the drawers for the kitchen and table linen are set on rollers so that they work as easily as office filing cases. The stairway of the house, the central feature, is built more



DETAIL OF THE WINDOW FRAMES

The concrete is moulded around the offsets in the frames so as to make a wind-proof, air-tight job. The wood sill, which gets both the wet and the sun, is covered with copper. A drip is formed so as to prevent the staining of the stucco, which is used to finish the exterior of these concrete houses.

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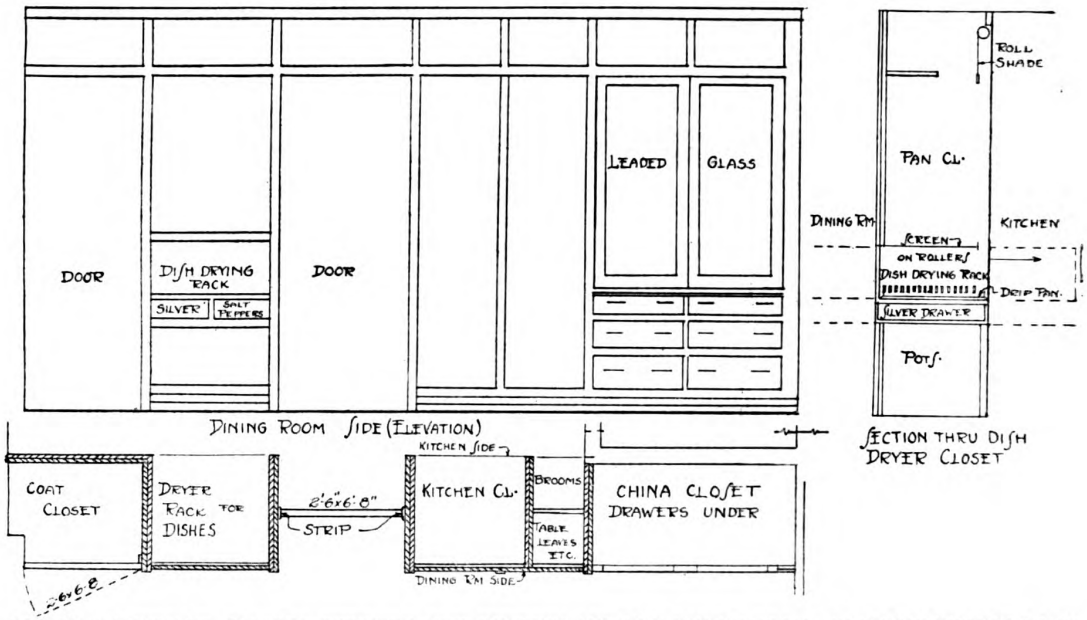


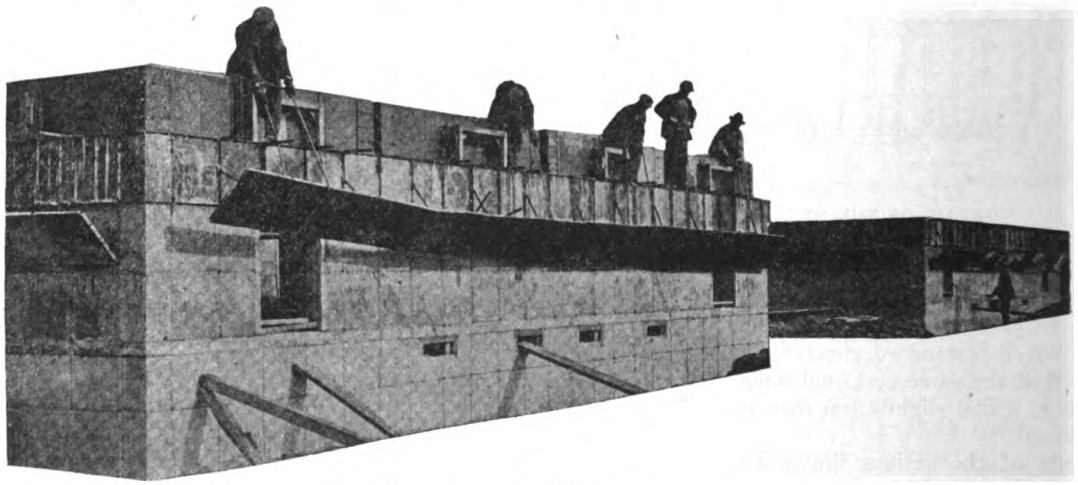
DETAIL OF SERVICE CLOSETS BETWEEN THE KITCHEN AND THE DINING ROOM. THE DISH-DRYING RACK AS WELL AS THE SILVER DRAWER SLIDES BOTH WAYS—IN THE KITCHEN AT DISHWASHING TIME AND INTO THE DINING ROOM WHEN THE TABLE IS TO BE SET. THERE ARE CONVENIENT CLOSETS FOR POTS AND BROOMS AS WELL AS SPACE FOR THE EXTRA LEAVES FOR THE DINING TABLE

like a piece of furniture than a fixture of the house. It stands open with lattice top and bottom, dividing the living room from the dining room.

These plans call for an excavation 4 ft. below grade; the first floor thus stands 4 ft. above grade; the excavated material is used to grade up a terrace 2 ft. in thickness above the natural grade; thus the house is made to look well, not set too high.

The garage can in this way be located in the basement of the house with an easy slope at the rear; there is a laundry in the basement, as well as storage rooms and heater rooms. The garage enclosure is encased in reinforced concrete so that it eliminates any fire risk.

In the second story of the "Easy-to-keep" house there are three bedrooms and a small room for a den or dressing room. By bringing up the plumbing pipes in a center partition two bathrooms are made



A CONCRETE WALLED HOUSE IN COURSE OF CONSTRUCTION. RAISING THE METAL FORMS FOR POURING THE NEXT TIER OF CONCRETE WALL. THESE FORMS ARE HINGED AND SWING UP WITH COMPARATIVE EASE

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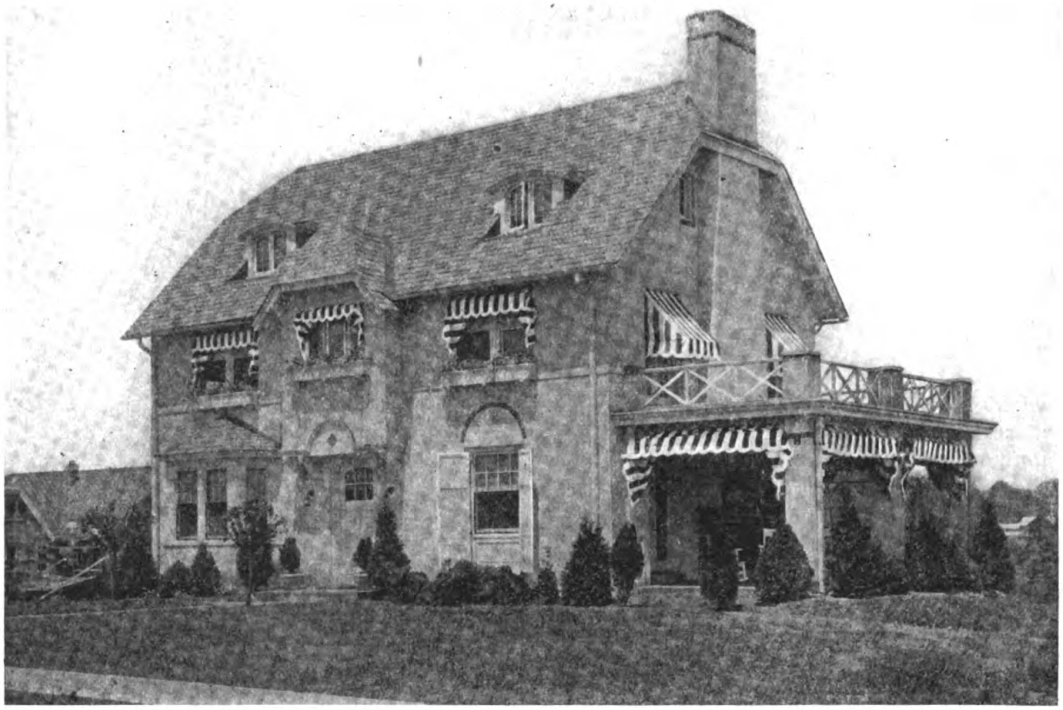
possible with little extra expense other than the plumbing fixtures themselves.

For the construction of the second story 4x8 spruce beams are used; the space between these beams is filled in with center concrete; thus an almost fireproof construction is obtained at little added expense. The floors are finished in the usual hard wood. The roof is covered with seagreen, random width slate.

The exterior finish for a rough moulded concrete for these standard houses is made by the application of a one coat cement stucco; this is applied with troweling and gives a permanent bond to the concrete walls.



AN ARTISTIC HOUSE CONSTRUCTED WITH WALLS OF STUCCO ON HOLLOW TILE
REX STACKHOUSE, *ARCHITECT*

Attractive Homes Constructed With Walls of Hollow Tile

Three Different Floor Plans Worked Out for Identical Elevations to Suit Varying Requirements

ONLY by seeing what has been done can we visualize what may be done. It is therefore of importance that those responsible for the housing development in this country (and this is a joint responsibility, resting upon the prospective home owner, the architect and the builder) keep in intimate contact with those sources of information which present for their study and help the best examples of small house design and construction.

To present the buyer's point of view we take the liberty of publishing part of a letter recently received.

"I intend before long to build a house, brick

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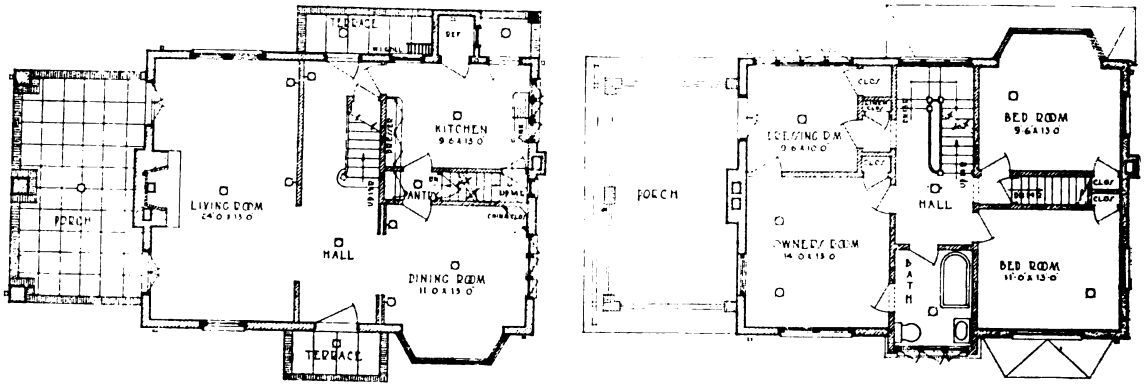
veneer or frame or hollow tile—eight rooms with bath, to cost $10,000 to $20,000 on a lot 75x160 feet.

"I want a well built house, economical as to construction and heating, modern and convenient in every way, distinctive in style as the price will warrant, but without vulgar ostentation.

"I don't care for any particular style or period. The present period interests me most, but I do want symmetry, and harmony and comfort.

"I feel sure that somewhere, *someone* has planned just the kind of a home *we* want and better than *we* could plan it.



FIRST AND SECOND FLOOR PLANS, TYPE NO. 1

"I would like to avoid the commonplace, but don't want a freak.

"I am more familiar with what I *don't* want than what I do want.

"I don't want a bungalow—nearly everything that's bungled is a bungalow.

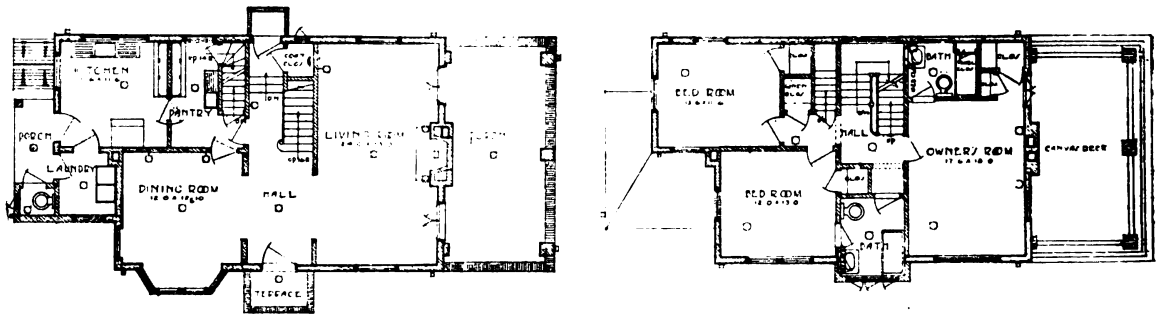
"I don't want a Dutch roof—neither high Dutch nor low Dutch.

"I don't want one of the so-called Colonial houses, now so favored in the East, and which look like an aggregation of 'lean-to' sheds put together any old way.

"I don't want to go back to little dinky panes of glass to accommodate some out-of-date style or period. I want windows through which I can see and which will let in air and sunshine.

"I have written most of this letter in the first person, singular number, but we are a family of three (father, mother and grown daughter), each and all to be pleased."

Of course, the viewpoint of this prospective home owner differs from that of others, or else those styles which do not meet his approval would never have been developed to the great extent that they now have. The client demands something to suit himself and insists that the architect's plans conform to a large extent with his own ideas. He often has very definite ideas both as to the construction and design. After all, the client pays the bill—so why shouldn't he be satisfied. The successful working out of the client's ideas, are however the problem which the architect must solve satisfactorily.



FIRST AND SECOND FLOOR PLANS, TYPE NO. 2.
FRONT ELEVATION REVERSE OF TYPES 1 AND 3,
AND CORRESPONDS WITH PHOTOGRAPH

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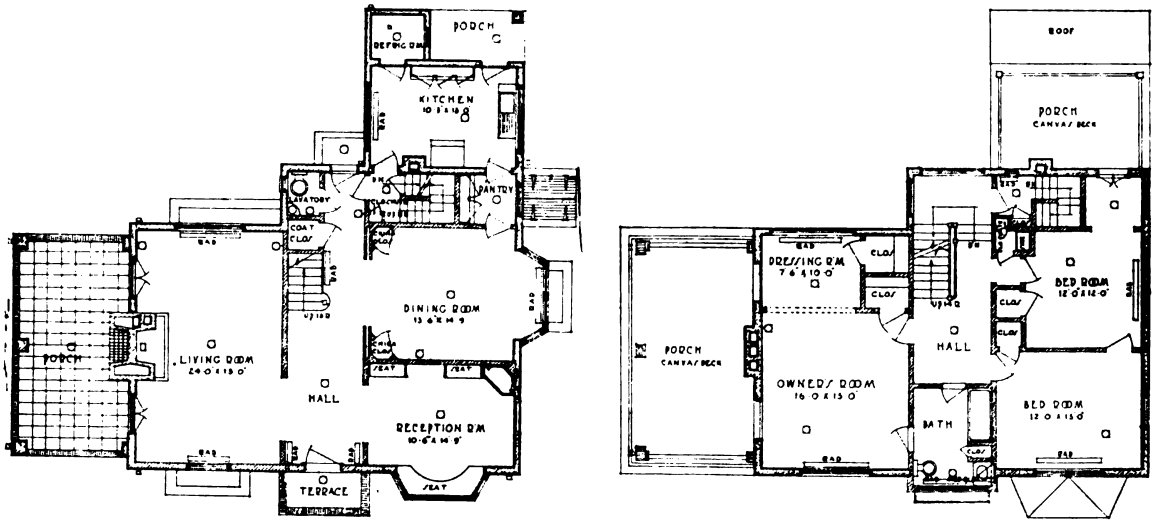
IN an endeavor to satisfy three different clients in varying localities whose views as to exterior appearance seemed alike, but whose needs and ideas of the interior arrangement differed, Mr. Rex Stackhouse, architect, solved the problem by designing three different houses, all of which have the same front and side elevations, but which differ in the number of rooms and general interior arrangement, thus meeting each client's requirements. These houses have been built and occupied to the satisfaction of the owners.

conform to the front and side elevations shown in the photograph. One set of plans is reversed from the other two, the lay of the rooms being thus changed to suit different physical conditions for a house placed facing in the opposite direction from the other two. The number of rooms has been altered to suit varying requirements. In Plan No. 1 the ground floor contains but three rooms and a small pantry, and the second floor four bedrooms and bath, while in Plan No. 2 the ground floor contains in addition a laundry, besides having a much



FIRST AND SECOND FLOOR PLANS, TYPE NO. 3

The walls above the foundation are of 8-inch hollow tile blocks stuccoed. The stucco was applied in two coats, the first composed of one part cement, two parts of lime and three parts of sand, while the second coat was mixed in the proportion of one part cement, three parts of lime and six parts of white sand.

Since in the February issue of BUILDING AGE the correct methods of building with this material were described and illustrated, such information will not here be repeated.

The plans presented in connection with this house are interesting. As already mentioned, three different arrangements have been worked out, all of which

larger pantry. The second floor contains but three bed chambers, but these are considerably larger than those shown in Plan No. 1. An additional bathroom is also provided. Plan No. 3 provides for a reception room, refrigerator room and lavatory in the ground floor, as well as the rooms included in Plan No. 1. In the second floor the rooms are slightly larger.

It is quite often the case that a prospective client may like the exterior appearance of a certain house, the interior arrangement of which is entirely unsuitable. The plans described illustrate the possibilities of arranging the interior to suit the varying needs of different clients.

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Constructing a Winding Stairway

By RICHARD M. VAN GAASBEEK
School of Science and Technology, Pratt Institute, Brooklyn, N. Y.

II. Foreman's Layout

THE first step in the building of a stairway of this character is to make a full size layout. It is from this layout that all measurements are to be taken. First lay out the outside strings A-B and C, Figure 7. The position of these strings are determined by the well hole, as strings A and B are between two walls, 3′ 5½″ apart and cannot be changed. Next lay out strings before the position of the hand rail can be found. This will vary on each job, according to the ideas and desires of the architect or owner. The trim for this particular job is shown in Figure 8. The face of the string is dressed and sandpapered and is used as a panel, the stiles, top and bottom rails forming a panel effect are planted on the face of the string. A shoe covers the joint on the top edge

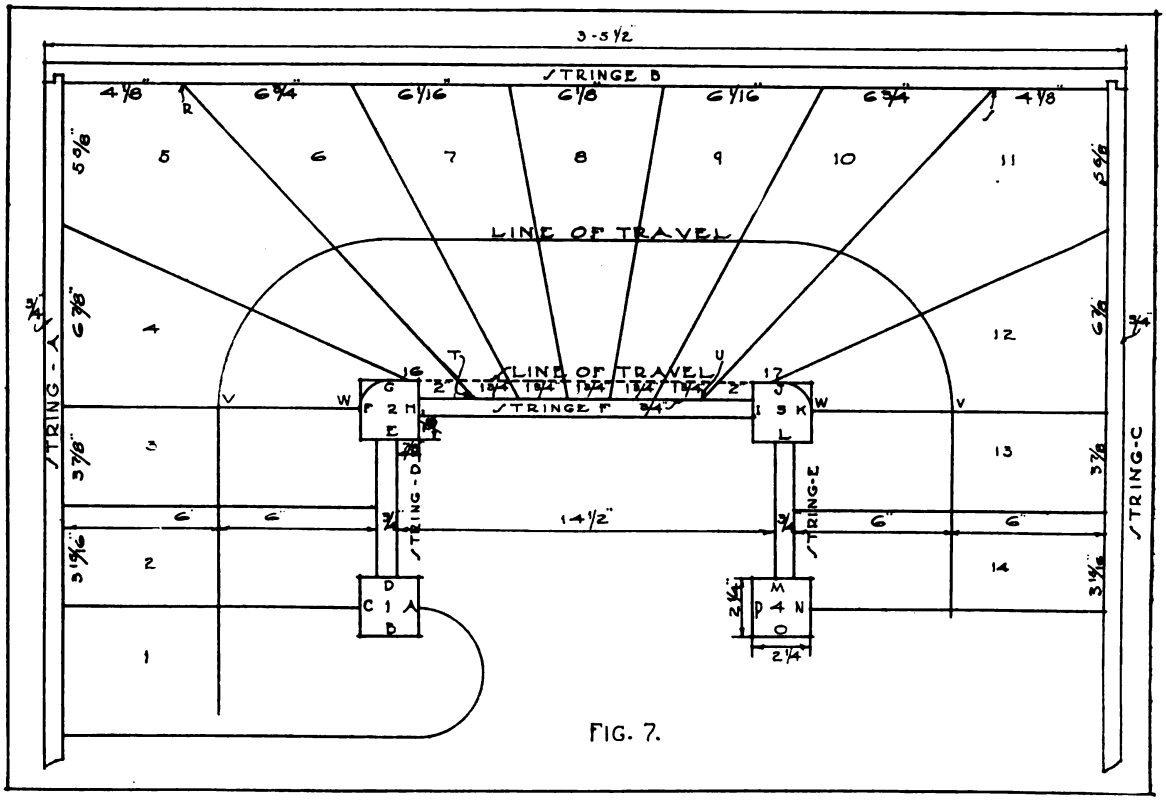

FIG. 7.

PLAN OF WINDING STAIRS. A FULL SIZE LAYOUT SHOULD BE DEVELOPED ON THE FLOOR OR A LAY-OUT BOARD

D-E and F, the desired width of the stairs. Then lay in the newel and angle posts. Note that the center of the string is not the center of the hand rail and that the center of the hand rail must be the center of the posts. It is necessary therefore to determine the trim or finish of the outside string and projects over either edge about ⅛ inch to to give a finish. The center of this shoe is the center of the balusters and hand rail. Referring to Figure 8 it will readily be seen that the thickness of the finished string ¾″ plus ¼″, the thickness of the fillet makes a total thickness of 1″. Deduct

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this from the thickness of the post, Figure No. 7, post No. 2, which is 2¼", which leaves 1¼" and one-half of 1¼" leaves ⅝" on either side of the center line when the string is trimmed. The face of the string itself sets in from the center line the thickness of the trim or fillet or ⅝" plus ¼", thus locating the outside of the string ⅞" from the outside edge of the post. Having determined the position of the posts, it will be necessary to find out how many risers are needed to reach from the top of the lower floor to the top of the floor above.

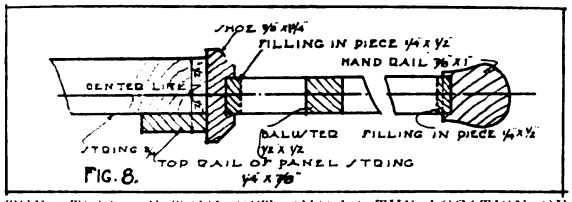

FIG. 8.

THE STYLE OF TRIM DETERMINES THE LOCATION OF THE STRING ON THE FACE OF THE NEWEL AND POSTS

Divide the total rise according to the rule for proportioning by 7 to find the number of risers and then divide the total rise by the number of risers to find the exact weight of each riser. In a stair of this kind where the walls are fixed, it is not always possible to proportion the treads and risers in this way, as the run may be limited, which necessitates increasing the rise somewhat, making the stairs a harder flight to travel.

Having found the number of risers, lay in the line of travel, which should be in a full size flight about 14" from the face of the outside string. In this particular model it is located in the center, Figure 7. Divide this line of travel into the desired number of risers. Produce a second line of travel as shown, the position of which is a matter of judgment of the mechanic. Divide this line into the number of winders and connect the points on either line of travel to get the exact shape and size of each winder to complete the stair. In this plan note the easy line of travel. It is the practice very often to place a riser in the center of the angle posts, putting in only three winders to make the turn, making the steps between turns all straight. This makes a hard flight to travel. It is just as simple to lay the winders out as shown in Figure 7 if the mechanic understands his job and the slight extra cost is more than overbalanced by the appearance and the easiness with which the stair is traveled.

Number each step as shown for reference and identification marks. Likewise measure the width of each tread on the string line and mark each tread accordingly to save time in measuring when laying out the strings.

To Lay Out String A—The width of the string proper may vary from 10 to 12 inches in width, it being necessary to glue pieces on at either end to form the easement. The width of the string used in this problem is 4", the rise 2". Referring to Figure 9, the pitch of string A can be taken from the pitch board and applied to the string as shown in Figure 12. Before beginning to lay out dress both edges of the string to have them perfectly straight. Apply the template as shown on the top edge of the string; place the pitch board against it and line in the face of the riser and tread as shown in the shaded portion. Move the template along and place the pitch board so that the riser line coincides with the tread line previously drawn and intersects it exactly on the nosing line. This operation may be repeated a number of times for straight flights. Referring to Figure 9 and Figure 7, steps 2 and 3 are of uniform width, but the rest vary. Measure forward from riser 2 the required width of step 1, which is 5", and at right angles to tread 1 line in riser 1 as shown in Figure 9. String A should finish at the bottom wide enough to intersect with the base that is to be used. This necessitates gluing a piece on the top edge of the string to provide stock for an easement and a lap joint where it intersects the base. All easements should finish on a level line in order that the molding on the rake will intersect with the molding on the level. A simple way of laying out the easement is shown by producing a level line until it intersects the rake line. Measure off on the level line from the rake line a number of spaces an equal distance apart as shown in Figure 13. Measure up on the rake line from the intersection of the level

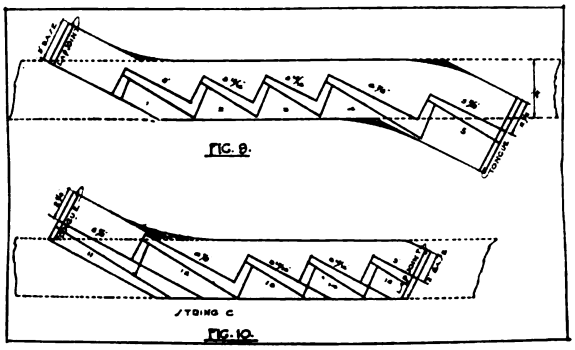

FIG. 9. LAYOUT OF STRING A
FIG. 10. LAYOUT OF STRING C

line the same number of spaces and the same distance apart. Connect point 1 on the level line with point 1 on the rake. Likewise connect point 2-2, 3-3, 4-4, 5-5, 6-6, 7-7 and points 8-8. Where these diagonal lines intersect each other another series of points are formed through which a line may be drawn making a perfect easement. All easements throughout the entire job may be laid out in the same manner with the intersection of lines. To

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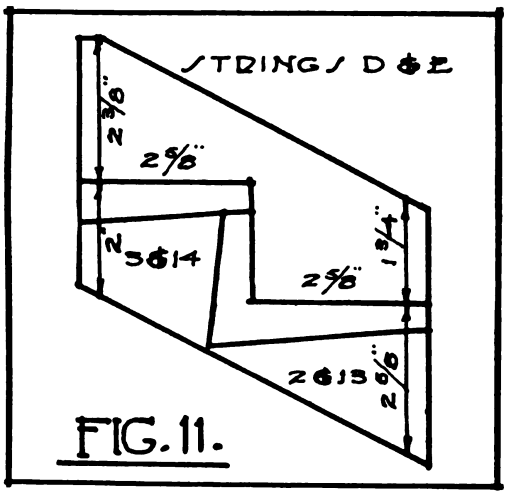
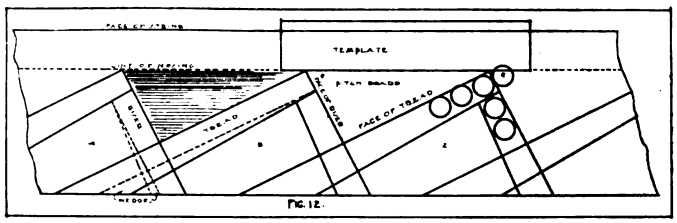
complete tread 4 measure in from riser 4 on the tread level the width of tread 4 taken from the layout or 6⅞" and at right angles to tread 4 line in riser 5 and at right angles to riser 5 line in tread 5. Measure in from riser 5 on the tread level the width of tread 5 or 5⅝" and at right angles to tread 5 produce a plumb line which gives the inside intersection of strings A and B. Produce another parallel line to this line ⅜" apart to allow stock for forming a tongue to fit into the groove in string B. It is not advisable to lay out the easement at the top of string A until string B is also laid out. The distance above tread 5 on string A must be the same distance above tread 5 on string B. There is no given rule for determining the height where the two strings intersect, it being a matter of individual judgment. The tastes of some mechanics would require more wood in the corners than others. In this particular job, 2½" makes a good proportion. Produce a level line and finish with an easement as shown. It will be necessary to glue a piece



LAYOUT OF STRINGS D AND E

on the bottom of the string to provide stock for carrying part of treads 4 and 5; finish also with an easement. The width of this piece is immaterial other than to have it wide enough to receive the two treads, as it comes underneath the stairs and is not seen.

To Lay Out String C—Referring to Figure 10, the pitch for string C can be taken from the pitch board and applied to the string as shown in Figure 12 and previously described in laying out string A. Lay out treads 13 and 14, which are the same width as treads 2 and 3. Also lay out the nosing 15 which is generally about 4" wide and against which the flooring on the upper story butts against. The height of the easement above tread 15 is determined by the height of the base to be used on that story, allowance being made for a lap joint as at the beginning of string A. To complete tread 12 measure



THE NOSING TEMPLATE IS APPLIED TO THE TOP EDGE OF THE STRING, THE PITCH BOARD RESTING AGAINST IT AND MOVED ALONG AS THE TREADS AND RISERS ARE LINED IN

out on the tread line from riser 13 the width of the tread taken from the layout, which is 6⅞". At right angles to tread 12 line in riser 12 and at right angles to riser 12 line in tread 11. Measure out from riser 12 on the tread level the width of tread 11 or 5⅝" and at right angles to tread 11 produce a plumb line which gives the inside intersection of strings B and C. Produce another parallel line to this line ⅜" apart to provide stock for forming a tongue to fit into the groove in string B. Glue a piece on the top of string C to provide stock to support tread 11 and the easement to intersect with string B, the distance above tread 11, string C and tread 11, string B being the same. All easements must finish on a level line in order to have the base molding intersect.

To Lay Out Strings D and E—Apply the pitch board as for strings A and C and produce riser 3 and tread 2 and 3 as shown in Figure 11. Measure on the layout, Figure 7, the distance from riser 3 to the face of newel 1 on the inside line of string D. The distanee from riser 3 to angle post 2 will be the same owing to the riser being central or 2⅝". Now measure in on tread 3 on the string. Figure 11, from riser 3, 2⅝" and likewise measure forward on tread 2 from riser 3 the same distance. These points give the face of the newels, the plumb lines being drawn in at right angles to the treads. Produce another plumb line to this line 5/16" apart to allow for housing into the newels. Strings D and E are alike.

Wedges—Completing the layout of strings A-C-D and E, use the template for laying out the wedges shown in Figure 6. Place the straight edge of the template in line with the tread line already laid out, with the projection of the nosing coinciding with the face of the riser. Insert a small nail in the center of the nosing and give a slight tap with the hammer when the template is in place and line in

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the lower line, providing room for the wedges as shown in Figures 12, 9-10 and 11.

Housing—The face lines should be laid out with a sharp knife which will materially aid the mechanic in following the line and sawing accurately. To start the housing bore about 4 holes in the treads and about 3 holes in the risers a trifle smaller than the stock to be used. Insert the worm of the bit for the first hole in the tread in the center given by driving the brad in the template as previously described. Bore the other holes as close as possible. Use wide chisel and insert into the knife marks and chisel accurately to the lines and finish to the required depth with a router plane. After starting the treads and risers in this way, they can be finished with a saw, cutting accurately to the line, a little undercut if anything, to provide for a close fit when the treads are inserted. Use a smaller chisel for chipping out the housing and finish with a router plane to the required depth. In a full size flight they are generally housed ½" deep; in this particular problem 5/16" is deep enough as the strings are only ¾" thick.

How One Country Home Problem Was Solved At Willington, Conn.

Old Store Building Reconstructed into Charming Residence

By J. H. CHURCH

MANY years ago a prominent feature of the Hilltop in Willington, Conn., was the little store shown in one of the illustrations where the men assembled at night to swap yarns and relate the newest gossip.

A wide variety of merchandise littered the shelves in promiscuous fashion, and the oldest resident remembers Moses Dinrock as the proprietor. He was also the town clerk, kept the post office and was an apothecary.

The years passed and left their impress on this intelligent man, who at length sold the store. The new owner had the building repaired, but did not find business all he expected and was forced to close.

A musician from New York, visiting a friend at the house next door to the deserted store, was much impressed with the Hill and the beautiful view from the building. An idea that the unused structure could be successfully reconstructed into a summer residence soon crystallized into action. Negotiations for purchase of the property were at once begun, and before the neighbors realized it that old landmark, the store, was being converted into a handsome house. The space formerly used as store and back room was changed into one large room, now





BEFORE AND AFTER ALTERATION

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called "The Studio." The new owner had always desired roominess and her desire has been fulfilled in "The Studio." The wide store windows, with their heavy shutters and bar across them, remain the same. A concert grand piano occupies one corner, and a flight of stairs leads up to the next floor. The sleeping porch is an addition and from this a magnificent view can be obtained. This reconstructed building now provides an ideal home, its present appearance being shown by the accompanying photograph.

The old store building, with its associations of the past, has been merged into the progressive present. Although the convenience of a store is missed, the attractive house is an ornament to the Hill, whose residents are delighted to welcome their new neighbor and enjoy gathering in "The Studio" for a social chat and cup of tea, where a subtle spirit of the long ago comes haunting back.

Are there not several old buildings like this in your own neighborhood which could easily be reconstructed into much needed homes? The progressive builder will soon find an opportunity to increase his business and the foregoing offers one suggestion for so doing.

Decorating and Furnishing the Low-Cost House

THE KITCHEN—Part II

WHEN the original plumbing is installed in the kitchen, the housewife should see to it that sinks are of a convenient height. It is not necessary to stoop oneself into a backache every time one washes dishes.

Just here emphasis must be laid on a very important point in kitchen efficiency. For years and years it has been the custom for plumbers to build sinks about twenty-seven inches from the floor. This has been an arbitrary height standardized for economy in buying pipe, and without relation to the user. Exhaustive experimentation in kitchen usage has evolved the fact that the correct height for the sink of the woman of average size is about thirty-five inches from the floor. The motions made at the sink are from side to side—upper arm movements. The height of the sink should therefore be nearer that of the shoulder than is customary. These few inches in the height of the sink are the difference between backache and comfort. It is unpardonable carelessness and indifference on the part of the plumber or the builder who supervises his work deliberately to install fixtures that undeniably and invariably cause backache, when a little consideration will for all time insure the amount of comfort that may reasonably be demanded.



EVERY HOUSEWIFE SHOULD INSIST THAT HER SINK BE THE RIGHT HEIGHT, SO THAT SHE SHALL NOT NEED TO STOOP OVER. THE CABINET ABOVE CONTAINS THE SINK ACCESSORIES. THE WIRE BASKET RECEIVES THE WET DISHES; THEY ARE STUCK IN THE MESHES AND ALLOWED TO EVAPORATE INSTEAD OF BEING SEPARATELY DRIED

Courtesy of Good Housekeeping Magazine

It is just a thing like this that causes the woman of to-day so generally to regard housework as pure drudgery. It may seem uncalled for to place such emphasis on the commonplace things of the every-day life, but the thoughtful

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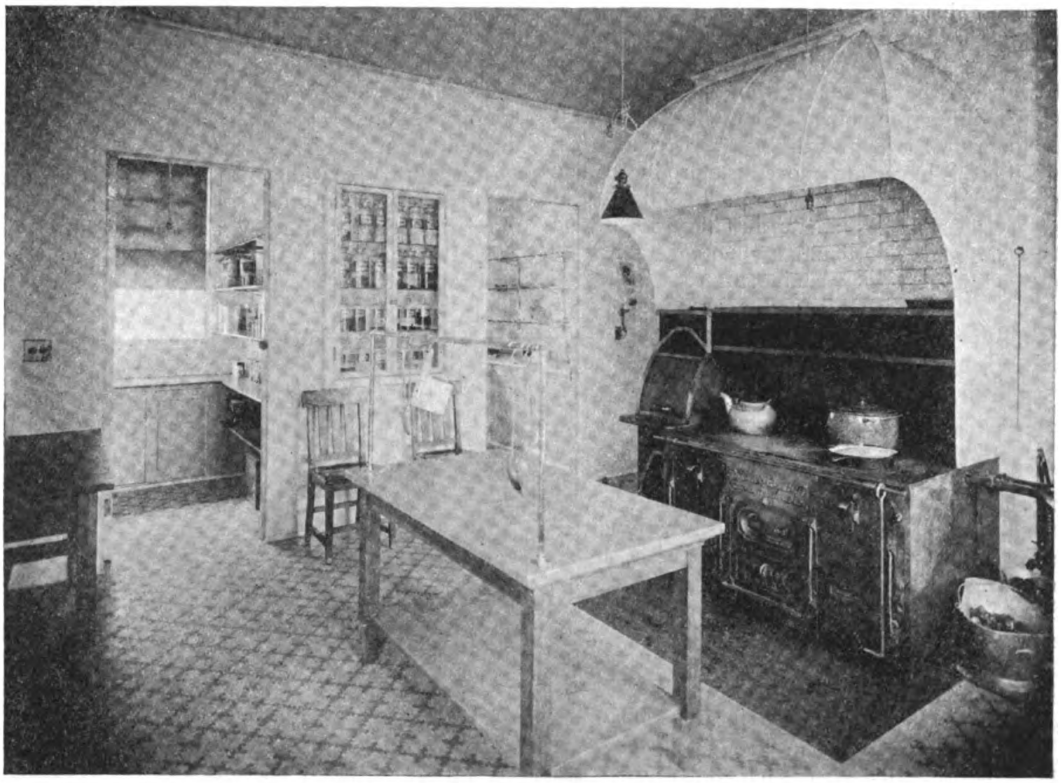
reader must realize that just these details are the controlling features in one's attitude to one's work. The plumber is beginning to feel the force of public opinion on this matter, and in the near future, it is hoped, it will be quite usual to see sinks at a logical and comfortable height. In the meantime, every housewife should see to it that the sink is originally installed to suit her convenience in this respect, or if the sink is already in, she may order an alteration job that will conserve her energy and temper. Every builder should impress his plumbing contractor with the value of this, and every plumber, in turn, should convince the manufacturers of pottery and fixtures that certain things are right and should be done.

The housewife is rare and hard to find who does not want a window over her kitchen sink. This is for reasons both practical and aesthetic. A north outlook is best, as the worker does not then face the source of light. It is pleasant to look up from one's work and out upon a garden or the activities of one's next door neighbor. It is easier to wash the dishes clean if one can see what one is doing. The sink should be of easily cleaned enamel and not enclosed with woodwork. Twin sinks separated only by a low partition, each with a drain board, greatly increase the facility with which cleanliness may be attained. If only one drain board is had, it should be at the left of the sink, for as the right hand does the washing, the left naturally moves the dishes to the drain. Enamel, tile or composition finish should be the material selected for the drain. This finish usually backs up the sink wherever water is likely to splash, and may always be kept clean. The drain board may slope toward the sink, and the fewer grooves it has the better. The space under the sink is not an approved location for a closet. Although such closets have been sanctioned by custom, experience has shown that they easily get smelly and are troublesome to clean.

If there is electric power available, a device for immediate hot water service is on the market and may be readily attached to any spigot for a moderate price. One simply turns the water on in the usual way; one turn makes an electric closed circuit which instantly heats the water to boiling temperature, and incidentally purifies it in the process. Another turn cuts off the electric current, removes the



NOTE THE SPECIAL LIGHTS, OVER THE TABLE, ABOVE THE STOVE AND IN THE PANTRY. SEE ALSO THE TELEPHONE LEFT OF STOVE. THE BAR OVER THE TABLE SUPPORTS COOKING SPOONS JUST WHERE THEY ARE NEEDED. THE UNIFORM, GLASS JARS, EACH LABELLED WITH ITS CONTENTS, ARE ADMIRABLE. THE LINOLEUM IS A CHEERFUL FEATURE

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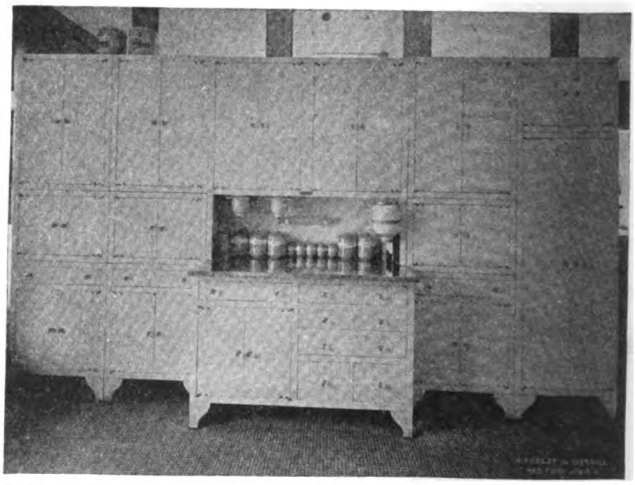
THIS ONE PIECE OF FURNITURE CONCENTRATES WITHIN IT ALL THE EQUIPMENT, TOOLS AND ACCESSORIES THAT ARE ORDINARILY NEEDED. THEY ARE SCIENTIFICALLY ARRANGED, ARE OF THE CLEANEST AND BEST QUALITY AND ARE LABOR SAVING IN THE BEST SENSE OF THE WORD

Courtesy of Good Housekeeping Magazine

source of heat, and the next second the water runs cold again. This does away with the discomfort of frozen pipes in winter, with the inconveniences of coal handling, and with the delay in boiling water, so usual when the present methods are employed. It also simplifies plumbing, as only one faucet is needed instead of two, and the system is economical because there is never any more heat produced than is required.

Just as the sink has all its auxiliary soaps and powders close by, so should each other utensil be grouped with the larger equipment to which it is accessory. A pancake turner for instance, serves no good purpose in a cabinet for it is only useful right at the stove. There may well be a shelf to the right of the stove from which these things may be hung on hooks. Again, just over the sink, there should be a cabinet where scouring powders, silver polish, reserve soap, and a few first-aid things should be kept. The dish-mop, wash cloths and towels should each have a separate and definite hook as close to the sink as possible. The cupboard, where table dishes are kept between meals, should be above the drainboard, where one may put them away without the intermediate steps of piling them together on a specially cleared space and then carrying them around, possibly climbing on chairs to reach the place where they belong. Cupboards should have glass doors with large panes, as small ones are hard to clean. If the contents are very miscellaneous, oiled paper with a simple pattern gives the effect of frosted glass. It is easy to apply and durable. It is desirable to have a hook for each cup as they are awkward to nest, and take a lot of room, and are likely to chip.

As much as climbing is troublesome, every housewife knows that stooping is still more so, particularly when it is to abstract a recalcitrant pot from the very bottom of a closet when a lot of other pots are nested in it. If the cabinet with its sliding shelves, already described, is not part of the equipment of the kitchen, measures should be taken to prevent this daily discomfort. It is possible to get a kitchen table with a horizontal bar supported about three feet above it, from which these pans may be suspended from hooks, but a more sightly and equally convenient method is to have shelves for these, and enough of them to avoid the necessity of nesting a number of dishes within one another. It is not ordinarily thought desirable in the private dwelling to have these shelves exposed. In the restaurant or large hotel, where speed is so vital and where the chef has a great many assistants to clear away all the confusion he makes, it doesn't much matter if the dishes are exposed, for they are almost all used every day anyhow. But in the small house, the housewife who uses the dishes also has to clean them, and if they are not used as frequently as the more varied diet produced in the restaurant requires, they get soiled from exposure and need more attention than they are entitled to. There should be provided as many drawers, shelves and cupboards as it is possible to get in; the more there



VIEW OF MODEL KITCHEN CABINET, CLOSED. SEE THE ELEVATION AND OPEN VIEW. THIS IS THE LAST WORD IN KITCHEN CONVENIENCE

Courtesy of Good Housekeeping Magazine

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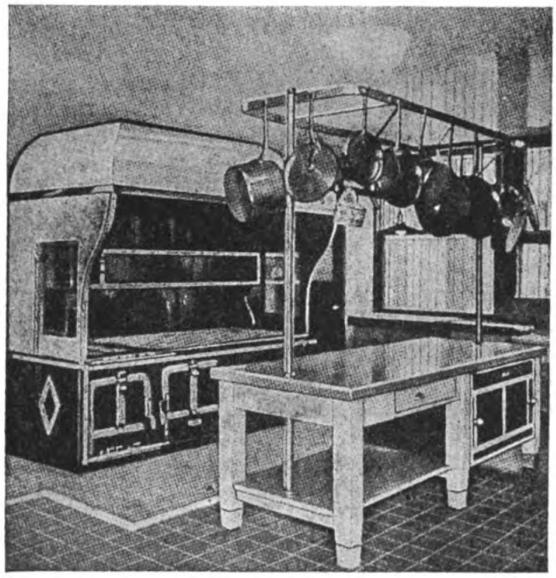
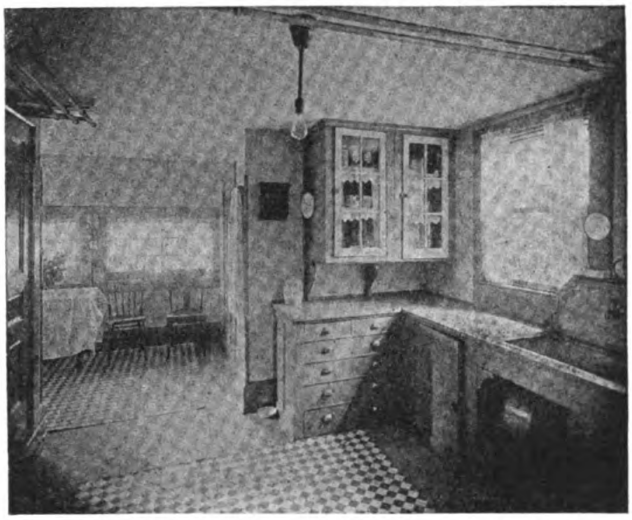


THIS IS A GOOD EXAMPLE OF A SPACIOUS WORK TABLE. THE PANS SUPPORTED UP HERE PREVENT STOOPING. THE ALUMINUM TOP IS DURABLE, DECORATIVE AND CLEAN. NOTE THE TILE FLOORS, AND THE LIGHT JUST OVER THE TABLE. THE HOOD OVER THE STOVE TAKES CARE OF COOKING ODORS

are, the happier the woman. Aluminum pots and pans commend themselves for several reasons. They are seamless and easy to clean. They do not chip off like enamel, and pieces do not get into the food, creating an unknown source of illness. They are attractive and durable.

One of the elements in the time-saving arrangement of the practical housewife is that the kitchen shall be reasonably small so as to save her steps. The days are long passed when the head of the house could sit majestically at the kitchen table and send serving maids to distant cupboards. If she wants anything she must get it herself, and it is a blessing to have it nearby. On the other hand, in the general plan of the kitchen it is well to bear in mind the fact that in these servantless days we are reverting to the ways of our ancestors and sometimes eating in the kitchen. Also there are numerous occasions when a woman wants space: to iron, for example, or at preserving time. To meet these two seemingly incompatible demands for space and for compactness, an ideal kitchen would have one part of the room crowded with its refrigerator, kitchen cabinet, stove and table, and beyond this center of activity a larger, sunny open space where movable furniture might be placed and where upon occasion the wife may sit comfortably to darn stockings while with one eye she watches the stove cooking the dinner.

Inasmuch as there is usually heat in the kitchen generated by constant performance of the stove, special heating facilities need not be provided. For the same reason, a north outlook for the kitchen will, other things being equal, be found satisfactory. The kitchen should be very well ventilated, owing to the usually high temperature, and to the odors resulting from the processes of cooking. There should, if possible, be windows on at least two sides of the room or a transom to carry off odors. If desired, windows for strictly ventilating purposes may be built rather high on the wall, leaving space below for table or cupboard. It is well to have a window opposite the stove, throwing the light back into the oven and making it possible to see what is really going on. Glass oven doors are being introduced to facilitate this, as the opening of the oven doors retards the cooking process by letting the heat out of the stove instead of keeping it within. If there is a door leading from the kitchen to the back porch it should be screened, so that the wooden door may be left open. Windows also should be screened. The back porch may be made a particular center of pride for the housewife. Few things are more telling as to her ability as a housekeeper. If it is littered down with broken furniture, smelly refuse and what-not, it is just as if she stood upon the roof and declaimed to all the community against cleanliness and civic pride. It is a tacit admission to her children that some places may be dirty and disreputable, and it is just a matter of deciding upon



A WELL PLANNED KITCHEN SHOWING VIEW INTO BREAKFAST ROOM. NOTE THE CAPACIOUS BUILT-IN CLOSETS. THE OPEN SHELF LEFT OF THE SINK SERVES AS A DRAINBOARD, AND THE CHINA SHELVES ARE JUST WHERE WANTED

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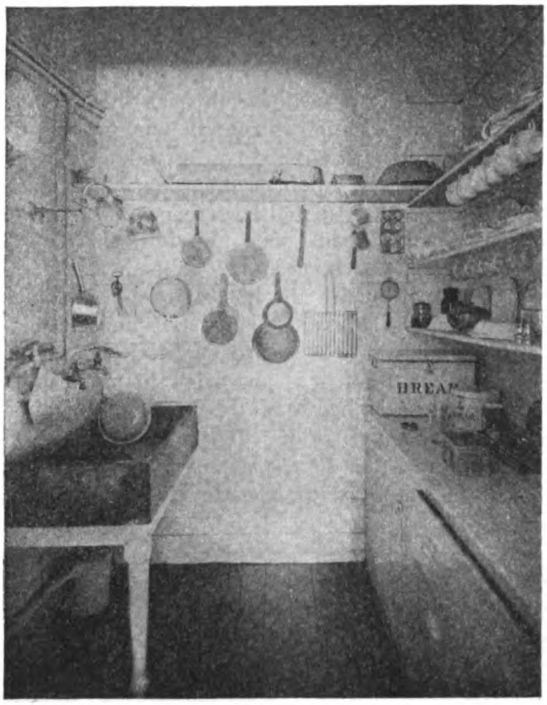
the place. The housewife has a choice opportunity in the administration of her kitchen and the rear of the house to exemplify characteristics of thrift and skill that her children can get in no other way. Here is her training ground for the young people, in manual work, and in system. It is essential to the cleanliness of the kitchen that odors or dust or miscellaneous cats and chickens should stay outside, and it is also essential for the morale of the household that the outlook from every source shall be one that is clean and wholesome.

In selecting stoves it is well to have a range which uses both coal and gas or both coal and electricity, as this permits an economy of space in that part



THIS IS A CORNER OF A KITCHEN WITH A LIGHT OVER THE SINK AND THE DISH CLOSET JUST A STEP AWAY. NOTE THE GOOD USE MADE OF HOOKS, FOR THE CUPS AND FOR THE PANS. A DRAINBOARD ON THE LEFT OF THE SINK WOULD BE AN ADDED CONVENIENCE. THE BREAD AND PROVISIONS ARE TOO FAR REMOVED FROM THE CENTER OF ACTIVITY

of the kitchen where compactness is so essential. The stove should have a hood to carry off odors. The fireless cooker is gradually being adopted to a large extent. There are many ways in which its usefulness is very considerable, when it is intelligently managed. It is possible for the handy man about the house to make one with little difficulty.

Some ambitious housekeepers have devised what is actually a dumbwaiter, converted to serve as an icebox without ice, that runs between the kitchen and cellar, and permits of certain things being drawn up and down without walking the steps: such things as eggs, cake, canned goods—articles of food that should be kept cool, as in the cellar, but which do not actually need ice. The part of it visible from the inside of the kitchen looks just like a dresser or closed cupboard, and the top of it may be treated like any other shelf.

In choosing a refrigerator, consideration must be given to its vital importance to the health of the family. Pure Food Commissions in certain states have placed restrictions on the use of unsanitary ice-chests, and the testimony of many eminent physicians should be enough evidence of their serious menace to health. Noxious bacteria and poisonous gases that often are the cause of serious illness may be traced to damp and unsanitary refrigerators, and the medical profession has repeatedly warned the public against them. Odorous and leaky iceboxes should also be avoided.

Lighting the kitchen is a matter of great importance. Much of the work during the short winter days has to be done after dark, and if the high standard of cleanliness and efficiency is to be kept there must be ample light. The chief work centers should have special lights. The sink, the stove, the kitchen cabinet or work table—each should have a good bright light, properly shaded to avoid glare. There should also be a general light suspended from the center of the ceiling.

In a small house where laundry work must be done in the kitchen, one set tub and an electric washing machine is a very practical arrangement. While the electric washer is working, one can do other work, and while ironing it is easy to watch the baking. When the washtub is not in use for laundry purposes, it should have a clean white enamel cover and may then be used as an additional table.

The interesting part about a kitchen is the fact that it is possible from time to time to buy inexpensive articles of convenience that are no tax on the pocketbook and that contribute immensely to the comfort of the worker and the appearance of the room. For instance, there is perhaps nothing more irksome to the housewife than the disposal of refuse; the scraping away of unconsumed food, the uncovering of a stubborn iron garbage can with one hand and the odorous process of handling it. Instead of all this there is a white enamel sani-can; one opens it by a slight foot pressure, the lid rising back on a hinge; a deodorizing substance may be put in the top, neutralizing the unpleasant smell, and both hands are free to manipulate the plate and hasten the performance. This is distinctly an attraction to any room and its comfort-giving qualities

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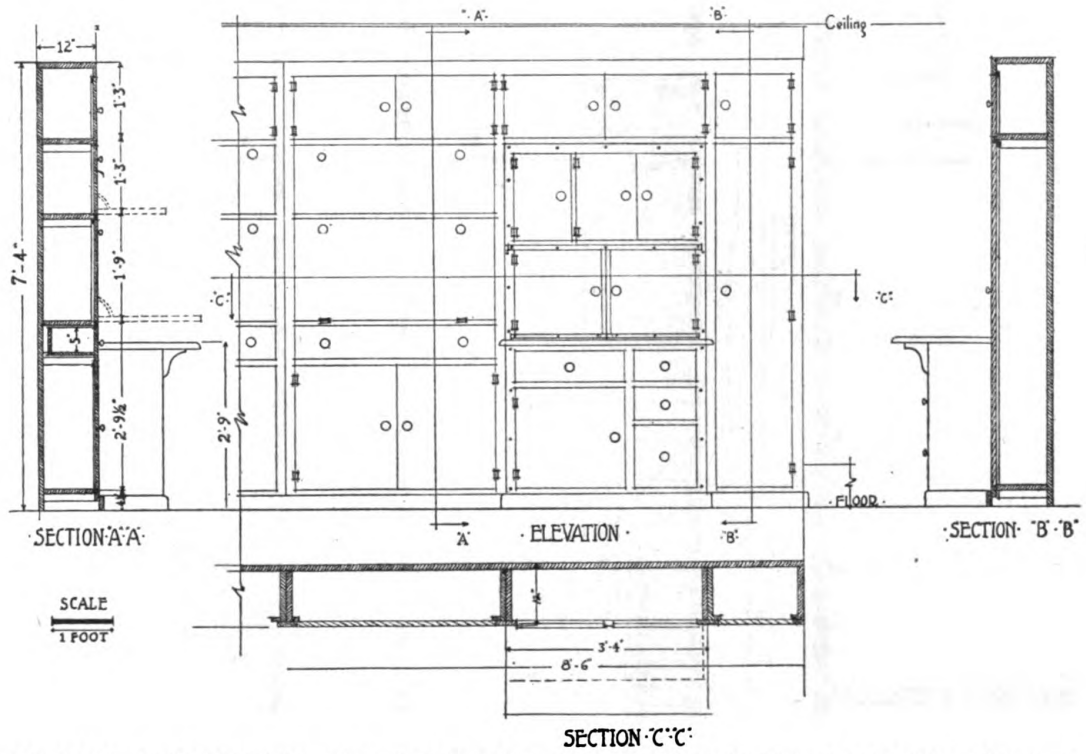
are noteworthy. There is a hard rubber shovel that may be bought for ten cents to scrape the dishes clean. This works much better than the improvised fork-shovel, and simplifies the dish-washing process. It is possible to get a wire basket and stand each dish in it as it is washed. The moisture will then evaporate, and one does away with the need for drying the dishes and washing the dish towels. The dishes are likely to be cleaner than if they are rubbed with damp towels. Sliding tables, drop tables, folding tables are all useful, easily devised at home. They are always convenient. Frequently there is a broom closet in the kitchen. It is preferable to have this in the cellar or on the back porch, or at any rate rather removed from the cooking process. There are now for sale at moderate prices a number of devices by which cleaning is greatly simplified. Mops and dust-pans, scrubbing brushes and dust cloths may now be had on long handles, thus largely doing away with "housemaid's knee," and also with climbing on chairs to reach the high places. Broom closets should be large enough to hold the vacuum cleaner. If there is not a special laundry, the washboiler may also have to go in here. In buying a washboiler, one should be had with a spigot outlet, so that the whole heavy thing need not be tipped over to be emptied.

There should be a good clock on the kitchen wall, and a mirror, to encourage a smile and help the departing touch as one goes to answer the doorbell. A large mirror increases the apparent size of the room and serves to reflect the light. Besides the high stool there should be at least one other comfortable, but small, chair. A little rocking chair is good. All cooks like to rock. Or there might be a window seat built in.

Where the housewife does all the work herself, it may be further simplified by tea wagons and revolving trays. The former may be loaded up with all the dishes necessary to set the dining room table, wheeled in, emptied and wheeled out again, all in one trip. The latter may be set in the middle of the table, and each person may help himself.

To do full justice to the kitchen would be difficult. Each house has its own problems and each housewife her individuality. The foregoing suggestions, however, may serve to awaken builders to the far-reaching importance of domestic work, and to stimulate them with a desire to co-operate in every way to make this vital center of the house a wholesome and attractive place.



ELEVATION OF THE KITCHEN CABINET ELSEWHERE ILLUSTRATED BOTH OPEN AND CLOSED. THIS IS A MODEL UNIT OF ITS KIND

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Fire House and Town Hall at Ambler, Pa.

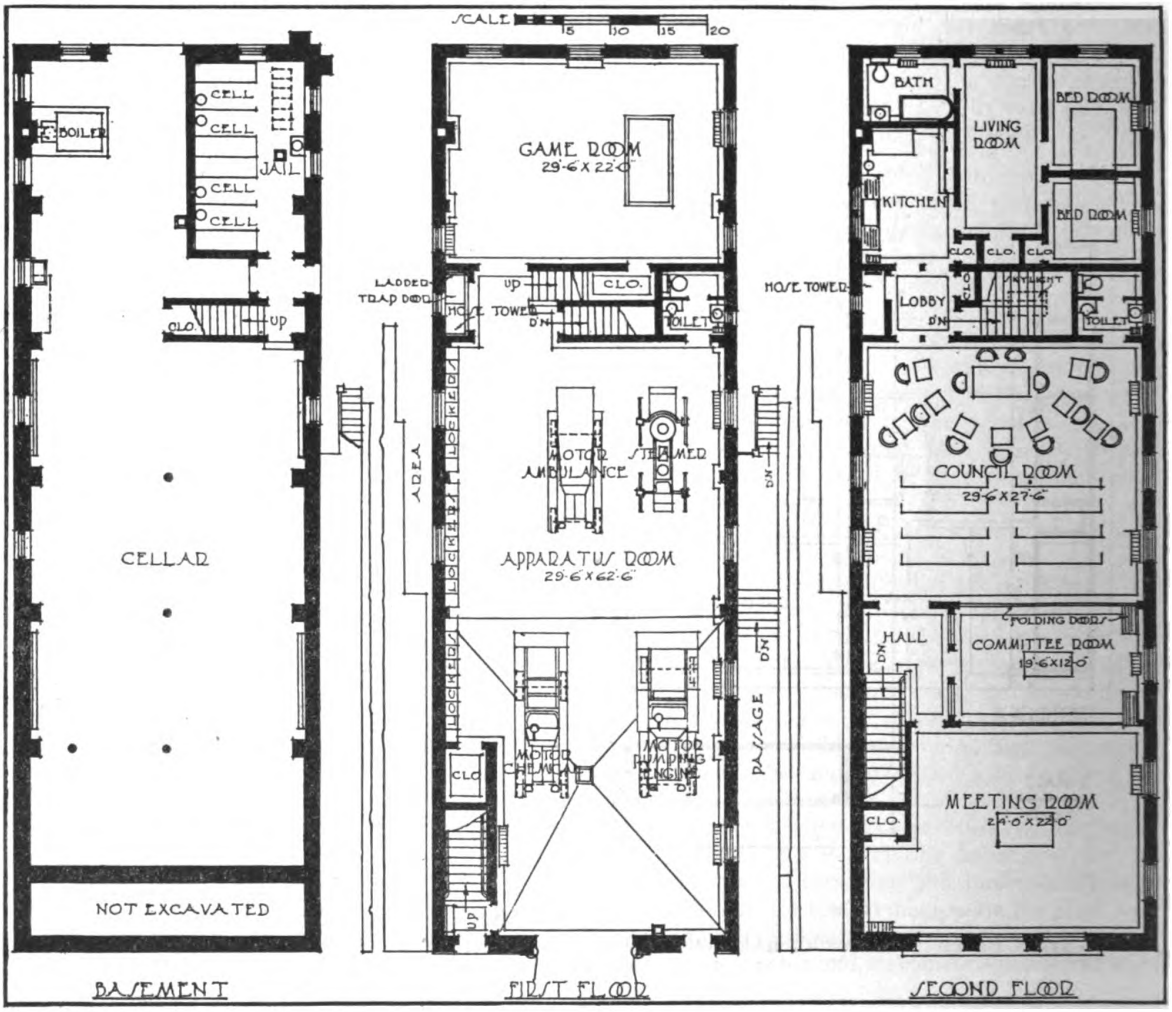
C. E. SCHERMERHORN & WATSON K. PHILLIPS, *Associated Architects.*

THE Town Council and the Wissahickon Fire Co. of Ambler, Pa., had joint quarters in an old frame building; the owner needed the building and as the quarters were far from satisfactory they began looking around for a new location. A one-story moving picture theatre on the main street burned out, and the property coming into the market, was purchased by the Fire Company.

The architects upon examination found the walls were not of sufficient strength to carry a second story; so 8" I-beams used as columns were provided at intervals along the wall to support new 24" I-beams which carry the second floor. Thus the old walls carry only the roof and second story walls.

The old 24" I-beams supporting the first story were at different levels due to the sloping floor and two of these were lowered.

The apparatus room 29' 6" x 62' 6" is of ample size to house the fire fighting equipment consisting of an American La France Motor pumping engine, an American La France chemical engine mounted



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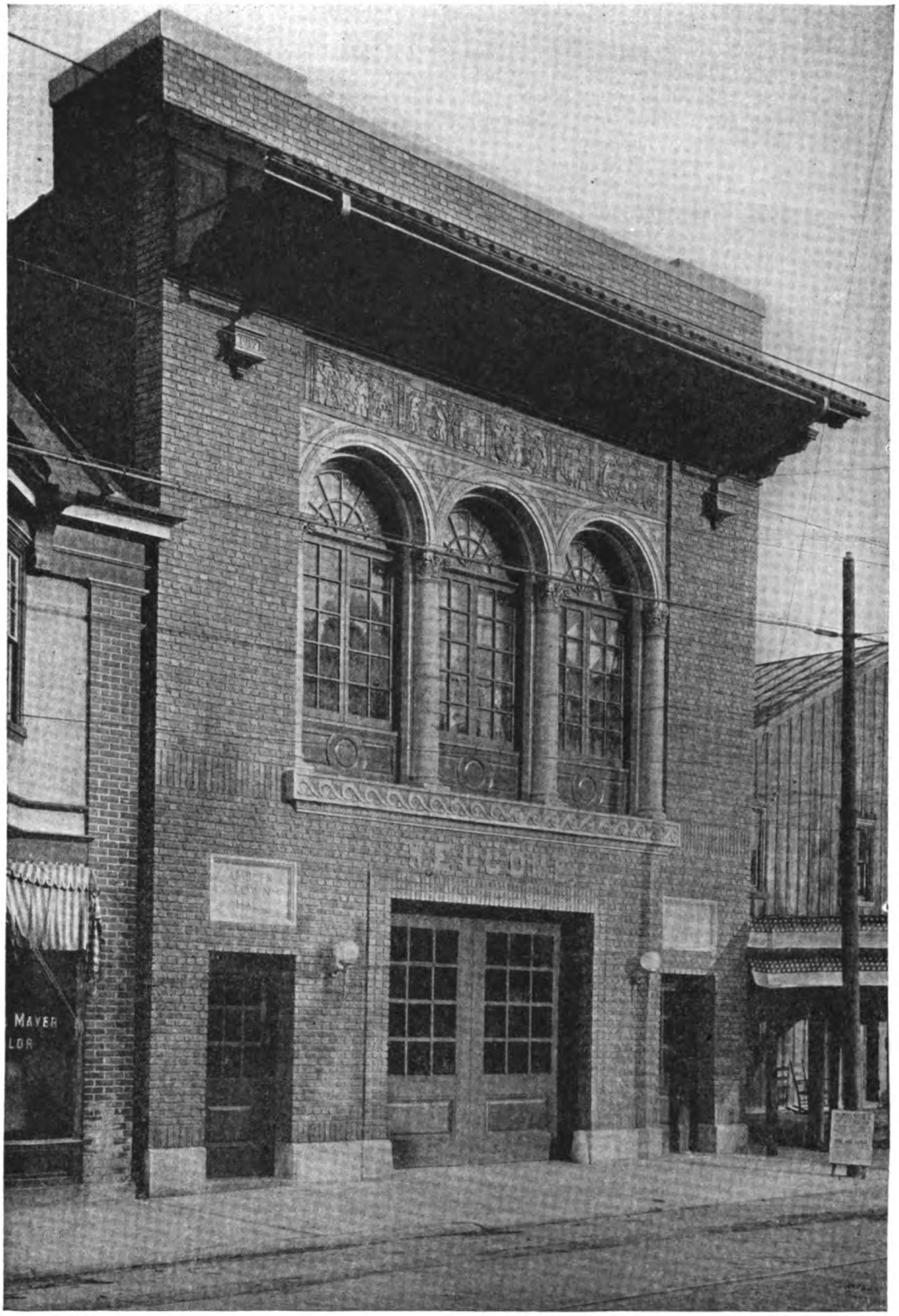

TOWN HALL AND FIRE HOUSE AT AMBLER, PA.
C. E. SCHERMERHORN AND WATSON K. PHILLIPS, *ASSOCIATED ARCHITECTS*

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on a Packard truck, and an old American La France horse drawn steamer. The latter has been rebuilt and painted and is used only in emergency. A Hudson motor ambulance owned by the Company is used for hospital or other emergency cases, and by the fire company to assist in transporting the firemen to out-of-town fires.

The front portion of the apparatus room has a reinforced concrete floor with a drain in the centre so the machines may be washed in the building. The hose is washed here also after which it is hung in the tower to dry. The large entrance doors are provided with an automatic door opening device.

In the rear of the apparatus room is a large game room used by the members of the company.

The meeting room on the front of the second floor is used by the Fire Company. In here are arranged the trophies won by the company and other interesting souvenirs.

A large room is provided for the use of the Town Council. Between the two is a committee room used jointly by the Fire Company and the Town Council. Large folding doors permit all three rooms being thrown together for dances, fairs, lectures, conventions, suppers, etc.

Living quarters are provided at the rear for the use of the man constantly on duty. During the war the entire second floor was used by the local Red Cross unit and many thousands of pieces of supplies were turned out by the local women.

The cellar is entered from the rear on a level with an alley. There is a jail room with four cells. The remainder of the cellar is used for the storage of the Town Councils' apparatus; street sprinklers, mechanical sweepers, road building machinery, supplies, etc.

The main front is designed along Italian lines. Rough texture buff colored brick with deeply raked out joints laid in diaper pattern gives a pleasing effect. The tile panel over the central archway is an original feature. Here is illustrated a history of the fire fighting apparatus. First the firemen of the Colonial days are seen drawing water from the old town pump to throw on a burning building. Next the hand pumping engine is shown and two men fighting illustrates a phase of that period. Then the horse drawn steam pumping engine is shown and last the modern motor driven combination water pumping and chemical engine mounted on an automobile chassis. This is worked in polychrome unglazed tile and was specially made from the architects' designs for this building.

The main cornice is painted in several colors, orange, brown, green, red and yellow and rubbed with dirt on a rag while still wet to give an antique effect.

In the spandrels of the arches replicas of old fire marks are used with fine decorative effect.

The building was completed in 1918 and cost about $25,000. It was built by Henry P. Schneider and designed by C. E. Schermerhorn and Watson K. Phillips, Associate Architects, all of Philadelphia.

Is Your Percentage of Profit Calculated Correctly?

MANY builders who desire to add a certain percentage to their estimate as a profit do not figure the percentage accurately, and so continue to take a lower profit than they are calculating on.

For instance, a builder will figure so much for his estimate and desire to make 10 per cent profit on the contract. In many cases he will take 10 per cent of the estimated cost instead of 10 per cent of the cost quoted to the owner. On small jobs a higher percentage is usually charged, as the overhead on such work is rather high.

Suppose that you have a $100 job for some repair work, and you desire to make a 20 per cent profit. Now note that if 20 per cent of the actual cost is added to the estimate the price quoted will be $120, the profit being $20. This, however, is not 20 per cent profit on the selling price. The proper price to quote would be $125, giving the desired profit of 20 per cent, which will be $25.

Such calculations can be figured by means of the following formula, where S = the sales price, C = the total cost and X = the percentage that it is desired to obtain of the price quoted.

$$S = \frac{C}{1 - X}$$

Using this formula on a $1,000 job where a 10 per cent profit is desired, the contract price after the percentage is added to the actual cost can be found as follows:

C, the total cost, is $1,000. Divide this by 1 — 10 (which is the percentage desired to obtain), or 1.000 dividend by .90. This will give the price to be quoted as about $1,111, or a profit of $111.

Of course, on small jobs the incorrectly calculated percentage does not amount to a great deal, but nevertheless it adds up to a considerable sum at the end of the season.

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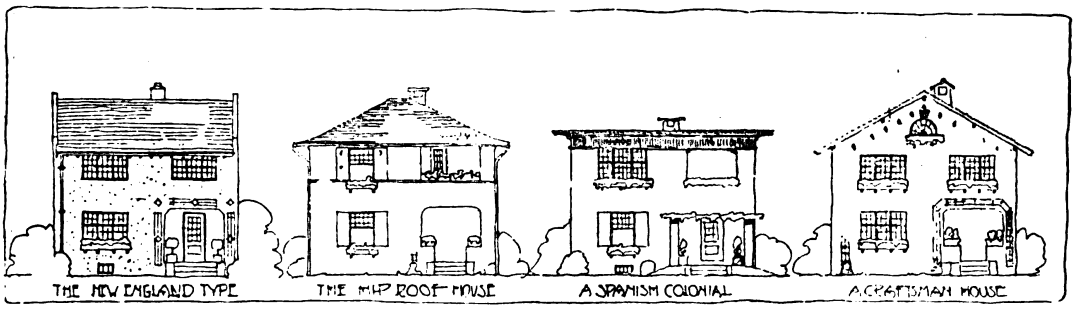
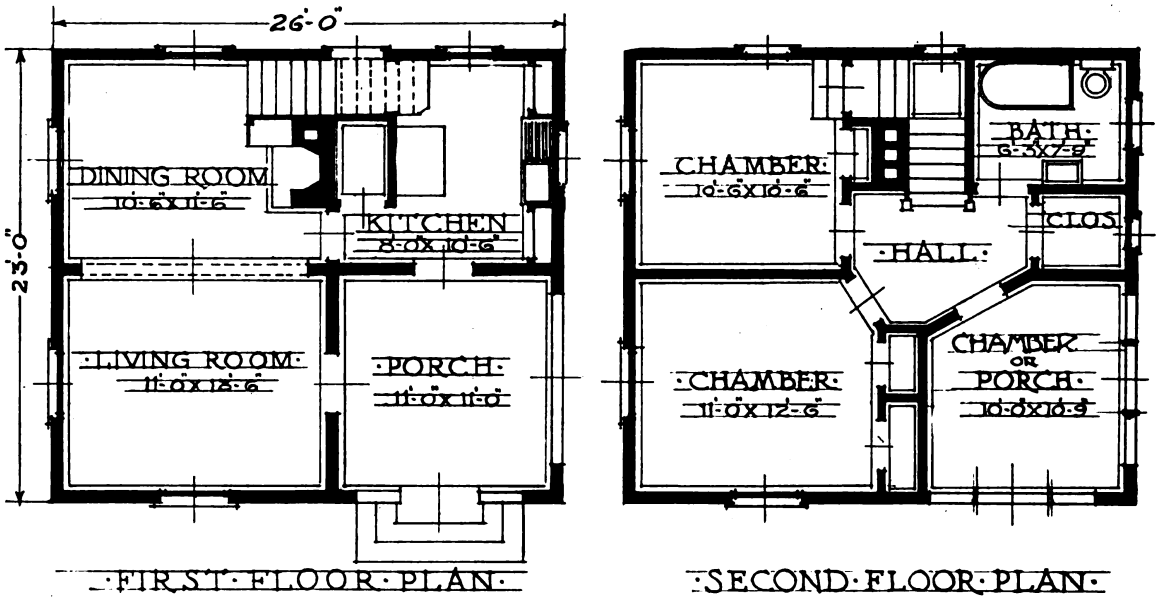


FOUR DISTINCT TYPES OF HOUSES EVOLVED FROM A SINGLE PLAN. GROUPINGS SIMILAR TO THIS LEND VARIETY TO THE STREETS OF SUBURBAN TOWNS



THE PLAN OF THIS SIX ROOM CONCRETE HOUSE IS VERY COMPACT. THERE ARE NO WASTE SPACES. THE PORCH MAY BE USED AS SUCH, BUILT-IN LIKE AN OPEN AIR ROOM, AND BY ENCLOSING WITH GLASS IN WINTER, CAN BE MADE TO SERVE AS AN ADDITIONAL ROOM.

MILTON DANA MORRILL, *ARCHITECT*

See article page 19, Standardized Small Houses.

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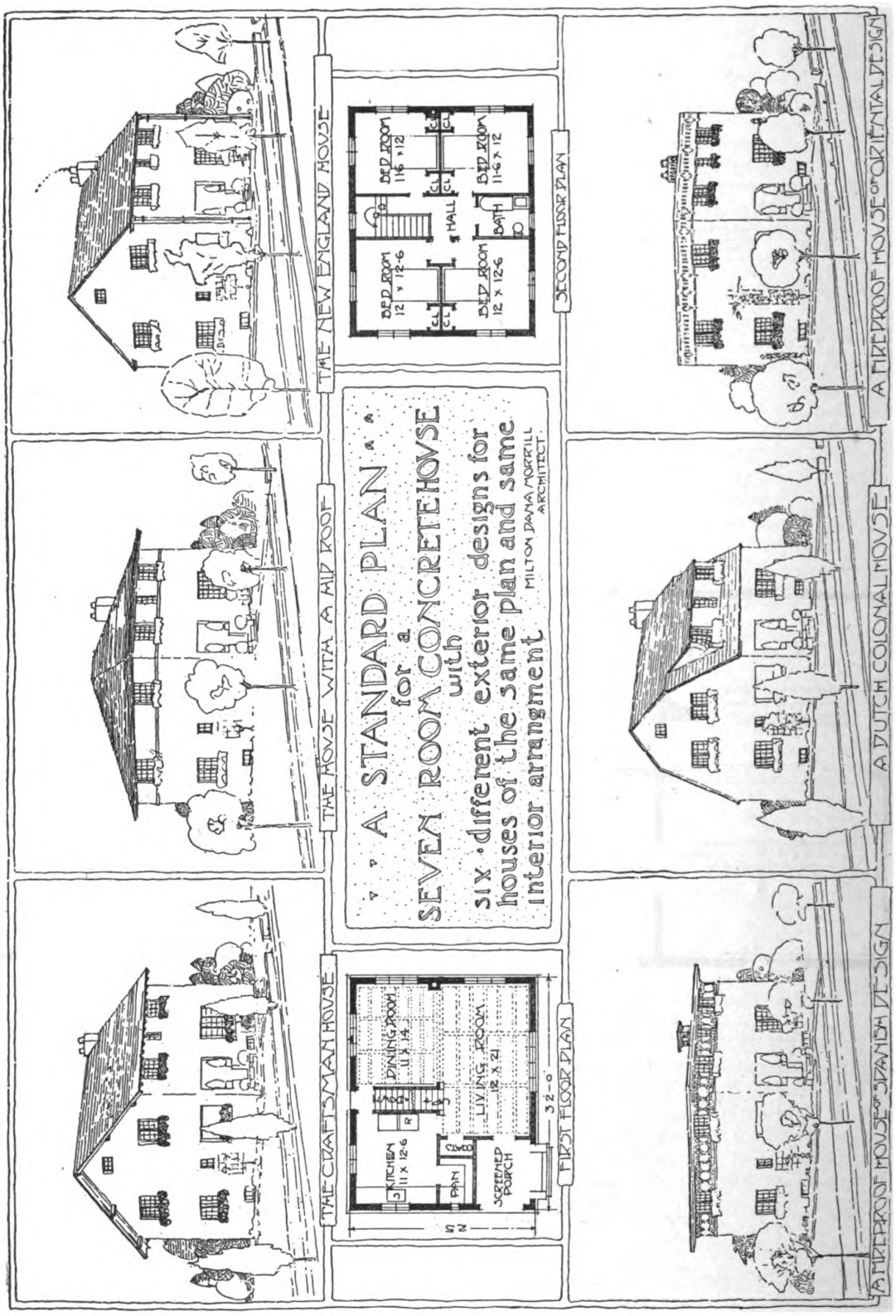

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FOUR DIFFERENT DESIGNS FOR THE SAME STANDARD PLAN



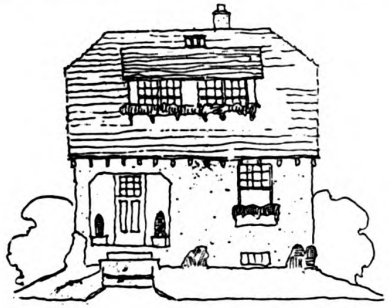
THE ENGLISH COTTAGE



A WASHINGTON COTTAGE

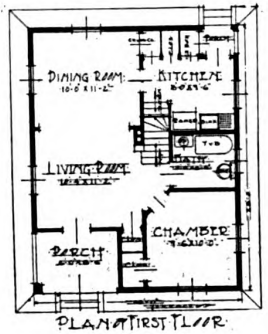


THE SPANISH GABLES



THE DUTCH COLONIAL

THE MORRILL STANDARD PLAN GIVES YOU A PERMANENT HOUSE



PLAN OF FIRST FLOOR



THE HIP-ROOFED COTTAGE

DESIGNS BY MILTON DANA MORRILL, *ARCHITECT*

See article page **19,** *Standardized Small Houses*

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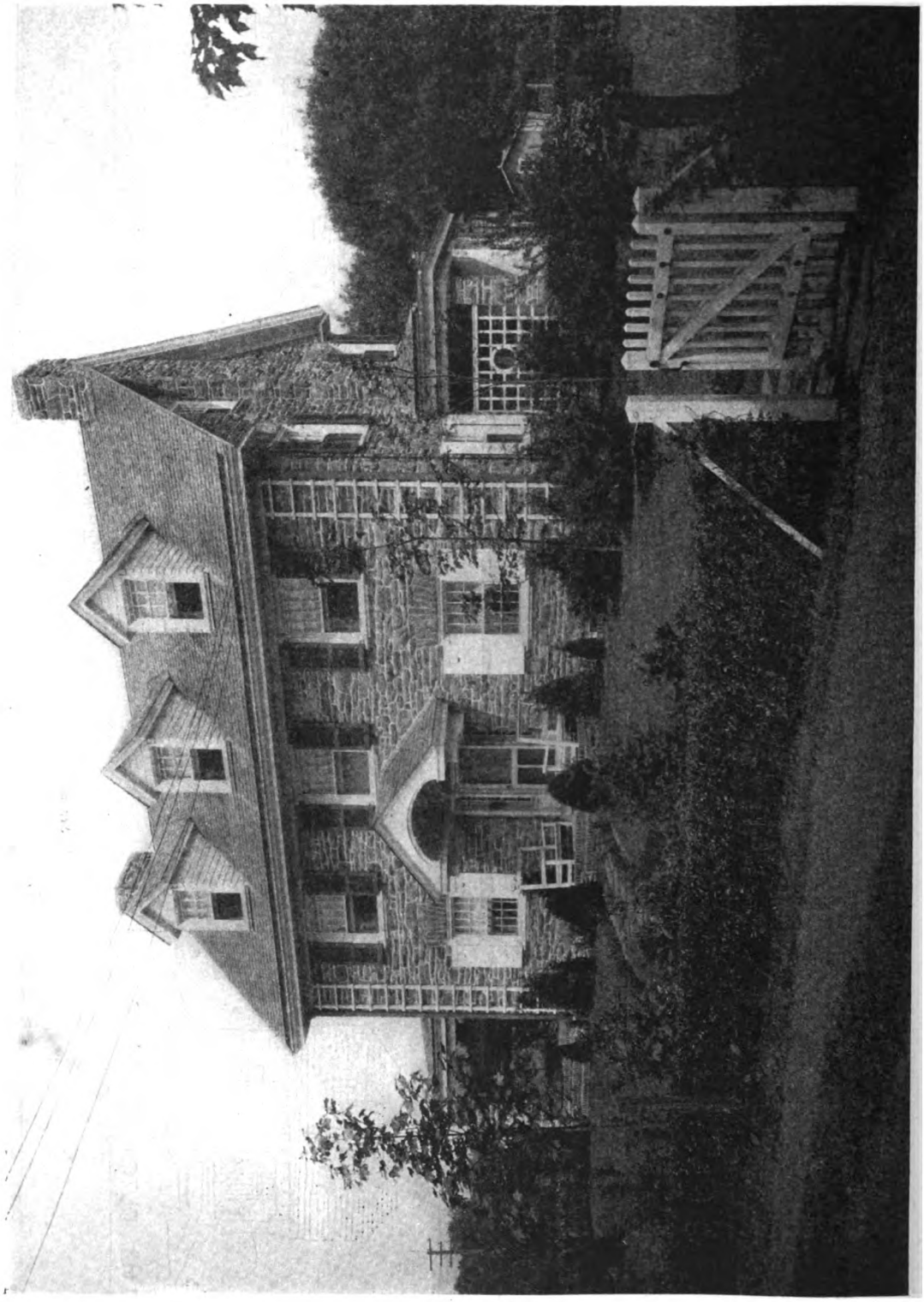

A HOUSE AT HAVERFORD, PA.
SAVERY & SCHEETZ, *ARCHITECTS*

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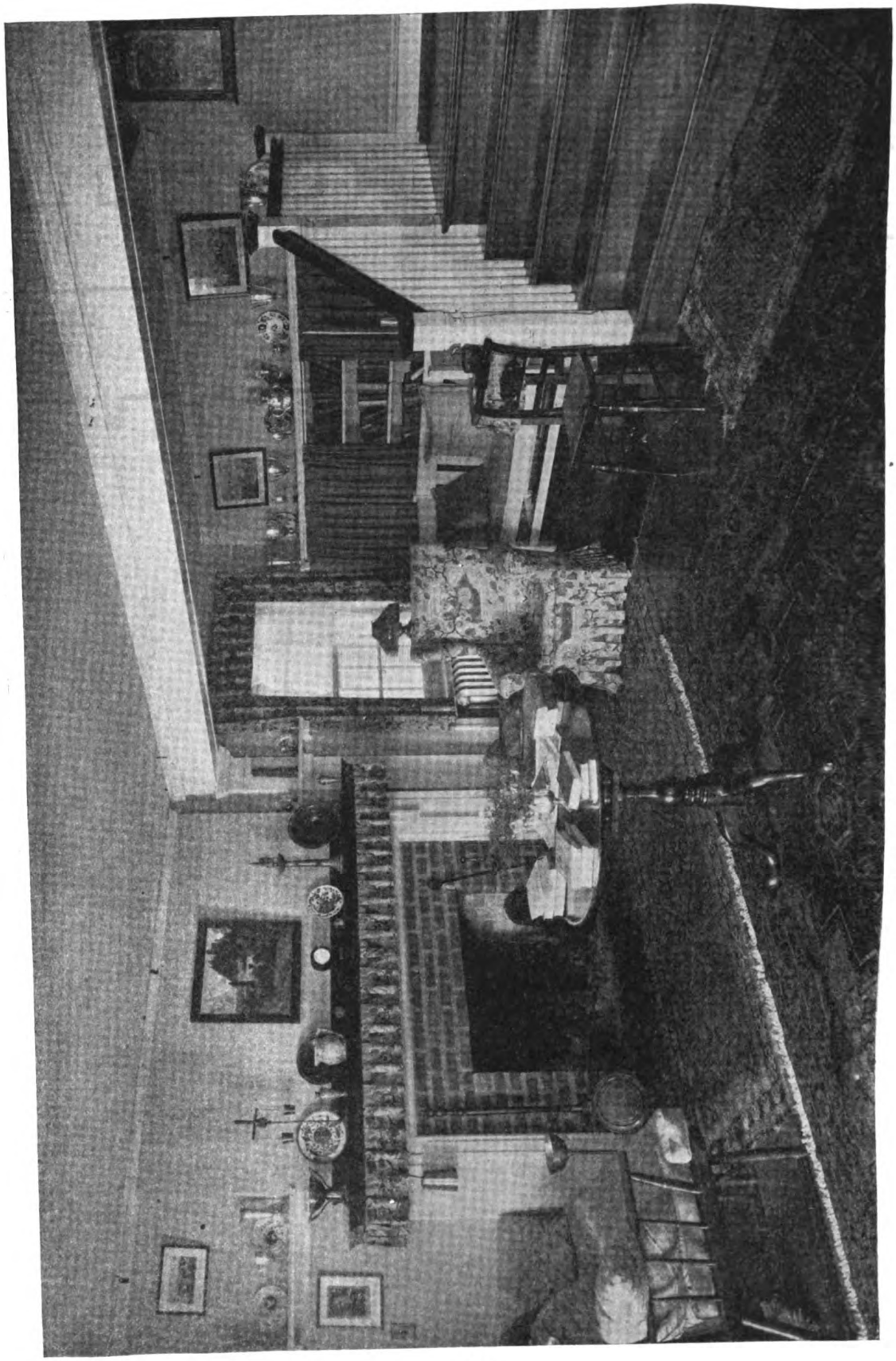

LIVING ROOM IN A HOUSE AT HAVERFORD, PA.
SAVERY & SCHEETZ, *ARCHITECTS*

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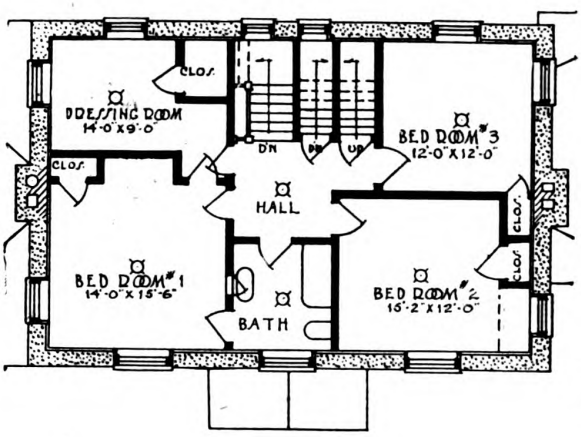
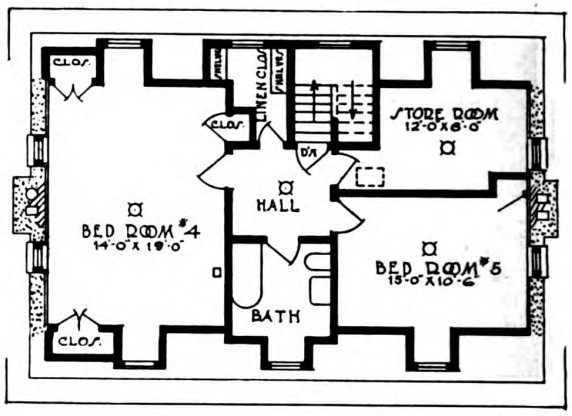


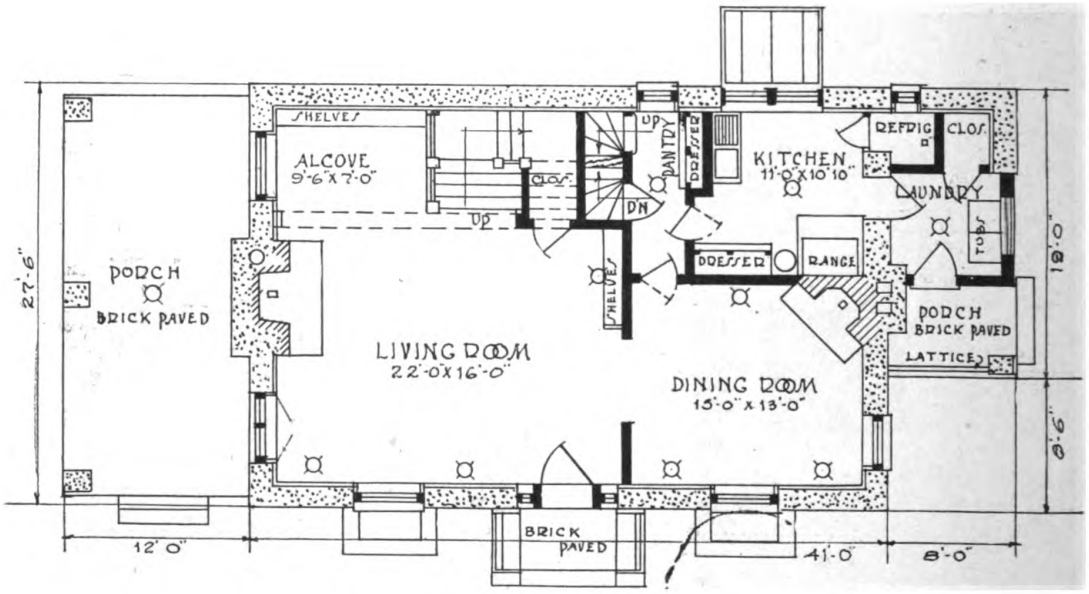
SECOND FLOOR PLAN



THIRD FLOOR PLAN

HOUSE AT HAVERFORD, PA.

SAVERY & SHEETZ, *ARCHITECTS*



FIRST FLOOR PLAN

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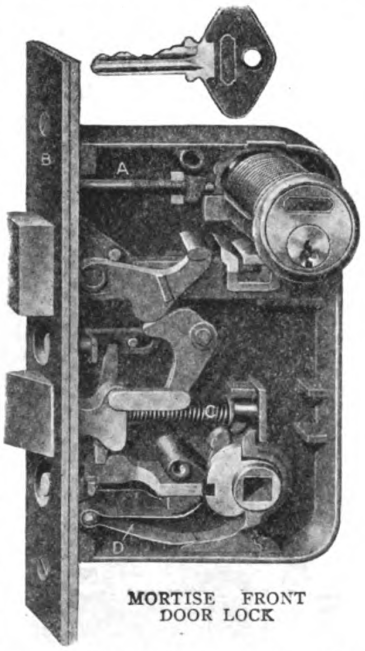
Finishing Hardware for the Home

By W. R. HILL

IT is strange how much is known of locks and builders' hardware and yet how little; in fact, it is rather unfortunate (although common) that the name "hardware" is so inclusive, as people often think of articles under the name of "hardware" which, according to the accepted interpretation, *are* really hardware, and yet are not included in a contract for hardware for a residence.

The technical term for hardware for a residence is "finishing hardware." Under this term is included all of the locks, knobs, escutcheons, bolts, window fastenings and articles of like nature. It does not include rough or constructional hardware, such as sash weights, sash pulleys, sash chains, sliding door hangers, nails and screws other than are necessary to fasten the finishing hardware to the openings, or to the woodwork.



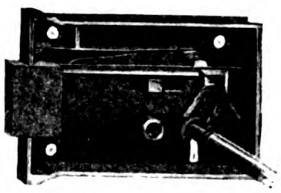
MORTISE FRONT DOOR LOCK

The reason we speak of "hardware" in the foregoing manner is that locks, knobs, escutcheons, etc., as hardware, always seem to be connected in the mind of the prospective purchaser with nails, screws, sash weights, sash pulleys, etc., and thus "finishing hardware" is not understood as requiring the careful selection and knowledge of plans and details that it actually does.

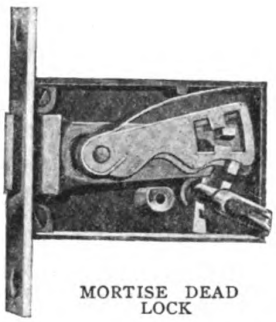
As a matter of fact, "finishing hardware" or "builders' hardware" requires good taste and expert knowledge so that hardware shall come ready for application on the job in shapes and sizes to fit the woodwork and harmonize with the general style of the building.

The reason why so many owners are dissatisfied with their builders' hardware is that the architect too often attempts to cover the builders' hardware in a specification by description. It is much wiser to omit the hardware from the general contract, not trying to cover it by a descriptive specification, but instead covering it by a clause which will permit the finishing hardware to be "selected later." This places the selection in the hands of the architect and the owner, who will choose the types of finishes and quality satisfactory to them.

Historically speaking, the art of lock making in America had its beginning about 1870. Prior to that year the locks in use were, in construction, like those in use in the old countries for centuries past, varying only as far as actual security was concerned in the multiplication of inconsequential obstacles such as peculiarly shaped cases, stationary obstacles in the case for which corresponding cuts were made in a bit of the key, and other ingenious contrivances. All of these, however, were easily overcome by a clever burglar and did not depend upon actual obstructions which had to be set in a certain position by the key before the bolt could be set in motion.



RIM DEAD LOCK



MORTISE DEAD LOCK

In like manner, the surface hardware, such as knobs, escutcheons, lever handles and butts, was very crudely made. No one apparently thought it interesting or necessary to spend any time in selecting hardware for buildings, usually leaving it entirely to the owner. Fortunately for us, many of these builders had an eye for the beautiful, shapely and simple handles and door knockers which our forefathers brought with them; or, in isolated cases, the owner had definite views of what would harmonize. However, with the exception of a few Colonial handles and door knockers used in the better class of houses, there was practically nothing fit to buy.

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Anyone to-day spending a few dollars for hardware for an inexpensive home would refuse even to consider the appropriate patterns in use from 1860 to 1880.

Mechanically the hinges, bolts, window fasteners, window locks and casement window fastenings were crude and undeveloped, as were locks and surface hardware. Such conveniences as the checking floor hinge for pantry door and the cylinder locks were unknown.



TWO TYPES OF PADLOCKS

A checking floor hinge for a pantry door is so practical as to be a necessity. The old style method used with swinging doors (and, we might say, the cheap way to-day) was to put double-acting hinges on the door, with the result that when the maid goes through with her arms full of dishes, and thus cannot hold the door down to a quiet closing, it flip-flaps and is apt to knock her arm and do damage either to the dishes or her temper, or both. The checking floor hinge, on the other hand, holds the door and quietly but firmly brings it back to the center of the jamb, thus preventing breakage and also helping to keep the cooking odors from the dining room.

Great care should be used in selecting floor hinges, as they are built with the same care and excellence in design that engines are. In addition to the convenience of a checking floor hinge is the removal of the double-acting hinge, which, because of its prominence on a door leading from the dining room to the pantry, is not always acceptable because it looks like "too much hardware." The right kind of a checking floor hinge is made so that there is practically no cost for maintenance, and adjustment of action is easily made through a screw in the top plate.

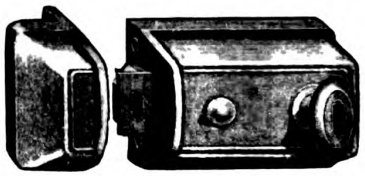
As familiar to us as are articles like cylinder locks, checking floor hinges, etc., to-day, the art of closing a door quietly, yet firmly, is barely twenty years old, and the art of lock making and ornamenting surface hardware is barely fifty years old. Yet so fast has been progress in these lines that such a device as described above may easily be obtained at a price very little more than the old devices and is well worth the difference in cost.

So rapid has been the progress in cylinder locks that it is now possible for an owner properly to guard his house by having a cylinder lock on all of the entrance doors to his home. For instance, he may have a cylinder lock on his front door with a latch and a dead-bolt, the dead-bolt being thrown on the inside by a thumb turn and both the latch and the dead-bolt being retracted by the one key from the outside.

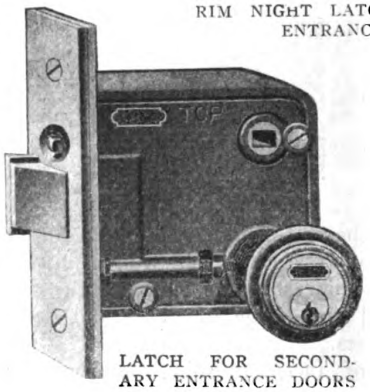
If there is a side entrance door, say off a porte-cochere, a mortise latch may be obtained which has the latch so guarded with a dead-locking slide that when the door is shut the latch-bolt cannot be forced back by a tool. In other words, the latch-bolt becomes a dead-bolt. The master's front door key may open the side entrance lock.

A rim night latch may be obtained (if it is not desired to put on a mortise night latch) for the kitchen door, with a key different from the front door, so that the servants cannot come in through the front door, but which will be operated by the master's key. This latch also may be had with a dead-locking slide, which, when the door is closed, makes a dead-bolt out of the latch-bolt.

If there are cellar batten doors in which mortise locks cannot be applied, nor yet even night latches,



RIM NIGHT LATCH FOR SERVICE ENTRANCE DOORS



LATCH FOR SECONDARY ENTRANCE DOORS

then a cylinder padlock may be obtained which may be passed by the servants' key, or the gardener's key, as one may desire, this key, however, not passing the front or side entrance door, but the lock being operated by the master's key.

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From the foregoing it may be readily seen how easily one's home may be properly protected if sufficient thought and care are given in the selection of the right manufacturer and the right hardware dealer. We lay stress on this point of getting the right manufacturer, as all manufacturers do not properly safeguard the purchasers of cylinder locks. For instance, if it is possible for any sneak thief or unauthorized person to order a key from a manufacturer by number, and the manufacturer will fill such an order, what assurance has the owner that he has the proper protection?

None.

Therefore, we say that a manufacturer should refuse to furnish these keys by number, and in that way obtain for the owner the proper protection.

We are, on the average, a careless people, and are too apt to place a cylinder lock on the front door, possibly a cylinder lock on the side door, and then put some miserable cheap lock on the kitchen door, so poorly constructed and designed that it can be opened with a button hook. You may laugh at that statement, and say it is absurd, but after you read this just go and look at your own kitchen door or side door, or cellar door, and see what fastening you have on the cellar door, or on the door at the head of the cellar stairs.

There is another place that ought to receive the prospective home builder's attention and care, and that is a closet where the master may put his valuables and which he can lock with the confidence and knowledge that it cannot be entered into without breaking down the door. Closet doors open out into the room and, therefore, it is necessary to place a cylinder lock on the closet door selected to guard valuables that has a protected latch, so that when the door is closed the bolt is dead-locked and cannot be pressed back by a tool. This type is obtainable in both rim and mortise latches and attractive shapes. The accompanying illustrations show some of the locks here mentioned.

Editorial

The Railroad Danger Signal

THE time is far past when only those materials locally obtainable were used in building. Communities built up a century ago bear witness to the use of local products, but now there is incorporated into the structure products from all sections of the country. The New York residence may and often does contain lumber from the Pacific Northwest, plumbing fixtures from New Jersey, brick from northern New York, pipe from Ohio, steel from Pennsylvania and slate from Vermont. To make the assembling of these widely scattered materials possible, we have built up a complex transportation system, probably the greatest in the world. During the World War this system, combined under Federal control, was strained almost to the breaking point. To-day, returned to private ownership, it seems at the point of collapse. Its inability to function properly has caused incalculable loss. Factories are threatening to shut down. Cement is piling up at the mills, while builders are clamoring for it. A few cars are loaded and leave daily, but what is this in face of the need? So it goes in practically every field. And while waiting for deliveries prices continue to advance. Undoubtedly rail conditions were vitally affected by the recent "outlaw" strike, not yet over, but this simply served to emphasize a condition already in an advanced stage. The railroads need more than 200,000 freight cars and thousands of locomotives. Tens of thousands of additional workers are also needed to successfully handle the present equipment and that which shall augment it. To purchase such equipment, and to pay wages that will attract the needed workers, additional capital is necessary. While the time allowance for repaying the $300,000,000 revolving fund, advanced by the Government, is to be extended to fifteen years, many additional millions are yet needed. This will undoubtedly make necessary further Governmental loans, usually accompanied by increased taxation. Higher freight rates seem inevitable. Assuming that financing can be arranged, months, possibly years, will elapse before the railroads' equipment can be brought up to the standard required to efficiently meet the need. Conditions are reported to be improving—slowly. In the meantime—what?

A New York City daily newspaper recently printed the following:

"There now is not the least possible chance that anything like the necessary volume of relief construction work can be completed by October."

Has our "Don't give up the ship" spirit vanished? Have we lost heart?

American ingenuity is never completely at a loss. Manufacturers already awake to the seriousness of

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the transit situation are finding ways and means to combat this existing menace. New methods of transportation are being devised. One automobile manufacturer, whose trucks are being delivered under their own power to distant purchasers, does not permit these vehicles to make the journey as empties. They are reported to a manufacturer of building products, who loads them with his goods going to the same destination. Does this not point the way to a solution, possibly temporary, but nevertheless an efficient aid in a difficult situation? Use the motor truck to its full capacity. Not alone the truck, but add a trailer. If every motor was delivered under power and used as a means of transport, tons of needed building materials would be at the job or on the way instead of at the factory or on a railroad siding.

And if our excellent system of roads were used to supplement the railroads, by establishing motor truck lines, as was done in both this country and France in the war emergency, we would not now be entirely at the mercy of a railroad embargo.

Food must have first consideration. Products used in the construction of shelter seem almost as important. In view of the present conditions and the great housing shortage it is vital that this material be moved. Shall we sit idly by and see the factories shut down because of a lack of shipping facilities, and the mechanic and builder idle for lack of material with which to build? Assuredly not. Let every community, through its Chamber of Commerce and working in connection with Chambers of Commerce of neighboring cities, make arrangements for organizing a motor truck auxiliary to keep things moving.

Don't stop building.

The Second New York Own-Your-Home Exposition

FROM May 1st to 8th the Second New York Own-Your-Home Exposition proved a veritable Mecca to which prospective home-owners flocked by the thousands. The value of the Own-Your-Home Movement can best be illustrated by the following quotations:

"The security of a country depends in a large measure upon the number of homes owned by the dwellers therein. Family ties grow strongest in the house, however modest, which the family calls its home. Love of home is at the root of love of country. Increase the number of home-owners and you increase the number of patriots of any land. We shall measure our progress during the years that lie ahead by the increase in the number of homes our people own."

—Governor Frank O. Lowden, of Illinois.

"It should be every man's ambition to own his home. In realizing that ambition he will be providing for the future of his family and himself. He will be doing far more than merely furnishing a roof over the heads of those he loves; he will be laying the foundation upon which his children will build firmness and nobility of character.

"A permanent residence in the home you own means the development of a higher type of citizenship, for the home-owners have pride in the community. They know that the general standard of the community will be raised or lowered by the interest or lack of interest they take in civic affairs."

—George M. Reynolds, Chicago Banker.

Miss Bessie McGurrin, eighth grade "A" pupil, Douglas Houghton School, Houghton, Mich., in competition with others was awarded a prize for an essay entitled "Why We Should Own Our Own Homes," from which the following extract is taken:

"Did you ever really consider the difference in the meaning of the words house and home?

"A house is a structure to live in. Home is the dearest spot on earth, made so by its family's associations, its joys, hopes, fears and aspirations. It is a refuge from the trials and struggles of the outer world."

The Own-Your-Home Exposition in New York City demonstrated its value as a means of promoting home-owning and home-improvement. Over one hundred exhibitors took part, and the interest displayed by the thousands of persons visiting the exhibition indicated that they meant business. Undoubtedly a large proportion of visitors were bent on finding ways and means of becoming home-owners. Of course this important step required many decisions on their part, such as: methods of financing; choice of site; size of house; choice of materials; type of heating system; matters relative to furnishing; the provision of labor-saving domestic devices; the planning and planting of the ground and numerous other items. For such the exposition

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A new Declaration of Independence
Own your Home



Rent your Home and be raised by the Landlord

Own your Home and raise your family

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provided valuable aid. Every phase of home-building was covered. Materials were shown "in situ," the "iceless" refrigerator was shown at work, etc.

Visitors at "Booth No. 17," occupied by BUILDING AGE, were numerous. It was interesting to hear the problems of the individual and to get his or her ideas of a home. The builder of small homes would have found clients by the score. Designs of many buildings, which have been illustrated in BUILDING AGE, were on view and attracted marked attention.

Mrs. Jones thought this cozy five-room bungalow was just the thing, while Mrs. De Smythe was very much interested in the design of an aristocratic-looking twelve-room house, and so it went. *All* were interested in homes—that is, Homes for themselves.

There is absolutely no doubt as to the greater value and easier salability of the *attractively* designed house. The builder who erects such buildings is advertising his business in the best possible manner. His product will so commend itself to others that his business will automatically increase.

Already plans are being made for next year's exposition. May the idea grow until home-owning will be accepted as a privilege and as a duty by every citizen of these United States capable of assuming the obligation.

Every agency helping towards this end deserves the utmost support and commendation. Exhibitions to promulgate the Own-Your-Home Idea should be held in every city in which it is possible.

The following were among the exhibitors whose booths attracted considerable interest on the part of those visiting the Exposition:

American Materials Company, Inc.; Ballinger & Perrot, architects and engineers; Bastian Morley Company; Beaver Tile & Specialty Company; Bisk Corporation; Bestwall Manufacturing Company; the Burnett-Larsh Manufacturing Company; Cement Products Company; Composite Metal Lath Company; the Fred L. Dalzell Company; Devoe & Raynolds Company, Inc.; Duplex Lighting Works; Robert E. Farley Organization; Fire Gum Manufacturing Company; Fli-Bac Screen Corporation; Granitex Company; Hardwood Products Company; Holmes Disappearing Bed Company; E. A. Jackson & Brother; Kompak Water Heater Company; Lord & Burnham Company; the Lunken Window Company; Lumber Trade Associations; Minneapolis Heat Regulator Company; Milton Dana Morrill; Mallory Industries, Inc.; Perfected Rolling Window Screen Company; Pierce, Butler & Pierce Manufacturing Company; Portland Cement Association; Richardson & Boynton Company; Sharp Rotary Ash Receiver Company; Arthur Todhunter; Traylor Dewey Contracting Company; Vesuvius Heating Corporation; West Coast Lumbermen's Association, and the Walter Concrete Machinery Company.

New York Building Trades Employes Granted Increase

The Executive Committee of the Board of Governors of the New York City Building Trades Employers' Association at its meeting held on April 15th received a request from the Building Trades Council for an increase in wages for all trades. The committee referred the request to the Board of Governors, and the Board of Governors, at its meeting on April 21st, referred the matter to the Executive Committee with power. The Executive Committee met the representatives of the Building Trades Council and on April 22nd agreed to grant an increase of One Dollar ($1.00) per day on May 1st, 1920. The committee authorized the signing of a modification of the existing agreement, providing for a new wage schedule to become effective on May 1st, 1920.

The modified schedule reads as follows:

It is hereby agreed between the Building Trades Employers' Association of the City of New York and the Building Trades Council of the City of New York that the wage schedule provided for in an agreement entered into and dated November 20th, 1919, shall be modified, and that the said modified schedule shall become effective on May 1st, 1920, and that the rate of wages on and after that date shall be as follows:

	Per day 8 hours.
Art Glass Workers	$8.00
Asbestos Workers and Insulators	9.00
Blue Stone Workers	9.00
Carpenters	9.00
Dockbuilders, House Shorers and Sheathpilers	9.00
Cement and Concrete Workers (Laborers)	6.50
Composition Roofers and Waterproofers	8.00
Composition Roofers and Waterproofers (Foremen)	8.50
Electrical Workers	9.00
Electrical Workers' Helpers	5.50
Elevator Constructors	9.00
Elevator Constructors' Helpers	7.00
Hoisting Engineers, by the Week	52.25
Hoisting Engineers, by the Day	10.00
Hoisting Engineers, Running Compressors extra per Week	7.00
Housesmiths and Bridgemen, Local No. 40	9.00
Housesmiths' Finishers, Local No. 52	9.00
Housesmiths' Helpers	7.00
Marble Cutters and Setters	9.00
Marble Carvers	10.00
Marble Polishers, Bed Rubbers and Sawyers	8.50
Marble Cutters' Helpers, Riggers, Crane and Derrick Men	7.00
Mosaic and Terrazzo Workers	8.00
Mosaic and Terrazzo Workers' Helpers	6.50
Metallic Lathers	9.00
Plasterers	9.50
Plasterers' Laborers	7.00
Plumbers and Gasfitters	9.00
Roofers and Sheet Metal Workers	9.00
Riggers and Machinery Movers	9.00
Steam and Hot Water Fitters	9.00

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The Selection of Putty

A Few Pointers on its Composition and Use

COMPARED with many other building materials, putty at first glance appears to rank relatively unimportant. But while the quantity used in the average building operation may not be great, yet upon its proper selection and application depends the "weather tightness" of the building. Without its use present-day window construction would be impossible and there are many other places where it may be advantageously employed.

Putty used by the painter for the repair of woodwork and by the glazier for setting window glass is known as common putty. It is made by mixing commercial whiting with raw linseed oil in the proportions of 18 pounds of raw linseed oil to 100 pounds of dry commercial whiting. After mixing, the putty is taken from the "chaser," as the mixing machine is called, and allowed to stand and age for two days. It is again worked in the chaser and during this process a little more raw linseed oil is added to obtain the desired consistency.

Good putty should be very soft and workable and should not stick to the hands. There are certain glazing operations which call for a somewhat better grade of putty and this is made from finer grades of sifted or bolted whiting and is more stringy than putty in which commercial whiting is used. For inside use a high-grade putty is secured by sifting white-lead-in-oil with dry whiting.

Window glass set in metal frames requires a special grade of putty. For this purpose a mixture of 60 per cent commercial whiting, 20 per cent dry white lead and 20 per cent litharge with sufficient raw linseed oil to give the property consistency will be found satisfactory. It will dry quickly, but will retain a certain elasticity and is excellent for all uses where the putty is in contact with metal.

In these days of high prices, putty is often cheapened by the addition of unsuitable materials. In some cases marble dust is used with the whiting and is very objectionable. When such a mix is made, considerable saving occurs due to the fact that to every 100 pounds of marble dust mix, only five to six pounds of raw linseed oil is required, a saving of approximately twelve pounds of oil. Such putty is not durable and will crack and crumble within a short time.

Another common practice to be strongly condemned is the use of petroleum in place of linseed oil. Putty so made will not properly harden and will turn yellow. Such hardening as does take place in putty mixed with petroleum is due to the absorption of the petroleum by the wood, such a process leaving the mixture with insufficient binding material, and causing it to crumble within a short time. In the case of linseed oil putty, the setting or hardening which occurs is due to oxidation and the putty is durable.

Wood that is to be stained should be given a coat of oil before puttying. Wood which will not be stained should be given a coat of paint before the putty is applied.

Changes in Cost of Living in Cities

The following table, compiled by the United States Department of Labor, shows the changes in the cost of living from December, 1917, to December, 1919, inclusive, for thirteen industrial centers in the United States:

TOTAL INCREASE IN COST OF LIVING FROM DECEMBER, 1917, TO DECEMBER, 1919, IN 13 SPECIFIED CITIES

City.	Per Cent of Increase.
Atlanta	37.89
Birmingham	34.32
Cincinnati	35.24
Denver	38.19
Indianapolis	36.53
Kansas City, Mo.	38.16
Memphis	35.23
Minneapolis	32.71
New Orleans	33.86
Pittsburgh	36.17
Richmond	32.02
St. Louis	34.24
Scranton	37.10

New Books

Applied Science for Wood-Workers. By William H. Dooley. This book contains some very interesting information on the laws of applied science, being compiled for use in technical, industrial and continuation schools and for science classes in secondary schools. It is a practical text book on physics, chemistry, etc., and touches on the principles of science in such a way that the technical or apprentice student will thoroughly understand the work that he may do in the shop.

It covers such subjects as science and the properties of matter, mechanical principles of machines, pulleys, inclined planes and wedges, laws of motion, heat and expansion, properties of gases, physico-chemical processes, magnetism and electricity, the telephone and telegraph, strength of materials, methods of heating, paints and varnishes, lumber, defects of woods, patterns, cores, flasks and molds, etc.

The data is prepared in a readily understandable form and contains many of those things which a mechanic desires to know and in such a form as he can readily refer to. The book has 457 pages, size 5 x 7½ inches, is illustrated, fully indexed, and is published by the Ronald Press.

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Heating Equipment for the Low-Cost House

III. Method of Computing Heat Losses

By CHARLES L. HUBBARD, *Heating Engineer*

HEATING computations are best made on the "thermal unit" basis, as the results, up to a certain point, are applicable to any system it is desired to use, and furthermore, they are founded on correct principles.

The formula used by the writer with satisfactory results is

$$H=[(Wxa)+(Gxb)] \times d \times e$$

in which

H=heat loss from room or building, in thermal units, per hour, by transmission and leakage.

a=Transmission factor for wall.

G=Glass area, in square feet.

W=Exposed wall area, in square feet.

b=Transmission factor for glass.

d=Leakage factor.

e=Factor for Exposure.

For the average dwelling house of wood or brick construction, and good workmanship as regards the fitting of doors and windows, we may use the following values for the factors given above, which are for a temperature difference of 70 degrees:

a=20

b=84

d= 1.2

e= 1.32 for north, 1.12 for east, 1.0 for south, and 1.2 for west. In case of a whole house, take the average of these or 1.16. Substituting these values in the formula we have $H=(20\ W + 84\ G) \times 1.2 \times e$. This as previously stated, applies to any system of heating, and its exact method of application beyond this point will be taken up in later articles.

Figs. 1 to 5 show the exterior view and architect's plans of a small dwelling house which will be used as a basis for the design of hot air, hot water and steam systems of heating, worked out in detail. Assuming the house to face the south, and applying the above formula, we find the heat loss from the different rooms per hour, in thermal units, to be as shown in Table 1, which will be used in subsequent articels. Wall and window surfaces are taken from the plans where dimensions are given, and scaled where they are lacking. They can be obtained with sufficient accuracy by this method from a drawing made ¼ inch to the foot.

The heat loss from the walls and windows should be increased about 10 per cent in order that ample allowance be made for transmission through the roof. This increase only enters into the computation for determining the size of furnace or boiler. It is not usually customary to provide extra radiation for this purpose but depend upon the heat given off from the piping system, which tends to rise to the upper part of the building.



FIG. 1. EXTERIOR VIEW OF HOUSE.

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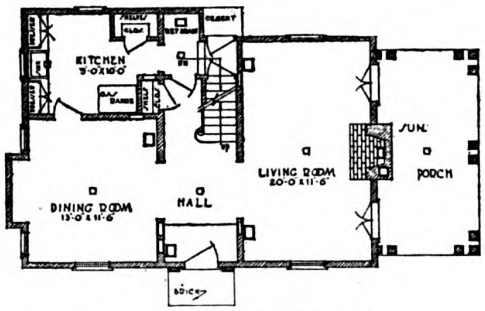


FIG. 2. FIRST FLOOR PLAN.

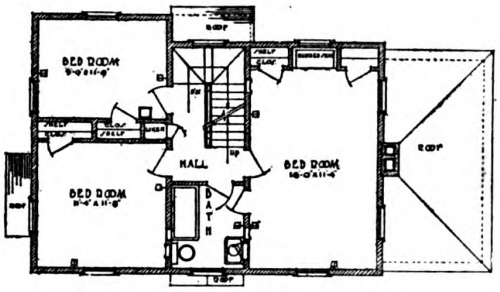
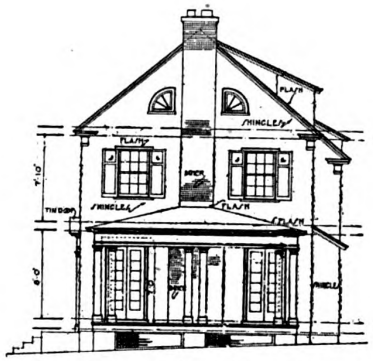


FIG. 3. SECOND FLOOR PLAN.

TABLE 1

	1	2	3	4	5	6	7	8	9
	Room	Wall Surface, Sq. ft.= W	Glass Surface, Sq. ft.= G	Wall Surface, x20	Glass Surface, x84	Total of col.'s No. 4 and No. 5	Corrected for leakage, Col. No. 6 x1.2	Room Exposure and factor E	Corrected for Exposure, (H.)
First Story	Living Room	270	84	5,400	7,056	12,456	14,947	I. E. & S. 1.15	17,189
	Hall	36	20	720	1,680	2,400	2,880	S. 1.0	2,880
	Dining Room	170	36	3,400	3,024	6,424	7,709	S. & W. 1.1	8,480
	Kitchen	136	24	2,720	2,016	4,736	5,683	N. & W. 1.26	7,160
Second Story	Large Bed Room	280	48	5,600	4,032	9,632	11,558	N. E. & S. 1.15	13,292
	Bath	36	18	720	1,512	2,232	2,678	S. 1.0	2,678
	South West Bed Room	160	26	3,200	2,184	5,384	6,461	S. & W. 1.1	7,107
	North West Bed Room	136	26	2,720	2,184	4,904	5,885	N. & W. 1.26	7,415
	Hall	36	18	720	1,512	2,232	2,678	N. 1.32	3,535

The total heat loss from the building per hour in thermal units (B.T.U.) for a temperature difference of 70 degrees between the inside and outside which must be supplied by the heating system is the the sum of the quantities in column No. 9 multiplied by 1.1 for roof leakage. This amounts to 69,736x1.1=76,710.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Efficient Management in the Home

Proper Planning Necessary to Obtain Maximum Service From Labor-Saving Devices

OF late articles have been appearing in various publications under such titles as "The Servantless House." "The Easily Kept House," "The House of No Regrets," etc.—we will not name them all—the purpose of such articles being to point out methods of eliminating labor. Unfortunately they tend to leave the erroneous impression that the house built as described will almost take care of itself. A careful study of the facts will show that while household labor can be reduced somewhat it cannot be entirely eliminated.

In this article it is proposed to show the *possibilities* of applying to the domestic establishment the same methods that make for efficiency as the business man and efficiency engineer introduce into the industrial establishment. It is probably true that practically everyone has a secret or announced desire to own their own home. This is a laudable resolve. These persons may be living in—or shall we say existing in—three rooms and bath. The janitor performs various services for their convenience, of which they never stop to think. Why worry about such things as the heat, ash and garbage removal, cleaning the halls, shoveling snow off the sidewalk, and numerous other items? Now suppose this family has built a seven room house in the suburbs. The labor required satisfactorily to conduct the household has not increased in the ratio that the rooms have, i.e., as 3 to 7, but far beyond it. First, the rooms in the house are naturally larger than those of the apartment; second, they are usually on different floors—the laundry in the cellar, the kitchen on the first floor, the bedrooms on the second, and the storeroom in the attic. Then in the winter there is the furnace to tend, the ashes to remove, the cleaning of snow from the walks, and in the summer the care of the grounds and other duties. The city dweller often goes out to eat, but when in the country he has no such desire. But the advantages enjoyed are so numerous that this additional labor is not considered a drawback—in fact it is probably never realized until after occupancy.



FIG. 1. AN ELECTRIC DISHWASHER FOR WHICH NO PLACE WAS PROVIDED IN PLANNING THE HOUSE. NOTE THE ADDITIONAL LABOR NECESSARY TO ITS OPERATION.

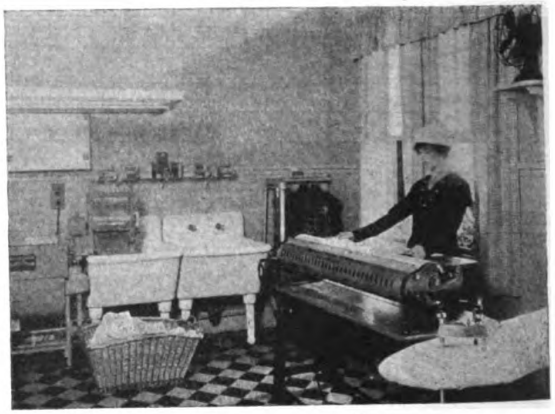

FIG. 2. AT THE RIGHT, AN ELECTRIC IRONER IS SHOWN, A MOST EFFICIENT PIECE OF APPARATUS FOR FLAT WORK. TO THE EXTREME LEFT AN ELECTRIC WASHING MACHINE CAN BE SEEN, WITH CONVENIENTLY LOCATED OUTLET.

The days of large houses cared for by a retinue of servants are fast passing, as are also the days when household drudgery was considered a woman's

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FIG. 3. IN THE HOUSE OF A MILLIONAIRE. NO OUTLETS WITHIN EASY REACH.

natural lot. So one of three things are happening to the girl who marries—either she remains at business and hires help for domestic purposes; she remains home and also hires help for domestic "drudgeries," or she remains home and becomes the business manager of the domestic establishment, and by good planning and making proper use of labor saving devices eliminates the drudgery and becomes more contented than her sister, who continues at "business" for others, for she is in business for herself.

Electricity, that wonderful servant, has made this possible. Among the more important electrically operated devices on the market are the dishwasher, the washing machine, the ironer, the vacuum cleaner and the sewing machine. All of these are real labor saving devices, provided they can be properly installed. And this brings us to the vital point at issue, i.e., Was your house originally planned to use labor saving devices? If it was not you will regret it—if you are planning a house now see that your architect or builder makes suitable provision if he has not already done so. The illustration (Fig. 1) will bring out the point. Here is shown an electric dishwasher about to go into action. It is in the center of the kitchen floor, and the housewife must carry the necessary hot water to the machine. Of course this piece of apparatus cannot stand in that location all day—it would be in the way. Probably the only place for it is some out of the way corner; and three times daily it must be pulled into a more convenient position for use and returned when the job is finished. Water must be heated in kettle on the range, then carried to the dishwasher. This same quantity of water must be drained from the machine, carried to the sink, and emptied. An electric wire must be stretched from the nearest lighting fixture each time, perhaps necessitating the use of a chair. Oh, yes, it's a novel piece of apparatus, but after all *how* much labor has really been saved? Some, of course, but look at the possibilities. When the house was built, a very convenient location, adjacent to the sink could have



FIG. 4. PORTABLE VACUUM CLEANER. BASE PLUG SHOULD BE PROVIDED IN EACH ROOM FOR CONVENIENT USE.

been provided. A water supply outlet could have been installed especially for the dishwasher, and the water heated by electricity. A drain connection might have been placed for emptying it directly into the house drainage system, and an electric outlet located at just the right point, to make the necessary connection. It would have cost very little compared with the total cost of the house, and think of the convenience. The same is true of the washing machine. An excellent arrangement for such a device is shown in Fig. 2. With the other pieces of apparatus conveniently located electric outlets are necessary. Fig. 3 is a photograph taken in the residence of a millionaire. An electric toaster was purchased so the family could have *hot* toast at breakfast. Of

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course they could use it—didn't they have electricity in the house? But the difficulty arose when the maid really *did* try to use it. One glance at the photograph and no further explanations are necessary.

The problem of house cleaning may be solved in either of two ways. (1) A portable vacuum cleaner, such as that shown in Fig. 4 may be purchased, in which case conveniently placed base plugs are all that are necessary to cut down the labor and obtain



FIG. 5. ELECTRIC RANGE.

the greatest efficiency, or (2) the house may be piped and outlets placed in each room for connecting a hose and cleaning attachment. In this latter case the dust receptacle and motor are located in the basement, the motor being controlled by switches in the various rooms. The dust is carried through the permanent piping system to the dust receptacle very much the same as the waste water, etc., is carried by the plumbing pipes to the sewer. No cumbersome apparatus need be moved about the room or from room to room. The portable machines, (Fig. 4) however, are being manufactured of lighter weight and less bulky proportions than formerly, and combine revolving brushes with the suction, so that a more thorough cleaning is claimed for such devices. In larger buildings, the second method is universally employed. The electric cooking range is a practical piece of household apparatus, but can only be operated economically where low electric rates prevail. Either gas or electric ranges will give entire satisfaction for cooking, the selection depending on the relative rates, and both are far superior to the old coal stove with its dirt, dust and ashes.

From the foregoing it will be seen what possibilities are opened up by proper planning. In subsequent articles the various devices will be taken up in more detail, and suggested arrangements for their placement shown.

New Industrial Plan Arranged for Fresno

Organized employers and employes of the building trades in Fresno, Cal., are experimenting with a new plan for adjusting industrial disputes. Each has appointed a conference committee, and these committees through constant discussion will seek to solve the problem affecting the employes as they arise. Recommendations will be purely advisory.

The worth of the plan will be tested soon after the first of the year when the joint committee will consider schedules of wages affecting employes in every branch of the building industry.

Skyscrapers Erected by Manila Capitalists

The business district of Manila is moving up into the air, according to C. F. Campbell, a contracting engineer of Manila, who passed through Honolulu recently on his way to the Pacific coast.

Campbell explained that times were so good in the Philippine capital that the business section was forced to expand. As the mercantile district is very restricted in area, taller buildings had to be erected and several of these are in the course of construction.

Manila, generally, is experiencing a building and business boom, Mr. Campbell said.

One Bath in 482 Families

A housing survey of a block in East Thirty-third street in New York, made for the State Reconstruction Commission, shows one bathtub in forty-three tenement houses in which live 1,700 persons. The bathtub is the property of the saloonkeeper. It is for use by the owner and his family, and comparatively few of the other 481 families on the block have even seen it.

The next approach to bathing facilities discovered by the investigators on that block was a stationary washtub with a partition which can be lifted out on Saturday nights.

In another instance a landlord complying with the tenement house laws, provided the necessary bath rooms in a row of tenements. Later, on investigation, it was found that none of these were being used for bathing, but mostly as receptacles for storage for coal, soiled linen, etc.

In one case where the bathroom had a sunny exposure, the tub was full of earth and an amateur gardener was endeavoring to raise flowering plants.

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Flooring for the Home

Its Selection and Characteristics

A GOOD FLOOR is something to be proud of —a poor one something to hide. But the day when the entire floor from wall to wall was completely covered with oil cloth, carpet or matting has passed, and today we glory in our partially exposed—partially rug covered—floors.

In the average seven room house there is something over 1,200 square feet of flooring, which at present prices seems a considerable item of cost, yet the difference in price between a good and poor flooring would not be over 1 per cent of the total cost of the house, an inconsiderable amount when thus considered, for why permit 1 per cent of the cost to detract so greatly from the remaining 99 per cent.

Let us consider briefly the different types of flooring. For the living room, dining room and bed chambers, the wood floor has been found most satisfactory. For the enclosed porch or sun parlor, which may be screened in Summer, and thus exposed to the weather, some waterproofing surface as tile is necessary. For the kitchen a surface that is waterproof and resilient is most desirable, while for the bath room, the tile floor seems to answer to best advantage. It will thus be seen that the major floor area will be of wood, and a study of the various woods available and adaptable will be profitable.

The oak floor, on account of its attractive grain and excellent wearing qualities, is widely used. Such flooring is milled tongued and grooved and comes in the following thicknesses and widths:

13/16"x2¼"	2,000 lbs.	Counted 1"x3"
13/16"x2"	1,900 lbs.	Counted 1"x2¾"
13/16"x1½"	1,800 lbs.	Counted 1"x2¼"
⅜"x2"	1,000 lbs.	Counted 1"x2½"
⅜"x1½"	900 lbs.	Counted 1"x2"

The lumber is either plain sawed or quarter sawed, the grading rules being as follows:

QUARTER-SAWED

Clear—Shall have one face practically free of defects, except ⅜ of an inch bright sap; the question of color shall not be considered; lengths in this grade to be 2 feet and up, not to exceed 15 per cent under 4 feet.

Sap Clear—Shall have one face practically free of defects, but will admit unlimited bright sap. The question of color shall not be considered. Lengths in this grade to be 1 foot and up.

Select—May contain bright sap, will admit pin-worm holes, slight imperfections in dressing or a small tight knot, not to exceed 1 to every 3 feet in length; lengths to be 1 foot and up.

PLAIN SAWED

Clear—Shall have one face practically free from defects, except ⅜ of an inch of bright sap; the question of color shall not be considered; lengths in this grade to be 2 feet and up, not to exceed 15 per cent under 4 feet.

Select—May contain bright sap, and will admit pin-worm holes, slight imperfections in dressing, or a small tight knot, not to exceed 1 to every 3 feet in length; lengths to be 1 foot and up.

No. 1 Common—Shall be of such nature as will make and lay a sound floor without cutting. Lengths 1 foot and up.

No. 2 Common—May contain every character of defects, but will lay a serviceable floor with some cutting. Lengths 1 foot and up.

The different grades are commonly used as follows:

Clear, Quarter-Sawed, Red or White—High class residences, hotels, apartment houses and club houses.

Sap Clear, Select, Quartered, Red or White—An economical substitute for clear quartered where a dark finish is desired. These grades make a flooring equally durable as the first grade.

Clear, Plain Sawed, Red or White—High class residences, hotels, apartment houses, clubs, churches and club houses.

Select, Plain Sawed, Red or White—Medium priced residences, hotels and apartments, schools, churches, office buildings and stores.

No. 1 Common—Cheap dwellings, tenements, stores, high class factories and manufacturers' buildings.

No. 2 Common—Warehouses, factories and cheap tenements.

The 1½" face makes a better, more serviceable and handsomer floor than any other width. The shading of the figure in the wood may be blended more harmoniously than where the wider strips are used.

The 2" and 2¼" faces are the widths more generally used in 13/16" thickness, and in ⅜" thickness, either 1½" or 2" face, as conditions demand.

To cover a certain space, figure the number of

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square feet, which means the width multiplied by the length; for instance, a room 12 feet wide by 15 feet long would contain twelve times fifteen or 180 square feet. Add to the square feet of surface to be covered the following percentages:

50% for	13/16"x1½"
37½% for	13/16"x2"
33 1/3% for	13/16"x2¼"
33 1/3% for	⅜"x1½"
25% for	⅜"x2"

The above figures are based on laying flooring straight across the room. Where there are bay windows, hearths and other projections, allowance should be made for additional flooring.

The laying of Oak Flooring is not difficult. Any first-class carpenter can make a good job. Some judgment and care are necessary in order to produce the best results.

A sub-floor should be used under both the 13/16" and ⅜" thickness.

The sub-floor in new houses should be reasonably dry and laid diagonally, Shiplap of 6" or 8" width is preferred. This should not be put down too tight and should be thoroughly dried and cleaned before the Oak Flooring is laid.

It is well to use damp proof paper between the Oak Flooring and the sub-floor. Do not use ordinary building paper of rosin sized paper. The Quantity required is small, and the very best quality of damp proof stock should be used. Where sound proof results are desired a heavy deadening felt is recommended.

It is very important to leave about ½" space on all sides between the Oak Floors and the base board to allow for expansion in event any dampness later gets into the Oak flooring. This opening is covered by the quarter-round or base moulding.

Oak flooring should be laid at right angles to the sub-floor in old houses. After laying and nailing three or four pieces use a short piece of Hardwood 2x4 placed against the tongue and drive it up. Care should be taken in driving up ⅜" flooring not to break the tongue, which is fragile. Also do not drive up excessively tight.

The nailing of Oak Flooring is very important. All tongues and grooved Oak Flooring should be blind nailed. The best floor made can be spoiled by the use of improper nails. The steel cut variety is recommended for all blind nailing. For 13/16" use 8 penny steel cut flooring nails; for ⅜" use 3 penny wire finishing nails—cement coated. The maximun distance between nails should be: For 13/16" thickness, 16" for ⅜" thickness, 8".

With the wide use of rugs in both homes and offices, an economical method is to have the center portion of the room laid with Oak Flooring of a less expensive grade, employing a better grade in the border. When the rug is laid, the visible portion of the floor will then be of the very best appearance at less initial cost. A room measuring 10x12 ft., for example, may have a border 2 feet wide of "Clear" (first quality), either Plain or Quartered; and in the center section, measuring about 6x8 ft., the Select Plain grade can be used. This procedure represents a saving of 15 to 40 per cent as against using all of the best grade. Care in finishing the Select Grade will make it closely resemble the Clear. This economical method is a common practice among experienced builders. Thin flooring measuring ⅜" thick by 1½" face can be laid over old floors in old homes and over unfinished sub-floors in new homes at minimum cost. This type of flooring requires less of a cash outlay than carpets or many other types of wood floor and gives satisfactory service.

Maple flooring has excellent wearing qualities, but lacks the attractive grain of oak, and therefore is little used for dwellings. In bed rooms where a light floor is desired it is sometimes specified.

Edge grain pine flooring has an attractive grain, looks well when scraped and finished and is coming into considerable favor. It is less expensive than oak, which is a strong recommendation these days. However, there are many individuals who prefer the "hardwood" floor and are willing to pay for it.

Douglas Fir (Vertical Grain) and Western Hemlock have been used to good advantage for flooring in the West.

One of the most satisfactory methods of treating the kitchen is to use a pine floor and cover this with a good grade of linoleum. An exposed wood floor in the kitchen, even if painted, is likely to prove disappointing. Both flooring and paint wear along the line of travel and spoil the original pleasing appearance. A tile floor is excellent from the sanitary standpoint, but is hard and cold on the feet. It must be set in cement and this makes the structural work more expensive. It is necessary to use rubber or similar mats in connection with such floors to obtain comfort. The cork tile floor is easy on the feet, warm, and provides an excellent non-slip surface. It would be an ideal kitchen floor except for one drawback. This is the difficulty of keeping clean. Cork tile floors are also more expensive than wood.

In the bath room vitreous white tile, with a sanitary base is the best solution. Such tile is manufactured in square, oblong, round or hexigonal shapes and in small or large sizes. The large size is the more expensive.

Where wood floors are laid a quarter round should be used where floor and wall intersect, as a square corner is a great dust catcher.

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House Building Must Increase

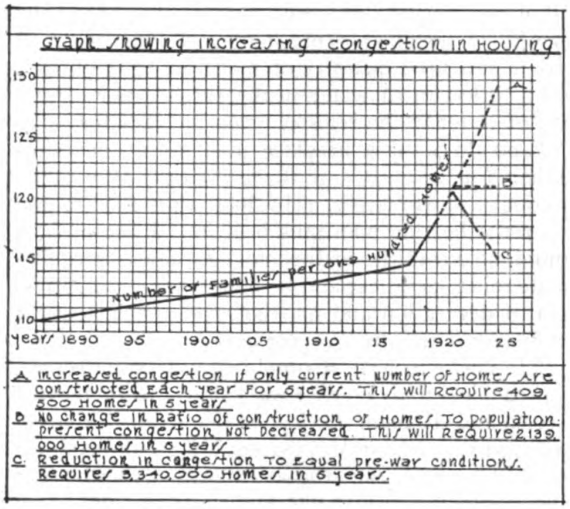
Shortage of Dwellings Grows More Acute as the Population Increases

By WHARTON CLAY
Commissioner Associated Metal Lath Mfrs., Inc.

THE stability of the building industry is based, like every other industry, upon supply and demand. The increasing population demands more dwellings, and building will, unquestionably, continue.

The year 1918 saw only 20,000 new houses built. There should have been twenty times that many.

The year 1919 was a bit better with 70,000† dwellings completed, according to the estimates by



the United States Housing Corporation. But still the increase in population is far outstripping the building program for new houses. While in 1890, an average of 110.5 families occupied each 100 homes, to-day that figure has mounted to 121 families for every 100 dwellings. Hence, the present acute congestion.

CONGESTION INCREASING

With a conservative estimate of 27,900,000 families in 1925 the great housing shortage will continue unless building in all parts of the country increases to an extent unparalleled in the history of the construction business.

If only the current number of homes are constructed each year for the next five years 409,500 homes must be built, and the congestion will reach 129.6 families per hundred homes or two families in every fourth house.

Merely to keep up with the increasing number of families and in no way alleviate the present congestion 2,139,000 homes have to be constructed before 1926, while a return to the pre-war conditions of 115 families per 100 homes means the building of 3,340,000 dwellings in that period. When it is considered that in a town of 25,000 this construction program means 475 and 750 homes in five years, respectively, the stability of the building industry becomes apparent.

The following table shows how, for the last three decades, the number of families in the country has exceeded the number of dwellings:

	Families	Dwellings	Families per 100 Dwellings
1890	12,690,152	11,483,318	110
1900	16,187,715	14,430,145	112
1910	20,255,555	17,895,845	113
1915	22,786,499	19,853,517	115
1916	23,292,887	20,263,051	115
1917	23,799,275	20,672,051	115
1918	24,305,662	20,808,562	117
1919	24,872,051	20,829,039	119
1920	25,319,443	20,900,000	121

In considering the housing shortage, it is of the utmost importance that new houses be built possessing a reasonable degree of fire resistance, thus aiding in reducing the enormous fire loss.

We are in much the same position as the frog trying to get out of the well by climbing up three feet and sliding back two. In 1917 the fire loss in dwellings reported to the National Board of Fire Underwriters was $66,166,420, or an equivalent of 13,000 average $5,000 houses. Something over 90 per cent of the fires originate inside the house and it is important that the lumber in them be more adequately protected than in the past.

*Estimates of this kind are necessarily based on more or less incomplete data, and so when made by different persons will vary considerably. The figures here given, however, are of value for the purpose of comparison.

Good Work Done by Tractor and Trailer

What Are Your Experiences? Building Age Will Be Glad to Hear Them

The William F. Rapp Stave Company, Pine Bluff, Ark., with a Federal heavy-duty tractor and six-ton trailer, increased their ton haulage twenty-six times. With this motor truck equipment they hauled a ton mileage equivalent to that of twenty-six teams of horses.

A good team of horses was only able to make six trips a week, with loads aggregating 2,400 pounds, to the railroad, a distance of eight miles. That is, 9.6 ton-miles a day or 57.6 ton-miles a week. The Federal tractor in actual practice made five trips a

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day with a load of 12,480 pounds per trip or 49.92 ton-miles per trip, which was 249.6 ton-miles a day. In a week this amounted to 1,497.6 ton-miles.

This divided by 57.6, the weekly ton-mileage of a team, is exactly 26. From a standpoint of tonnage alone the one tractor and trailer did the work of 26 teams, without taking into account economy of operation in the elimination of the drivers for each of the teams.

The tractor and trailer hauled 31.2 tons per day as against the 7.2 tons per week of the team, 4.33 times as much tonnage per day as the teams formerly hauled each week.

The roads or rather trails over which this tractor truck and trailer were forced to go were anything but good, as it was through the woods with several long hills, with deep sand deposits at the foot of each hill.

Rochester, N. Y., Health Officer Pictures the Ideal Dwelling

AT a recent meeting of the Life Club, Rochester, N. Y., Dr. George W. Goler, health officer of that city, in an address on "Housing" pictured to the audience his conception of the ideal dwelling of the future.

Features of such a dwelling, conducive of hygiene and comfort, were outlined in the address, extracts from which follow:

"Let us inquire into what were the conditions in the Rochester of our grandfathers. We know how primitive were the houses and the roads. We know the city was without a water supply and without sewers. We have only to ride on the Park avenue car line to realize that early Rochester streets were cow paths. Not every house had a well; there were public wells on the streets from which people took their drinking water and their typhoid when they didn't take water and typhoid from the wells in the back yard.

"This was the old city. What of the city of today? Man is gradually leaving the fields and coming into the city, and is exchanging the life of the fields and farm for that of the factory, store and office. He is requiring more things in many ways and he wants to have a house that is healthful and with many conveniences. Man should live in an ordinary well-built house which does not cost him more than 18 per cent. of his income for rent or for the expenses of owning it. Eight years ago Rochester workers were paying 26 per cent. for rent.

"The house a man lives in should not be an apartment house—no house was made for two families. Every family should live in a separate house, and when transportation becomes like salvation, free for you and me, and we are able to get gas and electric power and water at cost as a public monopoly and not a private one, then we may go to the suburbs and live with assurance that we may get into central amusements and meetings without the cost in money and time which is now entailed.

"Man, though not a house animal, spends most of his time in a house or a building. That is one good reason why he should sleep outdoors and why sleeping porches should become popular. Man ought to have a house built on a well-drained foundation; not because he wants a dry cellar, because most cellars are too dry; they ought to be kept wet when the furnace fire begins. He ought to build a house with a heating apparatus that will deliver to it a large volume of warm air instead of a small volume of hot air; and with this heating apparatus should be installed a moistening device that will give a measured quantity of moist air to the house, not a little pan of water in the furnace nor a little pan of water in the register or on the radiator.

"You do want a fireplace in a house, not altogether for warmth, but for comfort. Man is an original fire-worshiper. He does want a bath, and when the heating man puts heat in the house make him double it in the bath room. He does want adequate toilet facilities; and he does want a single system of decoration and not the lurid and impossible wallpaper with which people cover walls.

"He ought to have a simple type of architecture, approaching that which comes down from the old Greek and Roman, so as to shame the unlovely architecture of East Main street bridge, the ugliness of Rochester by the Rochester Railway and Light Company in its great gas tank, and the offending menace of the canal bridges and other architectural impossibilities connected with the canal.

"He ought to have a dustless cleaning device and a kitchen and a dining room which shall be laid out by an engineer with due regard for the woman who does the work, whether she be wife or mother. Labor-saving devices and sweepers and washing machines, silver polishing machines and table cooking apparatus should be introduced into the home as far as possible. These things will be done when we come to realize the value of men, women and children as assets.

"When our cities are remade the house will be in the country. It will be a hollow-walled structure with impervious floors, and the house so built that the whole structure can be washed down with the hose, when the furniture is removed, and the water drained out through a hole in the floor. Labor-saving devices run by cheap electric or other power will be devised for these houses, and the maidless house of the future may be one in which it will be

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a delight to keep house, even without a maid. Cooking may not be done in the kitchen; it may be done for the most part at the table, and dishes may either be conveyed to a dish-washing machine or the housewife may learn to use improvised and transparent paper covers for her best china and the covers will be gathered, put with the waste into the chute and into a house incinerator.

"It is not altogether the healthful house that is the greatest value but the use to which we put the well-constructed house with labor-saving devices connected with it.

"Europe has for a long time been a labor mother to America. She has served notice on America that she has no more laborers to give us. Where Europe with her population of 250 millions had five births she now has less than one. Many of our sons and daughters are leaving our shores to go to their own country to reclaim the land that was their fathers' or upon which their families lived and which they hoped to make theirs. We here in America find that our birth rate is slowly diminishing. We have got to find workers, and unless we house them and care for them we may find that one day our civilization may be threatened with the same destruction which menaced Rome."

Building in April

Two outstanding factors dominate the building situation late in May, when this is written, and the present indications are that unless Government action is promptly and effectively taken a hoped-for relief is not yet in sight. In spite of the erratic tendencies of the building material market and the constantly changing scale of prices both for important materials and for labor, there is apparently a willingness to proceed with building operations, particularly those where the extension of business interests demand increased facilities, but prospective builders are concerned with the almost insurmountable obstacle to securing at favorable prices and on favorable terms the necessary loans to finance building operations. It is encouraging to note that the Government has awakened to the realization of the necessity to move what has become known as "frozen credit"—or that large amount of capital that is locked up in loans on comomdities that are being everywhere stored by profiteers in the hope of creating scarcities of material and essential products, and keeping up the present abnormal high prices. The cheering news comes from Washington that action will be taken through the Federal Reserve Banks to call in these "frozen credits" as fast as they mature and to see to it that in the reloaning of this large amount of money it does not drift into similar channels, but will become available for exactly such type of loan as the prospective builder will desire to obtain.

The building operations during the month of April, this year, are encouraging insofar as they refer to residential buildings. After many months of depression in building of this type, it is gratifying to be able to learn that the proportion of residential building has now increase to over 30 per cent, being an advance of almost 12 per cent over the first quarter of the year.

	Contracts let April, 1920	Contracts let March, 1920	Projected work in April, 1920
Minnesota, North and South Dakota	$11,900,000	$11,038,000	$15,000,000
Middle West	94,300,000	89,727,000	150,000,000
Ohio, West Virginia and Western Pennsylvania.	61,920,000	67,888,000	53,984,000
Eastern Pennsylvania Southern New Jersey, District of Columbia, Delaware and Maryland	51,230,000	50,036,000	65,681,000
New York and Northern New Jersey	88,000,000	36,374,000	100,860,000
New England	28,589,000	42,584,000	52,121,000

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A Simple Tension Joint for Wood Trusses

THE improved joint shown in the accompanying illustration has been designed to provide greater simplicity in tension joints in wood trusses. This joint eliminates the use of all special plates, beveled washers and complicated mortised joints. One bolt only for each joint and that bolt in the axis of the stress is used.

It is due to some extent at least to the difficulty of designing a simple tension joint for wood members that wood trusses are not more popular. It is acknowledged that wood is more economical than steel; in most localities wood can be obtained as readily, if not more so, than steel, and wood requires no painting to resist corrosion.

The Fire Underwriters have recognized heavy wood timbers as more fire-resisting than unprotected steel.

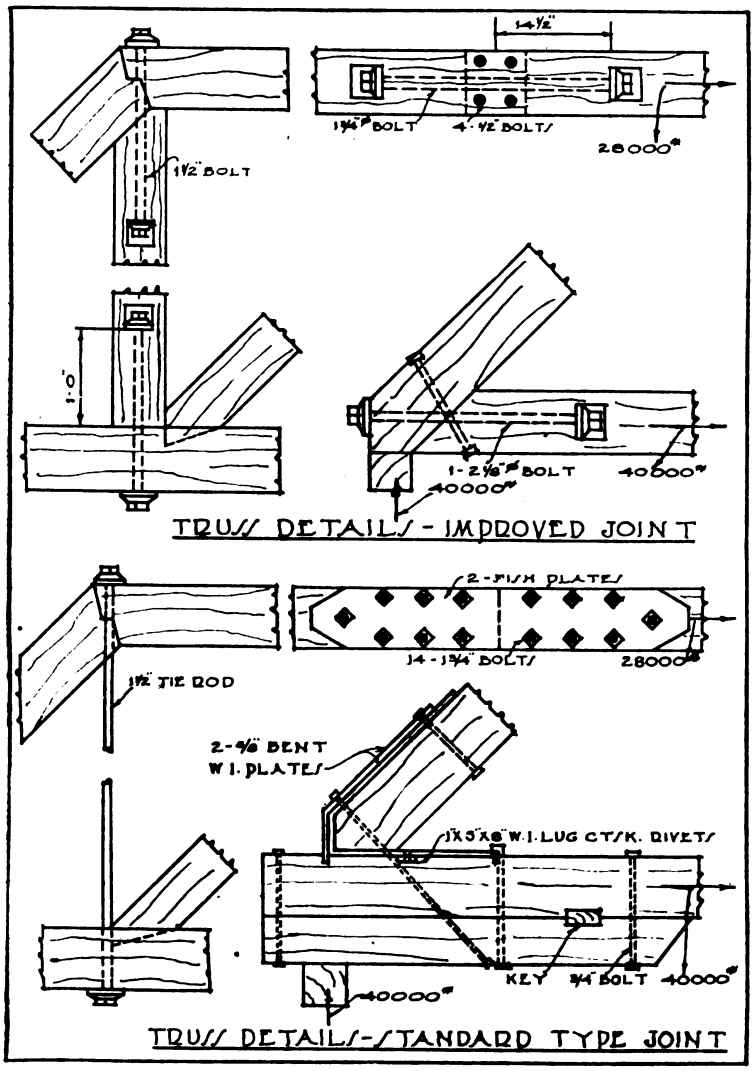
This joint was submitted by its designer to Professor H. S. Jacoby of Cornell University and an extract of his reply is given below.

"I have never seen this joint used in the form in which you have arranged it, and hence, so far as I know, your design is original. Of course, the distance from the upper bolt and washer to the lower timber depends upon the shearing strength of the timber parallel to the fiber.

"The joint has merits since the stresses are transmitted in the most direct manner possible and the construction is also simple.

"It deserves to be brought to the notice of the Engineering profession, for if every improvement in detail which is discovered by members of the profession were reported to the Engineering press, it would materially advance the progress of engineering design."

This simplified joint was designed by Elwyn E. Seelye, Consulting Engineer, New York City.



Building Trades Unite in Philadelphia

Plans for the launching of an intensive campaign for 1,000 members were adopted at a meeting of the Building Trades Employers' Association.

Although the organization is less than two months old, it already has a membership of 200, and is represented strongly in practically all the trades of the city.

The high light of the charter, which is expected to be drawn up within the next two weeks, will be the development of a better building business in this city with a better class of work, satisfied mechanics and equitable treatment to all concerned. While the organization is well represented in the steel, iron, plumbing, painting and other trades allied with the builders, it wishes to announce that it is neutral on the labor question and was organized to protect the employers from their own and other tradesmen and from unjust legislation and will not fight labor.

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Legal Department



If you are bothered by any point of building law, write to our Legal Adviser, A. L. H. Street, LL. B., who is retained for the benefit of subscribers to Building Age, and is at your service.

Is an Architect Liable for Defects in Plans?

From J. B. R., Bushnell, Ill.—Please advise me whether an architectural company in Illinois is responsible for plans they send out that are not strong enough to stand up. About one year ago I got a set of plans of the ———— Company for a large corn-crib and granary. The crib went apart and it cost me $75 to get it together so that it would stand the load and strain. I wrote them, but they would not answer my letters. So my attorney wrote them. They would not answer his letters either. I have been advised to take the matter up with the post-office department, as the company advertised and sold plans through the mail. Would like to know what to do.

Answer—Assuming that failure of the structure to stand was due, not to overloading or defective materials used or defective workmanship, but due to defects in the plans, the question of the architect's liability turns on the point as to whether he used a reasonable degree of skill and care in preparing the plans. (I use the pronoun "he" in speaking of the architect, since the question of liability would be the same in the case of both corporate and individual architects.)

An architect is no more an *insurer* that his plans will stand up than the attorney is an insurer that he will win his client's case, or the doctor is that he will cure his patient's disease. The test of liability as to all three professions is the same—the exercise of reasonable skill and care.

As applied to architects, the law has been authoritatively summed up as follows:

"In the preparation of plans and specifications the architect must possess and exercise the care and skill of those ordinarily skilled in the business; if he does so he is not liable for faults in construction resulting from defects in the plans, as his undertaking does not imply or guarantee a perfect plan or a satisfactory result, it being considered enough that the architect himself is not the cause of any failure, and there is no implied promise that miscalculations may not occur. Where, however, the architect does not possess and exercise such care and skill he will not only be liable in damages for defects in his plans, but he cannot recover compensation for them." (5 Corpus Juris, 269, 270.)

In the case of Niver vs. Nash, 35 Pacific Reporter, 380, the Washington Supreme Court said:

"It appears that the plaintiff sold the plans for the building with full knowledge of the purpose for which they were to be used, and in the light of such knowledge expressly represented to the defendant that he was a competent and skillful architect, and that a building built in accordance with said plans would be well and properly lighted and first-class in every respect; that such representations were untrue; that his building, erected in accordance with such plans, was not well lighted or first-class; and that by reason of the defects in the building, occasioned by the plans not being as represented, he had been put to expense, and greatly damaged. Under the circumstances under which the representations as to these plans were made, they must be held to have amounted to a warranty on the part of the plaintiff that they were as he represented them to be. He was an expert, representing himself as fully qualified to judge as to such matters; whereas the person with whom he was dealing had no such qualifications."

And in the case of Schreiner vs. Miller, 24 Northwestern Reporter, 738, wherein it was decided that it was the duty of an architect to cause a foundation to be sufficiently deep, or otherwise protected, to prevent such settling as would cause the walls to crack, the Iowa Supreme Court said:

"Plaintiff, under his employment [as architect to prepare plans and supervise construction], was bound to furnish proper plans, and to see that the house was at least reasonably well constructed. * * * A house is not constructed with reasonable care, the foundations of which are so defective as to cause the walls to crack."

And in the case of Erskine vs. Johnson, 36 Northwestern Reporter, 510, the Nebraska Supreme Court decided that an architect is liable for mistakes in plans and specifications which increase the cost of the building.

Coming back to the specific questions propounded by the gentleman from Illinois, we are of the opinion that if the corn crib and granary plans were defective, and if the defects reflected failure on the architect's part to exercise the care and skill of those ordinarily skilled in the business, the architect is liable for the reasonable cost of making the work good. But this

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assumes that our friend, the contractor and builder, was justifiably innocent of knowledge that the plans were defective when they were used.

If a cause of action exists, in the light of what has been said above, it seems that the damages cannot exceed $75, and it is therefore doubtful whether the claim is worth litigation.

There is no likelihood that any actual fraud was committed or intended by the architectural company. Therefore, I do not believe that the facts of the case would justify a complaint to the post-office department. It is a serious offense against the laws of the United States to use the mails to aid a scheme to defraud. But mere sale of defective plans would not constitute use of the mails in connection therewith a crime. It seems, however, that the company is very unfair and very unbusinesslike in ignoring the letters you and your attorney have written.

When Do Changes Abrogate Special Contract?

From W. P., Ohio—What amount of changes are necessary to invalidate a contract and turn a job into a time and material job?

Answer—Probably the most satisfactory statement of the general rule of law governing this question is the following taken from a standard legal work:

"Slight modifications and variations made with the consent of the parties do not abrogate the entire contract and the rights and obligations of the parties thereto, but the original contract continues in force except as altered by such modifications and alterations; and this is especially true where the original contract expressly provides that modifications and alterations in the plans of the work may be made. Where, however, the original contract is deviated from in material respects so that the work cannot reasonably be recognized as that originally contracted for, the original contract should be treated as abandoned." (9 Corpus Juris, 721, 722.)

Numerous decisions of the highest courts of Ohio and other States are cited in support of this rule, which, after all, seems to accord with common sense. That is, the general rule is, as stated by the Maryland Court of Appeals, that the original contract governs as to all work performed in conformity to it; it being only as to work not contemplated by that contract that the contractor's compensation is to be based on a reasonable valuation of the labor and materials furnished by him, as distinguished from compensation based on special agreement.

But in any particular case, the question whether there has been an abrogation of the original contract, so as to entitle the contractor to any benefit derived from valuing his work on the basis of current labor and material costs, must naturally turn upon the mutual intention of the parties, as disclosed by the peculiar facts and circumstances of the case.

"The parties to a building contract have a right to alter or modify the original contract by mutual consent. Thus the contractor and the owner may, by subsequent agreement, modify the original contract and authorize or require deviations and departures therefrom; or the contract may be merged in a subsequent one and the new agreement either expressly or impliedly may waive any right either would otherwise have had. But in the absence of any provision therefor in the contract, the owner has no right to demand that the contractor shall permit modifications and alterations of the agreement; and, of course, on the other hand, the contractor is not justified, without the consent of the owner, express or implied, in departing from the requirements of the contract. Building contracts, however, frequently expressly provide that the owner shall have power to make alterations and modifications and to require the contractor to assent to such alterations and modifications; but the owner has such power only to the extent that he is authorized to do so by contract. * * *

"The question as to whether there has been a modification or merger of the contract is ordinarily a question of fact to be determined by the jury from the facts and circumstances of the particular case." (9 Corpus Juris, 717-719.)

In passing, it may be interesting to note that in an early California case (Shaver vs. Murdock, 36 Cal. 293), it was decided that a provision in a building contract that "should the owner at any time during the progress of said building request any alterations, deviations, additions, or omissions from this contract, he shall be at liberty to do so, and the same shall in no way affect or make void the contract, but it will be added to or deducted from the amount of the contract, as the case may be, by a fair and reasonable valuation," should be read as meaning that the owner might omit things which might be entirely left out of the building without changing its general character, but not things intended to be taken off the contractor's hands, without his consent, and finished by the owner himself.

In the case of Gray vs. Jones, 47 Oregon Reports, 40, 81, Pacific Reporter, 813, it was held that a change in the plans and specifications by mutual consent, during the progress of the work, was not an abandonment of the old contract and the substitution of a new one in its place.

In the Washington case of Sweatt vs. Bonne, 110 Pacific Reporter, 617, it was decided that where a building contract provided for payments to the contractor on architect's certificates only, and new agreements were made for addition of a cellar and another story, without reference to any necessity for architect's certificates, the building was so changed as to be substantially different from that originally bargained for, and the contractor could recover on its completion, regardless of architect's certificates.

"Where the extra work and materials furnished are of the same character as the work and materials named in the contract, the general rule is that they are to be paid for according to the schedule of prices fixed by the contract. Where, however, the changes are such that it is impossible to trace the contract and say to what part of the work it should be applied, as where the extra work and materials are of a different character from those specified in the contract, and no price is agreed on for extra work, the rates named in the contract will not apply, and the party performing will be entitled to recover what they are reasonably worth; and in determining such value a reasonable profit is to be added to the actual and reasonable cost. The parties may of course expressly contract with regard to the compensation for extra work and will be bound thereby, and the original contract may fix the compensation to be paid for extra work." (9 Corpus Juris, 849, 850.)

As decided by the West Virginia Supreme Court of Appeals in the case of Fuccy vs. Coal, etc., R. Co., 75 W. Va. Rep., 134, the usual stipulation of building contracts, that extra work shall be performed at the price fixed by an engineer, is limited to such relatively small

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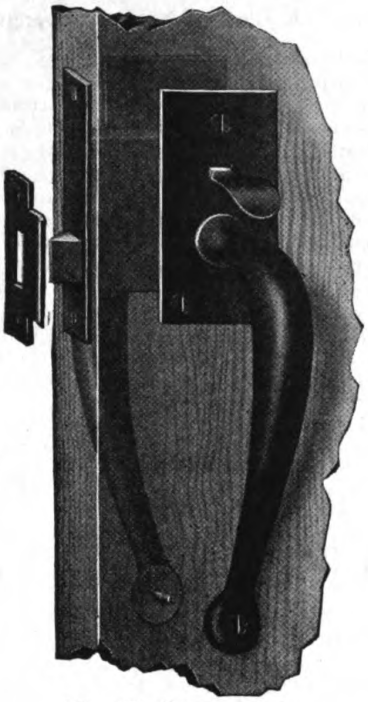
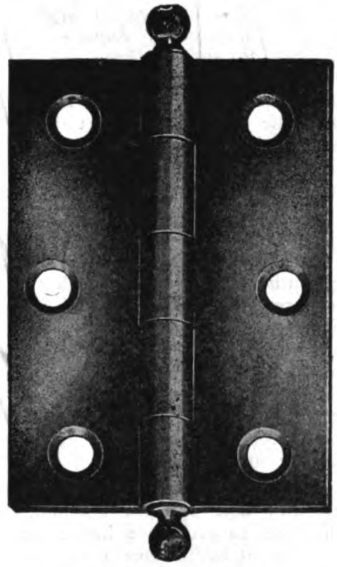
SPECIFY NATIONAL PRODUCTS



No. 27—Garage Door
Latch for Swinging Doors



No. 528—Ball Tip
Cut full size of 2½-inch

Eighteen years of consistent service to the trade is the proud record of the National line of Builders' Hardware.

Two National products illustrated herewith reveal the mechanical excellence and high class workmanship which are characteristic of the entire National line.

Our No. 27 Garage Door Latch improves the appearance of any garage. The handles have long, graceful lines and there are no complicated parts to get out of order.

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Write for catalog of National Builders Hardware. It will prove a revelation.

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amounts of such work as may become necessary to the completion of the building contemplated.

And, in the case of Fulton County vs. Gibson, 63 Northeastern Reporter, 982, it was held that where a building contract covers an entire structure at an aggregate price, and the price to be paid for extra work and materials is not fixed in the contract, the cash value of such work and materials is the proper measure of the contractor's compensation, and not the price paid for similar materials and labor under the main contract, which could only be computed by determining the value of the various materials used in the performance of the original contract in connection with the entire contract price.

In the Utah case of Rhodes vs. Clute, 53 Pacific Reporter, 990, it was declared that where after part performance of a contract to build a house, such substantial departures from the plans and specifications are made, at the instance of the owner, as will result in a radically different undertaking, and no agreement is made as to the price for such substituted work, the builder is entitled to recover the reasonable value of the material and labor furnished in accordance with the new undertaking, and will not be limited to the price agreed upon in the original contract.

From the observations made above, it will appear that no hard and fast rule can be laid down as to what changes in a contract will convert a building job into one based on the value of time and material. But it seems clear that, unless there is a showing that the parties intended to abrogate the original contract, it should govern the question of compensation so far as the work done is within the fair scope of that contract, including relatively unimportant alterations.

Guarantees to Be Strictly Interpreted

One who guarantees performance of a building or other contract is entitled to have it strictly construed in his favor, and not stretched to create liability against him. So the Texas Court of Civil Appeals holds in the recent case of Acme Brick Co. vs. West, 215 Southwestern Reporter, 476, that, where a written contract by plaintiff with a firm of builders provided for the delivery of brick to the latter to enable them to construct buildings for which they had contracts, a written guaranty by defendant that the builders would "*pay* for the brick under and according to contract above," did not constitute a guaranty that the builders would *receive* all the brick bargained for.

Limitation on Contractor's Agent's Authority

There is a rule of law sounder in reason than generally understood, to the effect that the employer of an agent is not liable on contracts made by the latter in excess of his express and implied authority. This rule was applied lately by the Arkansas Supreme Court in the case of Arkadelphia Milling Co. vs. Campbell, 216 Southwestern Reporter, 20, in a holding that the fact that a building contractor sent his representative to another town to supervise the erection of a building there for a client for the contractor, and to obtain the labor and materials necessary to complete the construction, did not constitute the representative a general agent in such sense that he could bind the contractor by making an unauthorized contract with another person to build another building.

Who Are Independent Contractors?

An Interesting Decision by Nebraska Supreme Court

The Workmen's Compensation Acts are so drawn as to make them inapplicable to injuries to persons who stand in the relationship of independent contractors, as distinguished from that of an employe in the ordinary sense.

The distinction became pertinent recently in the case of Barrett vs. Selden-Breack Construction Co., 174 Northwestern Reporter, 866, in which plaintiff was nonsuited in an attempt to secure an award under the Nebraska Workmen's Compensation Act on account of death of her husband while engaged in doing work for defendant company.

In this case the Nebraska Supreme Court holds that one who takes contracts for cleaning and pointing the walls of brick buildings, agreeing to furnish his own tools, scaffolding and materials, and to employ his own help, keep his own time, to furnish workmen's compensation insurance for the workers whom he employs, and who is under no obligation to do the work in person, and who is paid on weekly estimates of work done, is an independent contractor.

Is Wife Bound by Husband's Contract?

Another court decision gives a repeated warning to building contractors to make sure of a husband's authority from his wife to contract for the improvement of her real estate, when the builder desires to preserve the security afforded by a mechanic's lien.

The decision, which was handed down by the Kansas City Court of Appeals in the case of Berkshire et al vs. Holcker et al., 216 Southwestern Reporter, 556, denies to the plaintiff's right to enforce liens against a married woman's property on account of improvements contracted for by the husband in his own name. It is held that the evidence sustains the jury's finding that she never authorized her husband to bind her for the cost of the improvements, although she knew that they were being made. Apparently, it is assumed that she was justified under the peculiar circumstances of the case in assuming that he was bargaining for the work at his own expense.

"By the wife's passive permission and consent the husband would be authorized in the sense that he would not be a trespasser," remarks the court, "and yet there would be no element of agency, within the meaning of the lien statute, emanating from the wife to the husband, as an active and moving cause on her part, to procure the erection of the improvements. And unless there was at least this sort of an agency existing between the owner and the husband, there is no ground for a lien on the owner's land under our statute. * * *

"On account of the peculiar nature of the relation between husband and wife and the commonly performed duty of the husband to provide a house for their home and joint occupancy, it by no means conclusively follows that she has made him her agent to build a house for her because she knows he is building the house on her land, and that she shows interest in the construction of the house and, at his request, looks over the plans and makes suggestions. Anything short of that wifely interest would be unnatural, and it can all exist in entire consistency with her disclaimer of having made him her agent to build the house for her."

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One of the advantages of Barrett Everlastic Roofings is that they come both in shingle form and in rolls—two styles of each.

You will find some one of these four styles appropriate and economical for *every* type of steep-roofed building. And every Barrett roof you lay will prove a good advertisement for you and a sound investment for the owner.

Both styles of Everlastic Shingles are surfaced with real crushed slate, in natural, soft color-tones of red or green. They are suitable for the finest residences, school-houses, country-clubs and other buildings that demand handsome as well as staunch roofs. You can't buy more artistic roofs at any price.

One style of the roll roofing is also slate-surfaced in the same rich color as the shingles. The other is plain surfaced, of the so-called "rubber" type.

Barrett Everlastic Roofings are low in cost, easy to lay, durable and highly fire-resistant. They are made by one of the oldest and largest roofing manufacturers in America.

All four styles of Everlastic are briefly described here. Full information is contained in our illustrated booklet, which will be sent free on request.

Barrett Everlastic Roofings are carried by enterprising dealers everywhere. If your dealer does not carry them, write us, and we will tell you where you can be supplied.

The Barrett Company

New York	St. Louis	Johnstown	Duluth	Syracuse
Chicago	Cleveland	Richmond	Youngstown	Bangor
Philadelphia	Kansas City	Cincinnati	Bethlehem	Toledo
Boston	Peoria	Minneapolis	Detroit	Buffalo
		Atlanta	Nashville	Birmingham
		Lebanon	Salt Lake City	Seattle
		Latrobe	Milwaukee	Washington
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Everlastic Multi-Shingles
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The newest thing in roofing. Tough and durable. Made of high-grade waterproofing materials and surfaced with crushed slate in art-shades of red or green. When laid they look exactly like individual shingles and make a roof worthy of the finest buildings. Weather and fire-resisting to a high degree. Need no painting.

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Same material and art-finish (red or green) as the Multi-Shingles, but made in individual shingles; size 8x12¾ inches. A finished roof of Everlastic Single Shingles is far more beautiful than an ordinary shingle roof and, in addition, costs less per year of service.

Everlastic Slate-Surfaced Roofing

The most beautiful and enduring roll roofing made. Surfaced with crushed slate in art-shades of red or green. Very durable; requires no painting. Nails and cement in each roll.

Everlastic "Rubber" Roofing

One of our most popular roofings. It is tough, pliable, elastic, durable and very low in price. It is easy to lay; no skilled labor required. Nails and cement in each roll.

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New Catalogs of Interest to the Trade

These catalogs may be secured direct from the manufacturer. If you prefer, write the date of this issue and the numbers, of any catalogs on a postal and mail it to "Building Age," 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.

130. **Red-Lead in Paste Form.** National Lead Company, New York City—Booklet illustrating and describing this Dutch Boy red-lead, which is the surest and most durable preventive of rust.

131. **Crucible Tool Steel Edge and Head.** The L. & I. J. White Company, Buffalo, N. Y.—Literature illustrating and describing this tool as well as many others manufactured by this company

132. **Something New in the Building Field.** Art Stone Company, Waynesboro, Pa.—Literature describing and illustrating how beautiful reproductions of marble, onyx, granite, etc., can be obtained from ordinary concrete. Samples given on request.

133. **Copper Range Boilers.** Dahlquist Mfg. Company, South Boston, Mass.—Booklet illustrating and describing these copper range boilers which insure pure, clean water.

134. **Catalog 18.** American Saw Mill Machinery Co., Hackettstown, N. J.—Fully illustrates and describes the "American" line for saw mills: Edgers, bolters, trimmers, planers, matchers, etc.

135. **Storm Dumbwaiters.** Storm Mfg. Company, Newark, N. J.—Illustrated circular fully describes the Storm dumbwaiters. Prices are included.

136. **Nice Paints, Varnishes, Stains, etc.** Eugene E. Nice, Philadelphia, Pa.—Literature describing the various paints manufactured by this firm. Samples and prices furnished on request.

137. **Barrett Everlastic Roofings.** The Barrett Company, New York City.—Illustrated booklet fully describes all styles of Everlastic roofings.

138. **Sargent Hardware.** Sargent & Company, New Haven, Conn.—Literature illustrating and describing the hardware manufactured by this company.

139. **Reduce Your Bids by Reducing Your Cost on Workmen's Compensation Insurance.** Liberty Mutual Insurance Company, Boston, Mass.—Lilterature giving advantages derived from being a Liberty Mutual policyholder.

140. **The Humphrey Radiantfire.** General Gas Light Company, New York City.—Descriptive literature illustrates this gas heating appliance which saves coal money and reduces the fire hazard.

141. **Boyle's Bayonne Roof and Deck Cloth.** John Boyle & Company, Inc., New York City.—Sample book "R" contains prices and specifications for laying this roof covering which is especially adapted for the roofs and decks of piazzas, sleeping porches, conservatories, etc., and for low pitched and flat roofs.

142. **Huther Brothers Saws.** Huther Brothers Saw Mfg. Company, Inc., Rochester, N. Y.—Catalogue fully illustrates and describes the various types of saws manufactured by this company.

143. **Elastica Stucco.** American Materials Company, New York City, and Wisconsin Lime & Cement Co., Chicago, Ill.—Literature describing the advantages of this magnesite stucco. Illustrations show houses on which Elastica stucco has been used.

144. **Ambler Asbestos Building Products.** Keasbey & Mattison Company, Ambler, Pa.—Literature illustrates and describes the building products manufactured by this company. Samples showing color and construction given on request.

145. **"R. I. W." Toxement.** Toch Brothers, New York City. Illustrated booklet describing this integral waterproofing compound for concrete, stucco, cement, mortar, etc.

146. **The New Idea Pipeless Furnace.** Utica Heater Company, Utica, N. Y.—Literature illustrating and describing the construction of this furnace.

147. **Fireplaces.** Edwin A. Jackson & Bro., New York City.—Catalog No. 52 describes and illustrates the architectural wood mantels, fenders, dampers and all fittings for fireplaces manufactured by this company.

148. **Bermico Sheathing Paper.** Brown Company, Portland, Me.—Literature describing and illustrating the sheathing paper manufactured by this concern.

149. **The Carter Times.** Carter White Lead Company, Chicago Ill.—Illustrated booklet published by this company in the interest of good painting.

150. **Expanded Metal Construction.** North Western Expanded Metal Company, Chicago, Ill.—Booklet illustrates and describes the products manufactured by this company.

151. **Deming Pumps for Hand and Power.** The Deming Company, Salem, Ohio.—Catalog No. 26 fully describes and illustrates hand and power pumps for all uses. Sizes and prices are given.

152.—**The "Van Guilder" Building System.** Van Guilder Double Wall Company, Inc., Rochester, N. Y. —Folder No. 30 illustrates and describes the "Van Guilder" method of construction buildings with walls of concrete.

153. **Window Walls—Their Cost and Their Advantages.** Detroit Steel Products Company, Detroit, Mich. —Illustrated booklet describing the Fenestra window-wall, with comparative costs of the ordinary and "window-wall" types of construction.

154. **Master Mix.** The Master Builders Company, Cleveland, Ohio.—Illustrated booklet describing Master Mix which is a cement accelerator, waterproofer and anti-freeze compound.

155. **Musical Merchandising.** Unit Construction Company, New York City.—Extensively illustrated catalog describing typical Unico installations which provide for the displaying, selling and stocking of musical merchandise.

156. **Ruud Water Heaters.** Ruud Mfg. Company, Pittsburgh, Pa.—Booklet fully describing and illustrating the water heaters manufactured by this company. Model specifications are given.

157. **Catalog No. 47.** Hartmann-Sanders Company, New York City.—Describes and illustrates Koll's patent lock joint wood staved and turned columns which this firm manufactures. Contains photographs of structures in which these columns were used. Prices also given.

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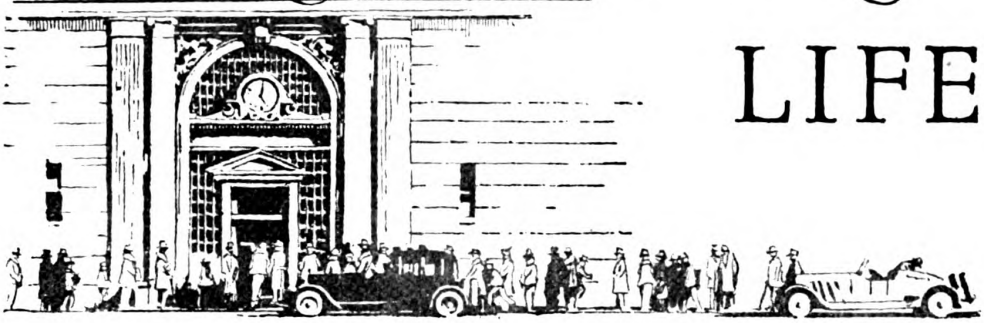
Giving a Building LIFE



TAKE the Hinges from any building and you strip it of its usefulness. You rob the engine of its power. From entrance to exit they are important. For they make doors possible. They afford activity —LIFE.

The use of hinges is never disputed. It is their selection that is important. To select the best is to guarantee life-long service. To be careless is to court trouble—noisy, squeaking, sagging doors.

McKinney Hinges and Butts have been on the market for fifty years. It was the name "McKinney" that first made it possible to select a really standard hinge—one that combined artistic design with sturdy, durable workmanship.

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Architects and Builders find the McKinney illustrated catalog a real help in matching out-of-the-ordinary designs and in meeting standard hinge needs. If you do not have a copy of this book in your files we will be glad to furnish you with the latest edition.

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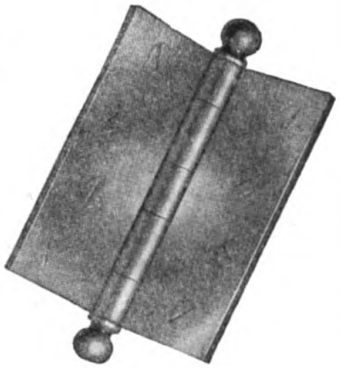

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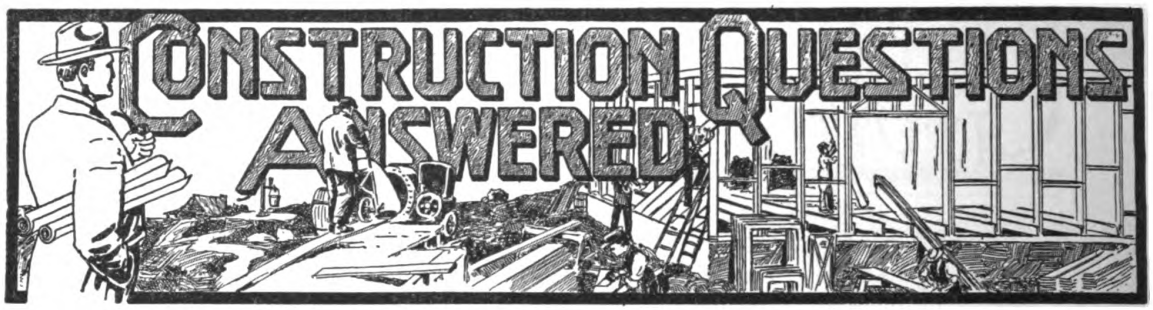
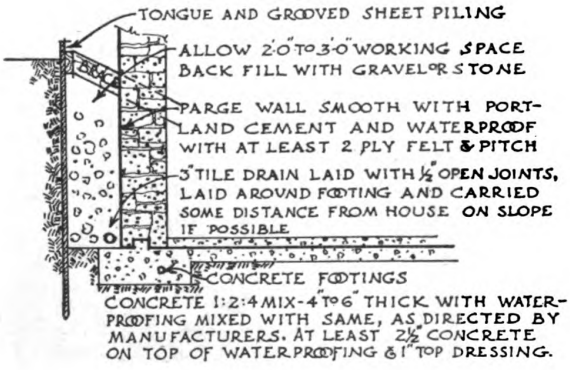


Building in Swampy Ground

From H. T., Clifton, N. J.—I would be much obliged if you would give me the following information, which would be of invaluable aid to your readers confronted by this same problem. Which is the best way to dig a cellar in a swampy locality, and how must I mix the concrete to keep the cellar as nearly dry as possible, after the job is finished?

Answer—This is indeed a difficult question, and because of the many failures both in excavating a cellar in such ground and in keeping it dry after it has been built, most buildings constructed over such soil are placing on pile foundations or else on spread footings, and no attempt is made to excavate the cellar.

Probably the best way in excavation is to use tongued and grooved sheet piling which will prevent the water from coming in from the sides of the excavation and keeping one or more pumps going to keep the excavation from filling up during the progress of the work. These pumps will have to be kept going at



night as well as the day time, otherwise the cellar will be found full of water in the morning and it will be difficult to again get it clear of water.

A 1:2:4 mix of concrete from 4 to 6 inches thick, proportioned to get as dense a concrete as possible, should be placed when the required depth has been reached. This should be mixed dry, as the water coming in will undoubtedly prove sufficient to cause setting. One of the reputable waterproofing compounds might be added to the concrete mix in the manner prescribed by the manufacturer, which will add to the waterproofing qualities of the concrete. This will be sufficient to keep the cellar from flooding. If a water head of several feet occurs the concrete should also be reinforced with a light wire mesh.

Both walls and cellar should be waterproofed by at least 2-ply felt and pitch, as shown in the accompanying sketch. A porous tile drain laid with open joints should be placed around the footings. It has often happened on important jobs that even after every precaution has been taken water will seep in.

In constructing some of the tunnels through New York City, where the work was done below the ground water level, the best waterproofing construction known at the time was used around the concrete lining, but despite this, water managed to find its way into the tunnels in small amounts, and this had to be pumped out regularly. For this reason, in large operations it is generally the practice to provide adequate waterproofing and in addition to provide for drainage into a sump pit, equipped with an automatic pump which discharges any water coming into the pit back into the sewer.

Framing and Placing Picture—Preserving Half Timber Work

From H. F., R. I.—In a new house with a fire place built of concrete in the living room a recess has been provided in the concrete above the shelf, which is intended for a landscape picture. This recess is 3 feet by 2 feet 3 inches. The house is entirely completed now and the owner wishes to install the picture. It is desired to have as narrow a wood frame as possible which should not project beyond the concrete face. They expressed the desire to have a carved frame, but I suggested that they get a perfectly plain one finished natural, but I am not quite sure whether varnish will prove satisfactory. Before placing the picture I would like to have some definite information concerning the prevention of dampness (if there ever is any) from reaching the picture and damaging it. The picture apparently is a water color painted on paper. How would you advise me to frame this picture in the recess? There are two wood grounds bed in the concrete for nailing purposes. The fire place is

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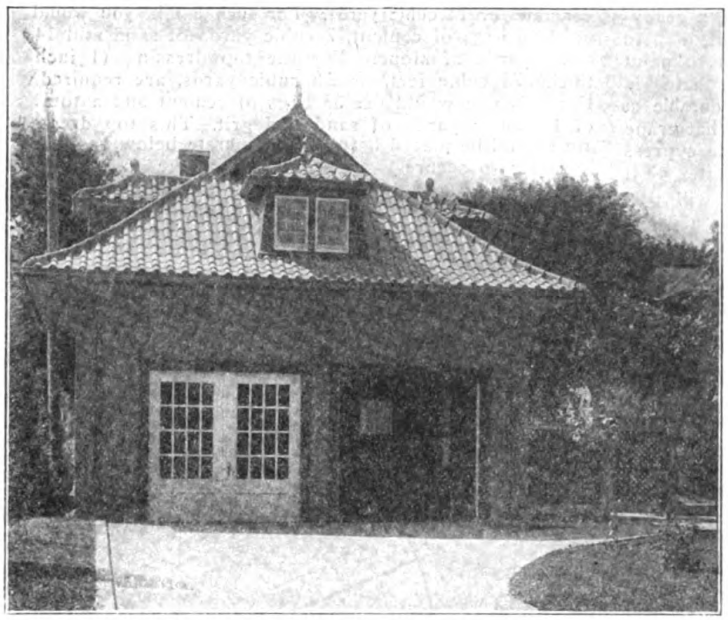
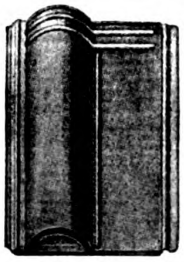
Spanish Metal Tile





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"TITELOCK" Spanish Metal Tile is adapted to the best class of residences, garages, churches, schools and public buildings.

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Safety Roof Circular Sent on Application

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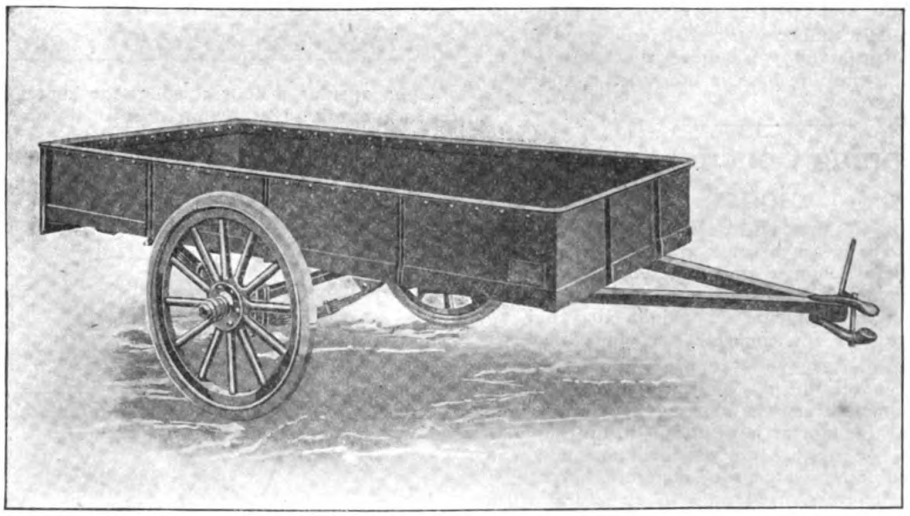

Capacity—2,000 pounds. Body—8 feet long, 46 inches wide, 12 inches high. Body and under frame built of open hearth steel. Axles—1½ inch square bed, special high carbon steel. Springs—Semi-elliptic, oil tempered and double heat treated. Bearings—Roller. Wheels—1½ inch spoke, artillery type, second growth hickory. Tires—32-2, solid rubber. Weight—534 lbs. Other models with gates at front; also extension tongue which permits carrying lumber, poles, ladders, etc., 30 feet long.

Write for Catalog A

ALL STEEL TRAILERS — EVERY TYPE — 1 TO 10 TONS CAPACITY

ROGERS BROTHERS COMPANY **Albion, Penna.**

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a very attractive one, and I contemplate having the same in my own house.

In the framing of my house, which is half timber style, I intend to use cypress plank, rabbetted, built onto the frame. I would like to know what kind of weathered oak stain to use on the face of these planks that will prove effective and durable. Would a ready-made stain be satisfactory? For the present, I plan that the stucco shall be white, and I intend to paint the other three sides of the planks with asphalt. Is this advisable? Is there any other wood as durable as and cheaper than cypress for these planks? What grade should be used? I have been using first grade cypress for outside finishing and am satisfied with it.

Answer—A picture placed as you propose will present a very artistic effect. We note that it is a water color painting on card. In its location over the fireplace there is not much danger of dampness, but if it is desired to protect it, it will only be necessary to place one or two thicknesses of ordinary building paper back of the picture, which we assume is exactly the size to fit the recessed opening in the chimney breast. For a frame, the simplest one would be a plain white wood moulding, simple O G mitred, and of sufficient depth to come within three-quarters of an inch of the surface of the chimney breast. The recession of the picture permits shadows to be thrown around the edges and produces a softening effect, that is the most artistic way to handle this material.

You inquire as to the lasting qualities of outside stains. There is no doubt that paint manufacturers have through years of experimentation secured the best outside stains that can be used. Any reputable manufacturer could provide the stain in a tone that you want and supply you with an article that you can absolutely depend on. We quite agree with you that first grade cypress is the very best type of wood that can be used for half timbered work on the exterior of houses, and as you state that it has been your custom to use none but the first grade, we do not see how you can proceed to a better selection than your own good judgment has already outlined. It is, of course, always a most workmanlike and satisfactory manner to prime the planks of any half timber work with any good moisture-repelling paint, and we believe that material of which creosote forms the base is the most satisfactory that you can employ.

Proportioning Concrete for Cellar Floors

From C. St. M., Victoria, B. C.—Will you kindly advise me as to how much sand, gravel and cement it takes to complete a cement and concrete floor 24 feet by 37 feet—six inches thick—using 1 part sand, 1 part gravel and 2 parts cement? I would also like to know what the rule for concrete per cubic yard is?

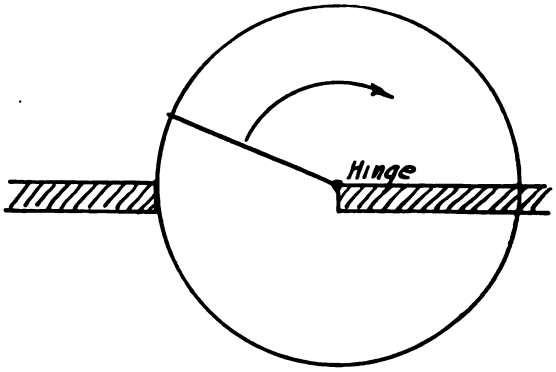
Answer—The mixture you propose using is unusual and extremely uneconomical. The whole theory of concrete is that sufficient cement be used to fill the voids in the sand, and this mortar be sufficient to fill the voids in the stone. A mixture so proportioned makes a good dense and fairly waterproof concrete.

For a very rich mix, used only in structural work where high strength is required, a mix of 1 part cement, 1½ parts sand and 3 parts stone or gravel is used. This is the richest mix I have ever seen used, and it will be noted that it is not nearly as rich as that which you propose using for a cellar floor where no extreme strength is required. For such a place a mix of 1:2½:5 or 1:3:6 would be sufficient, except for the top dressing, in which only cement and sand and grit mixed in the proportions of 1 part cement and 2 parts sand and grit would be sufficient.

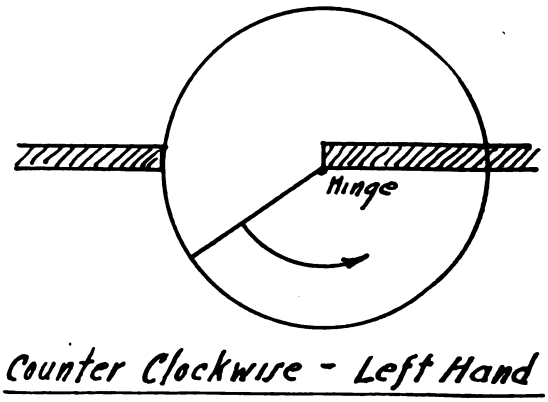
Assuming that a 1:3:6 mix is used for the lower 5 inches, this would require a total of 380 cubic feet of concrete, or 14 cubic yards. For such a mix you would need 60 bags of cement, 7 cubic yards of sand and 14 cubic yards of stone. For the top dressing (1 inch thick) 75 cubic feet, or 2.8 cubic yards, are required. For this you would use 35 bags of cement and a total of 1.4 cubic yards of sand and grit. This top dressing should be placed before the concrete below has set, in order to secure a proper bond. If the concrete is allowed to set and the top dressing placed afterwards, it should be thoroughly wetted.

More Information on Determining Hand of Doors

From E. M. B., Milwaukee, Wis.—In the April issue of BUILDING AGE Mr. F. McG. asks information on the hand of doors. The simplest rule I have known for years is as follows:



Upon opening a door consider the hinges as the center of a watch. If it swings open in the same direction as the pointers it is a right-hand door. If it swings open counter clockwise, it is a left-hand door. According to this method, you can determine left from right-hand doors no matter on which side you stand. See the accompanying sketch.



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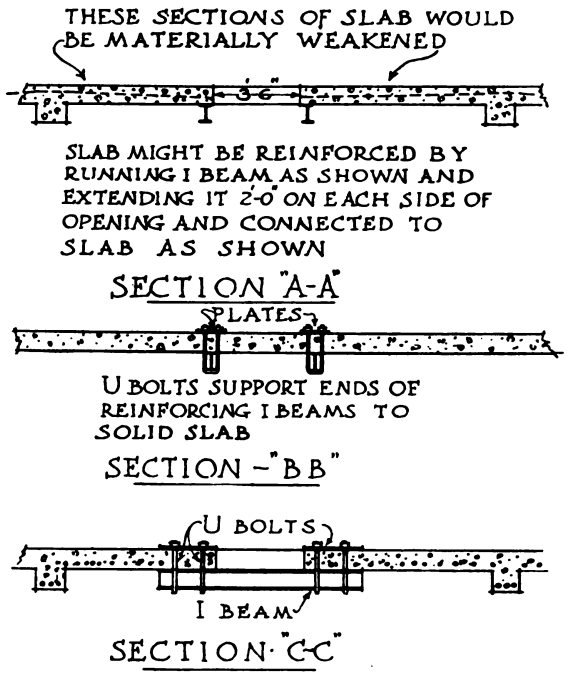
Cutting Hole in Concrete Floor Slab

From H. F. B., Buffalo, N. Y.—Will you please give me some idea of how much I am weakening the floor panel shown in the enclosed sketch by cutting the 42-inch square hole as indicated?

Answer—The sketch submitted, showing an opening three feet six inches square, located near the center of a reinforced concrete flat slab, has been examined. Since the computations which determine the thickness and reinforcing of flat slabs are often based on Empirical and not theoretical formulas, the bending moments having been determined on by tests, it is difficult to give a definite answer. The opening is located at approximately the point of maximum bending moment, and would be very likely to cause the collapse



THE FLOOR SLAB ADJACENT TO OPENING MAY BE REINFORCED BY FRAMING TWO I BEAMS (6" 8") ON TWO OPPOSITE SIDES OF THE OPENING, THE BEAMS BEING PLACED AT RIGHT ANGLES TO THE DIRECTION OF THE REINFORCING RODS.

of at least a portion of the floor slab were it loaded to capacity.

If the floor has been designed according to the formula you mention, WL÷10, with the rods running in one direction only, namely the 16 ft. way, then the slab on either side of the hole will not have been weakened to any extent, but that section of the slab extending from the supports out to the opening will have no theoretical strength except as a cantilever and that given it due to its shearing value.

Of course, in designing a slab around an opening of this sort, reinforced concrete girders should be run on either side of the opening and the rods reinforcing the slab between these girders should run at right angles thereto. It is considered extremely dangerous to cut this opening without providing any additional reinforcing underneath, and a suggestion for doing this is given in the accompanying sketch, by using two steel I beams, acting as headers, framed around the opening.

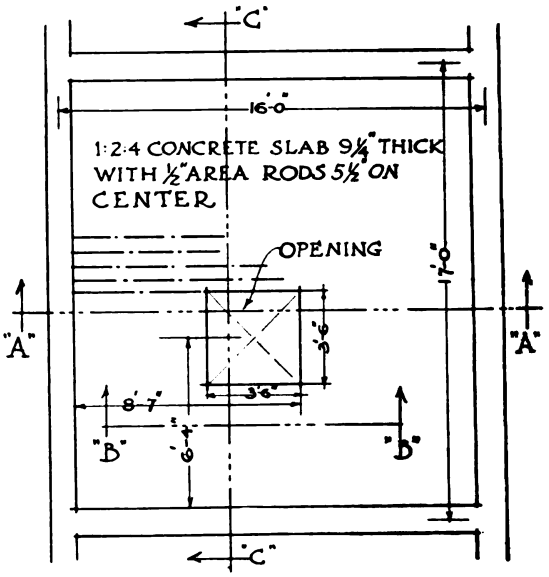


DIAGRAM OF FRAMING SHOWING LOCATION OF PROPOSED OPENING.

Quick Method of Making Small Tenoned Pieces

Where many narrow pieces have to be made and provided with tenons, as, for instance, the numerous slats or uprights in a child's bed or the balusters of a rail, much time can be saved by just cutting the board from which the pieces are to be made to accurate length, forming one tenon at each end with a rabbet plane, and then ripping the board into the desired number of pieces.

From half a dozen to a dozen pieces can thus be frequently tenoned with hardly more work than would be needed to tenon each piece separately, and with a great deal more accuracy.

Where the pieces to be made are not only numerous but also short, additional time can be saved by using a long board, marking it off accurately with the length of the pieces to be made, and forming the tenons on two ends at once with a plow-plane. The stock thus formed can then be ripped to the desired width and the several pieces cut off. The illustration shows this method applied.

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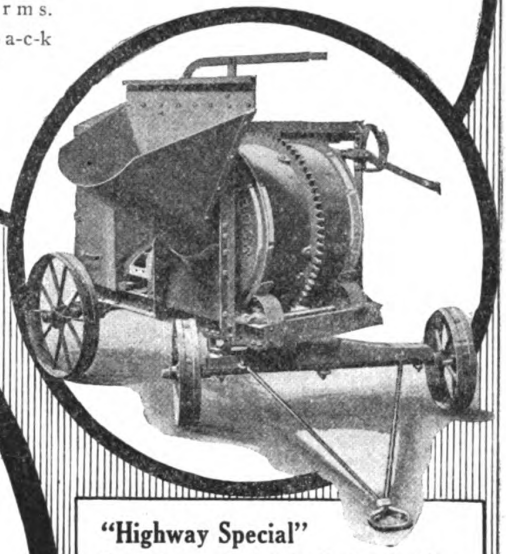

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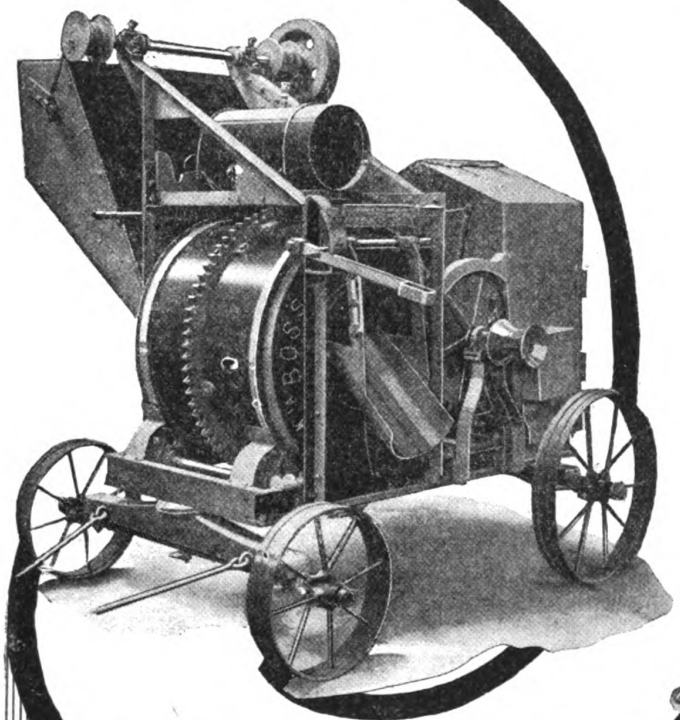

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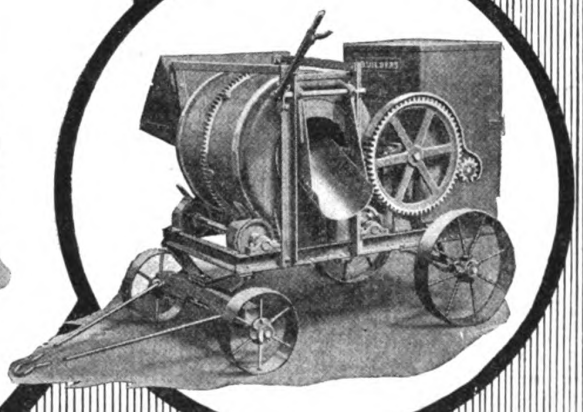

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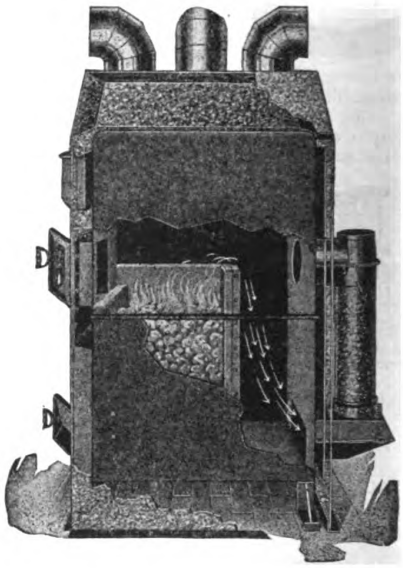

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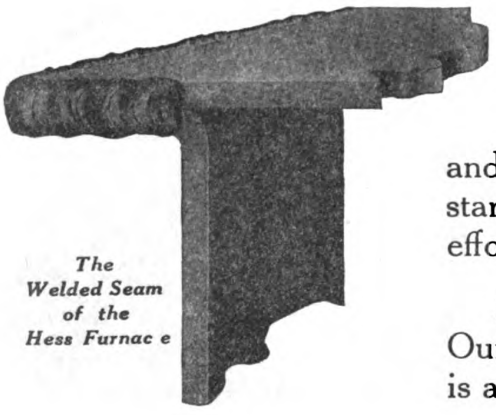

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Duplex Limited Specifications

Capacity—Normal Load 3000 lbs. Maximum allowable weight including body 5000 lbs.

Speed—5 to 30 miles per hour on high speed. The Duplex *Limited* will attain and *hold* a speed of 25 miles per hour with a full load, and *normal engine speed.*

Motor—4 Cylinder enclosed type, water cooled. Cast enbloc. Bore 4-inch, Stroke 5¼-inch, 3 Point Suspension.

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Cooling—Special Duplex design Radiator with cast tanks and finned head. Spirex core. 18-inch fan driven by 2-inch leather belt. Centrifugal water pump.

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Wheels—Heavy Artillery type—12 spokes 1¾-inch square.

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Wheelbase—145 inches.

Equipment—Windshield; Electric starting and lighting; Ammeter; Boyce Motometer; Speedometer; Electric Horn; Tools; Jack; Rim wrench. Front fenders; Alemite High Pressure Lubricating System; Driver's seat without extra charge. (Power tire pump at extra charge.)

Duplex Four-Wheel Drive

3½ Ton Capacity

America's Leading Heavy Duty Truck

The Duplex Limited

A Wonderful, Medium Capacity, High Speed Truck That is Establishing Remarkable Operating Records

* * * * *

Pneumatic Tired—Full Electric Equipment—Speed 5 to 30 Miles per Hour on High with Full Load—Here is a Speed Truck That Can Really Stand Speed Work.

* * * * *

THE need of the day is quick, sure, economical transportation. Goods must be *kept moving.* The fastest truck is the most economical truck, of course. But speed must be coupled with mechanical ruggedness.

The difficulty that users of medium capacity trucks have had to face is the fact that the general run of speed trucks couldn't stand steady work. They racked and strained themselves to pieces too quickly.

The Duplex Limited was developed specifically to meet this need. As the result of our years of experience in originating and building the Duplex 4-Wheel Drive *Heavy Duty* truck we knew how to build trucks that *last.*

The Duplex Limited is today probably the smoothest running truck on the roads. Loaded to capacity it travels along easily and steadily and *without strain.* Its motor is so large, so powerful that maximum road speed is obtained with the motor turning over only at *moderate speed.*

The Limited was designed deliberately for *speed.* It was *designed for* pneumatic tires—and not merely equipped with them. No excessive vibration or shock or strain. It works *easily* and therefore wears *longer.*

It was designed and is built to work—not to travel empty. And it stays on the road—not in the repair shop. It is strong and rugged and safe for *speed* work as the famous Duplex 4-Wheel Drive is for heavy work.

The way it handles; its strength and ruggedness; its ability to keep going without tinkering—these are the reasons why the Duplex Limited is all over America meeting with a wonderful success.

Write us for folders which give mechanical details—and show its mechanical superiority. Ask your Duplex dealer to demonstrate the Limited. You'll get a new idea of motor truck value.

DUPLEX FOR BUSINESS

Duplex Truck Company

Lansing • Michigan

One of the Oldest and Most Successful Truck Companies in America

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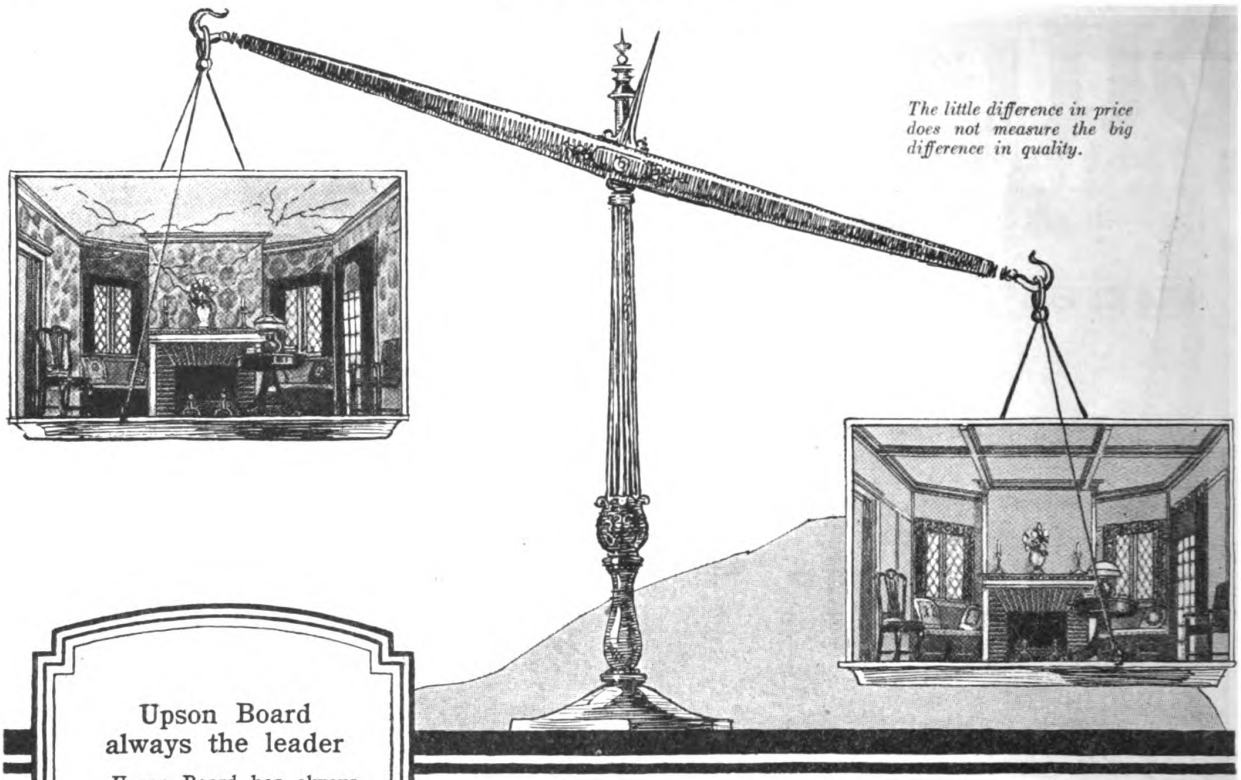

The little difference in price does not measure the big difference in quality.

Upson Board always the leader

Upson Board has always blazed the trail in the Wall Board world.

In Upson Board *first* has been incorporated practically every improvement that has been made in wall board during the past seven years.

It was the *first* board to be made hard and stiff like lumber.

The *first* board to be made four-ply—

The first board to be waterproofed—

The *first* to be kiln-cured—

The *first* to be surface filled—

The *first* to have directions printed on the back.

And today it is still the one board scientifically processed.

It is nearly twice as strong and stiff as the ordinary board.

Write today for samples and literature.

UPSON PROCESSED BOARD

In every way the merits of Upson Board outweigh those of cracking, falling plaster

The outstanding fact that Upson Board is five times stronger than cracking, falling plaster is alone sufficient proof of its superiority.

By official test Upson Board requires nearly four hundred pounds pressure to the square inch to break it, whereas plaster breaks at sixty to seventy pounds.

Your own experience with plaster will tell you that it cracks and falls—that its average life is only nine years!

When you expend energy and use every precaution to do a good job, all the pleasure of your effort is often lost by the plaster cracking even before the building is ready for occupation.

Why then divert business and profits to some plaster contractor when you can line the walls and ceilings of every job yourself and do it more economically and satisfactorily with dependable Upson Board?

Your men will like to work with Upson Board, because it is nearly twice as strong, stiff and woodlike as other boards.

In new construction or on remodeling jobs Upson Board can be applied quickly and permanently without the ever-present and irritating muss and inconvenience of plastering.

Knowing that Upson Board is superior to plaster in every way—why then hesitate to recommend and use it?

Insist on genuine *Blue*-Center Upson Board. Beware of imitations made to look like Upson Board but lacking Upson Board's inbuilt qualities.

The Upson Co., 68 Upson Point, Lockport, N. Y.

UPSON-BOARD PROCESSED

THE DEPENDABLE BOARD WITH THE FAMOUS BLUE CENTER

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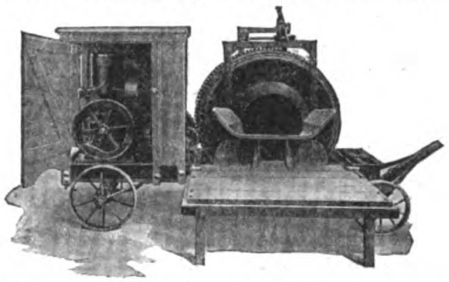
Fiberlic Wall Board

The *material* from which it is made, the fact that the pulp is *chemically cleansed* and that the *fibre lengths* give the finished product that *natural reinforcement* that is lacking in ground wood boards, is in itself a guarantee of the superiority of Fiberlic for *strong, permanent, economical* and *sanitary construction.*

MacAndrews & Forbes Company
200 Fifth Avenue, New York City
Factory: Camden, N. J.

"THE STANDARD"

Low Charging Concrete Mixers



Increase Production—Cut Costs

Speed and thorough mixing are the most important points to be considered when you are in the market for a concrete mixer. The faster you can place thoroughly mixed concrete, the more money you will make on the job.
"The Standard" Concrete Mixer is adapted to every sort of a building project.
In addition to Concrete Mixers, "The Standard" line includes Hoists, Pumps, Air Compressors, Wheelbarrows, Engines, Block Machines—everything needed by the contractor.

Ask for Catalog No. **48** *and specify the particular items in which you are interested.*

The Standard Scale & Supply Co.

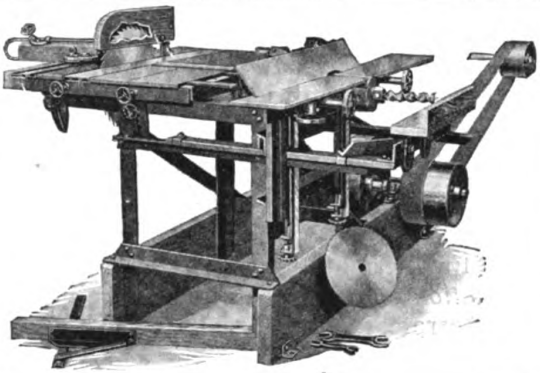
Pittsburgh	New York	Chicago
1631 Liberty Ave.	145 Chambers St.	163-171 N. May St.
Philadelphia	Cleveland	Baltimore
523 Arch St.	1547 Columbus Rd.	400 N. Gay St.

How a Parks pays for itself

"I can turn out in one hour by this machine what it takes six hours to do by hand," writes H. W. Wheat, 78 Wall St., Corning, N. Y.

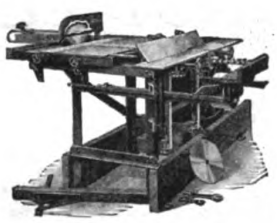
A Parks machine is a man-saver. No one in business these days can make the success he should of it unless he takes advantage of labor-saving devices. The hand carpenter, like the hand cobbler, are being forced out.

For greatest service and economy get a Parks. It offers ease of adjustment, speed in running, uninterrupted operation—no breakdowns. The cost of operation is insignificant. Its lightness makes it easily portable to and from the job. The angle steel frame, double riveted, almost vibrationless, gives maximum strength with least weight.



The Standard Rip, and Cross Cut Saw, 6 in. Jointed, 12 in. Sand Drum and Boring Machine. Weight 575 lbs., floor space 4 ft. 4 in. x 5 ft. 6 in.—pulley to belt to 10x4 in. face, right and loose; speed 550 R.P.M.; power 2-4 H.P. Complete, $150.00.

Write for catalog and full information. Ten-day free trial — 10-year guarantee.



THE PARKS BALL BEARING MACHINE CO.
Station A CINCINNATI, OHIO
Chicago Office and Show Room, 617 Machinery Hall

WOODWORKING **PARKS** MACHINES

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Reduce Your Bids by Reducing Your Costs On Workmen's Compensation Insurance

IF you would be interested in obtaining compensation protection *at cost*—

And in carrying a form of policy which has regularly returned 30 per cent of the annual premiums—

Which includes an Accident Prevention Service that has reduced the insurance *rates* of its policyholders 20 to 50 per cent—

Then you will be interested in investigating the advantages of the Liberty Mutual Insurance Company.

* * *

The Liberty Mutual is a cooperative organization of over 4000 of the biggest and best-rated contracting, public-utility, and commercial concerns in the United States.

It is managed by a board of directors elected from these associated concerns. All details of its actual insurance work are handled by expert insurance men, of long experience in compensation protection.

The Liberty Mutual furnishes compensation protection to its members *at cost,* paying back its profits each year.

It has already paid back, in cash dividends, *over* $3,000,000, averaging 30 per cent of its yearly premiums.

Furthermore, through *accident-prevention work,* it has reduced the insurance rates of many of its policyholders to 50 per cent.

Here is one typical instance—the experience of a—

NEW ENGLAND CONTRACTOR
RATE REDUCED 33.2%

1916, accidents on jobs reduced 22%
1917, accidents on jobs reduced 54%
1918, accidents on jobs reduced 66%

In *addition* to this 33.2 per cent rate reduction, the contractor received a *cash dividend* of 30 per cent of his premium. His insurance cost is now less than half what many other contractors are paying to stock companies that have stockholders' profits and agents' commissions to pay.

This accident-prevention service often effects, through reduced time-loss, a dollars-and-cents saving that exceeds the cost of the insurance.

* * *

Many prominent contractors are Liberty Mutual policyholders—such concerns as Fred T. Ley & Company, Inc.; Norcross Brothers; Roydhouse Arey Company; Hugh Nawn Contracting Co.; McClintock-Marshall Co.

It will pay you to investigate *why* they buy their compensation protection in this strong New England Company.



STRONG
LIBERTY MUTUAL
Established 1912
INSURANCE COMPANY
HOME OFFICE · BOSTON

District Offices: NEW YORK 30 East 42nd St. · RICHMOND Mutual Bldg. · PHILADELPHIA 20 South 15th St. · CHICAGO 220 South State St.

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WORKMEN'S COMPENSATION, PUBLIC LIABILITY, AND AUTOMOBILE INSURANCE

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The marvelous color effects obtained with Ambler Asbestos Shingles increase the value of the house

In considering the great *durability* and the *fire-resisting* qualities of Ambler Asbestos Shingles do not overlook the commercial value of the *color* schemes they permit.

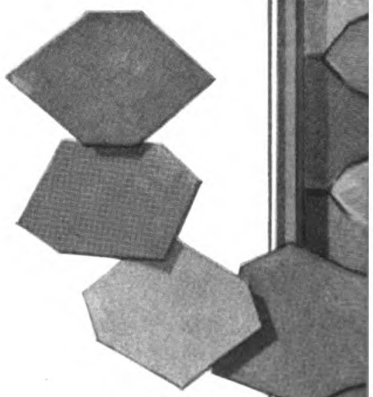
AMBLER ASBESTOS
BUILDING PRODUCTS

Ambler Asbestos Shingles are made in four non-fadeable tones, Newport grey, natural slate, red and green—the only green shingle that will not fade.

Many houses require color on the roof as a finishing touch. It is just that dash of color which gives the house character—which makes the favorable impression, which makes the house *command a better price.*

Ambler Asbestos Shingles are made from a scientifically accurate mixture of the best Portland cement obtainable and strong asbestos fiber. It is this combination of indestructible materials that gives to Ambler Asbestos Shingles their fire-resisting qualities and remarkable durability.

All architects and builders will be interested in seeing samples of the new shingle of everlasting green.



Send for samples showing color and construction

Asbestos Shingle, Slate and Sheathing Company
Ambler, Pa.

Factors: **KEASBEY & MATTISON COMPANY, AMBLER, PA.**
Branch Offices: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Minneapolis, New York, Philadelphia, Pittsburgh and Washington

Manufacturers of: Ambler Linabestos Wallboard, Ambler Asbestos Building Lumber, Ambler Asbestos (Century Brand) Shingles, Ambler Asbestos Corrugated Roofing and Siding, 85% Magnesia and Asbestos Pipe and Boiler Covering, Asbestos Textiles.

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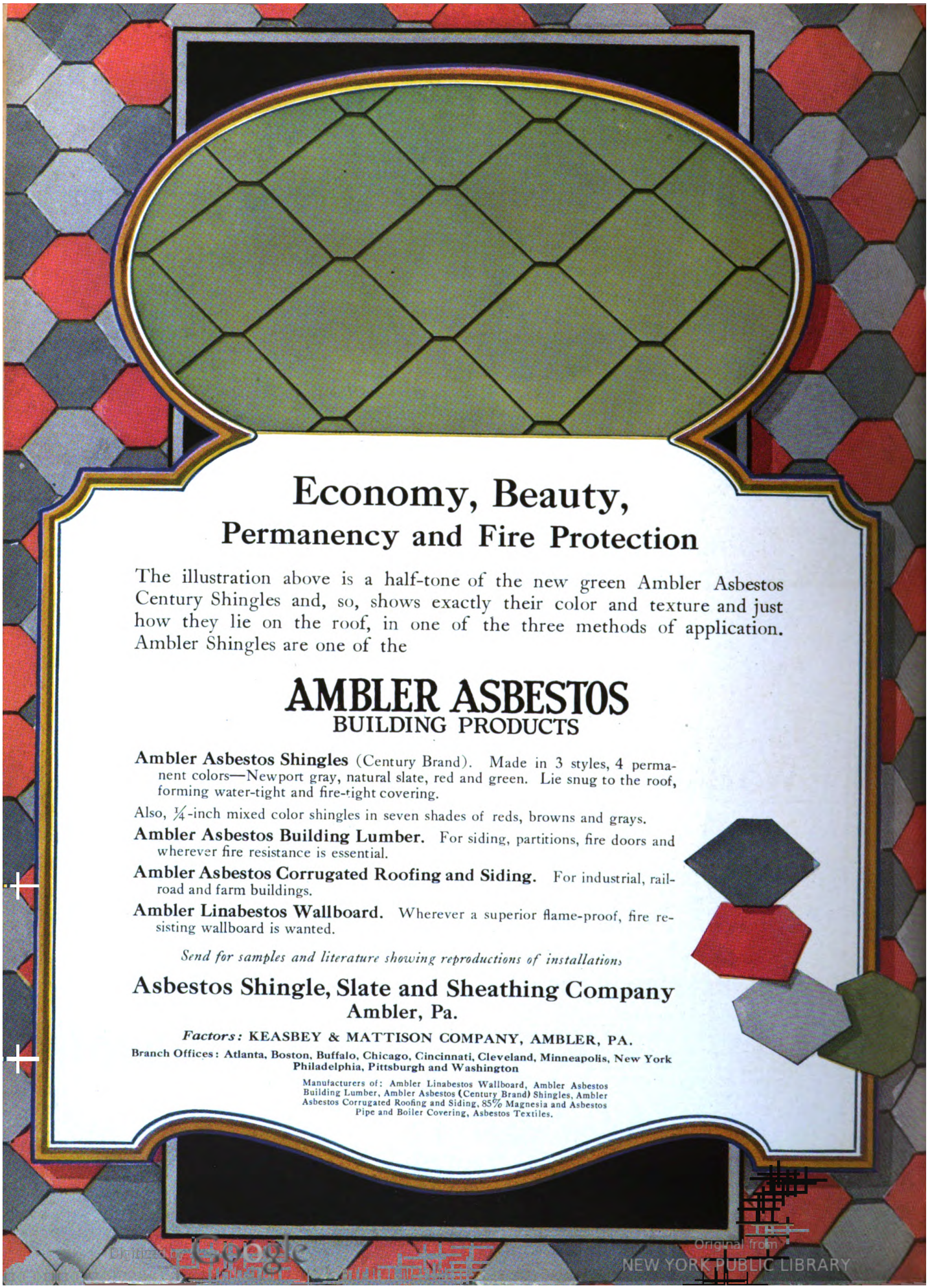

Economy, Beauty,
Permanency and Fire Protection

The illustration above is a half-tone of the new green Ambler Asbestos Century Shingles and, so, shows exactly their color and texture and just how they lie on the roof, in one of the three methods of application. Ambler Shingles are one of the

AMBLER ASBESTOS
BUILDING PRODUCTS

Ambler Asbestos Shingles (Century Brand). Made in 3 styles, 4 permanent colors—Newport gray, natural slate, red and green. Lie snug to the roof, forming water-tight and fire-tight covering.

Also, ¼-inch mixed color shingles in seven shades of reds, browns and grays.

Ambler Asbestos Building Lumber. For siding, partitions, fire doors and wherever fire resistance is essential.

Ambler Asbestos Corrugated Roofing and Siding. For industrial, railroad and farm buildings.

Ambler Linabestos Wallboard. Wherever a superior flame-proof, fire resisting wallboard is wanted.

Send for samples and literature showing reproductions of installations

Asbestos Shingle, Slate and Sheathing Company
Ambler, Pa.

Factors: KEASBEY & MATTISON COMPANY, AMBLER, PA.

Branch Offices: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Minneapolis, New York Philadelphia, Pittsburgh and Washington

Manufacturers of: Ambler Linabestos Wallboard, Ambler Asbestos Building Lumber, Ambler Asbestos (Century Brand) Shingles, Ambler Asbestos Corrugated Roofing and Siding, 85% Magnesia and Asbestos Pipe and Boiler Covering, Asbestos Textiles.

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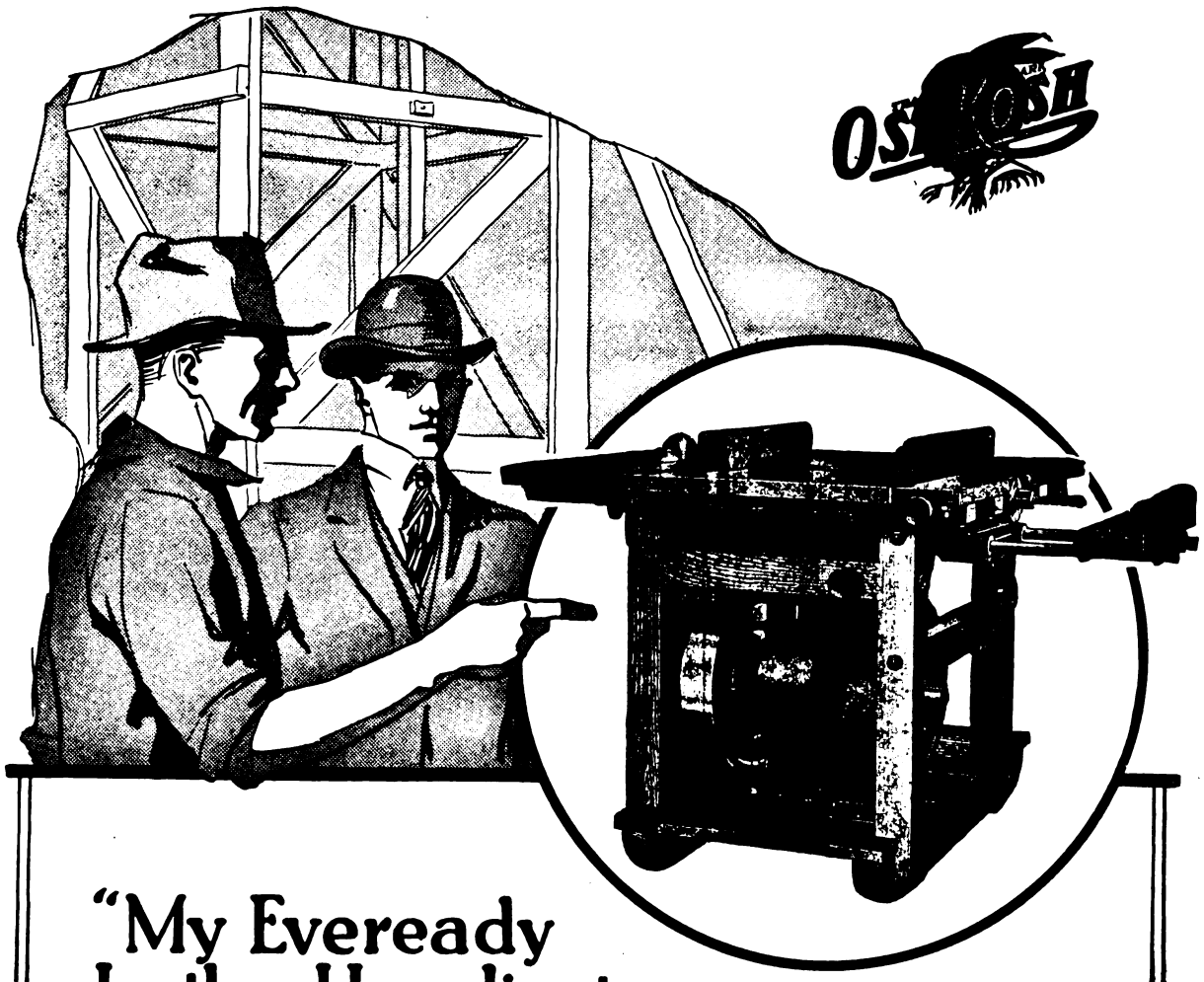

"My Eveready Is the Handiest Worker on Every Job!"

That's what one contractor writes us. He says, "I take my Eveready Saw Rig right out to the job with me. It does away with all hand sawing. Saves a lot of time and labor.

And say—that Oshkosh Saw Rig outfit is a *skilled* workman, too. Performs eleven different woodworking operations, and every one of them as well as a good carpenter. But a darned sight faster.

JOINTS
BORES
MITRES
BEVELS
RABBETS
GRINDS
RIP-SAWS
CROSS CUTS
TENONS
SANDS
BAND SAWS

Never any labor troubles with an Eveready. No extra pay for overtime—no raise in wages—no loafing on the job. It's the best worker I have."

The Oshkosh Eveready Saw Rig is a compact, portable planing mill; occupies a space of 5 feet square. Powered by dependable gasoline engine, or electric motor. 3,500 now in use.

Write for our "Book of Evidence." It tells all about the Eveready and what it can do.

OSHKOSH MFG. CO.

803 BUCK ST., OSHKOSH, WIS.

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Just the Shade You Want

You watch your painter, as he stirs the color into his bucket of Dutch Boy White-Lead and Dutch Boy Flatting Oil.

It does not take him long to produce the exact tint of any color, which you require for the proper working out of your decorative scheme.

Dull Finish

Other advantages of this standard, reliable paint are washability, durability, and a soft, lustreless finish.

Economy

Brushes out easily, saving labor cost, and covers—by actual test—25 to 50% more surface than inferior paints.

Send for descriptive booklet

NATIONAL LEAD COMPANY

New York Boston Buffalo Chicago
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JOHN T. LEWIS & BROS.,
Philadelphia

NATIONAL LEAD & OIL CO.,
Pittsburgh



Save the surface and you save all: to save the surface, White-Lead it.

Dutch Boy Flatting Oil and White-Lead

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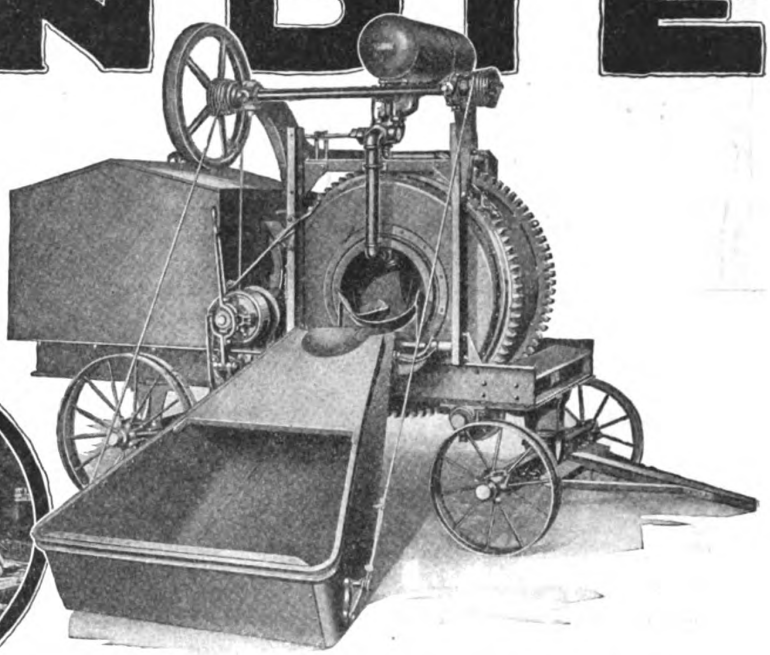
DANDIE

The Big Value
KOEHRING-BUILT
Light Mixer





Sizes 4 and 7 cubic feet mixed concrete. May be equipped with low charging platform, charging skip or batch hopper, automatic water measuring tank and light duty hoist.

The Lowest Price You Can Afford to Pay

THERE are lighter mixers than the Dandie. There are cheaper mixers than the Dandie.

But the Dandie is as light as a ***good*** mixer should be built. And its price is the lowest for which such a mixer can be sold.

The Dandie is made by the largest makers of heavy duty mixers in America. Every economy of automatic machinery, standardized processes, and quantity production is reflected in its price.

In it is incorporated many of the features of the Koehring heavy duty mixers. It has the famous Koehring re-mixing action —the double gear drum drive—drum rollers keyed to shafts turning in big bearings.

Its cost is the ***lowest price you can afford to pay!*** It is not the cheapest mixer, but the reliable, money-making, long-service light mixer, at the extremely reasonable price which makes it the ***big value*** buy in the ***light mixer*** field.

KOEHRING MACHINE COMPANY

MILWAUKEE, WISCONSIN

MAIL COUPON TODAY ☛

Send back the coupon for the Dandie catalog. You do not obligate yourself in any way—it brings you money-making information about the money-making light mixer.

KOEHRING MACHINE CO.
Milwaukee, Wisconsin

Please send me Dandie Catalog No. D-3

Name.....

Address.....

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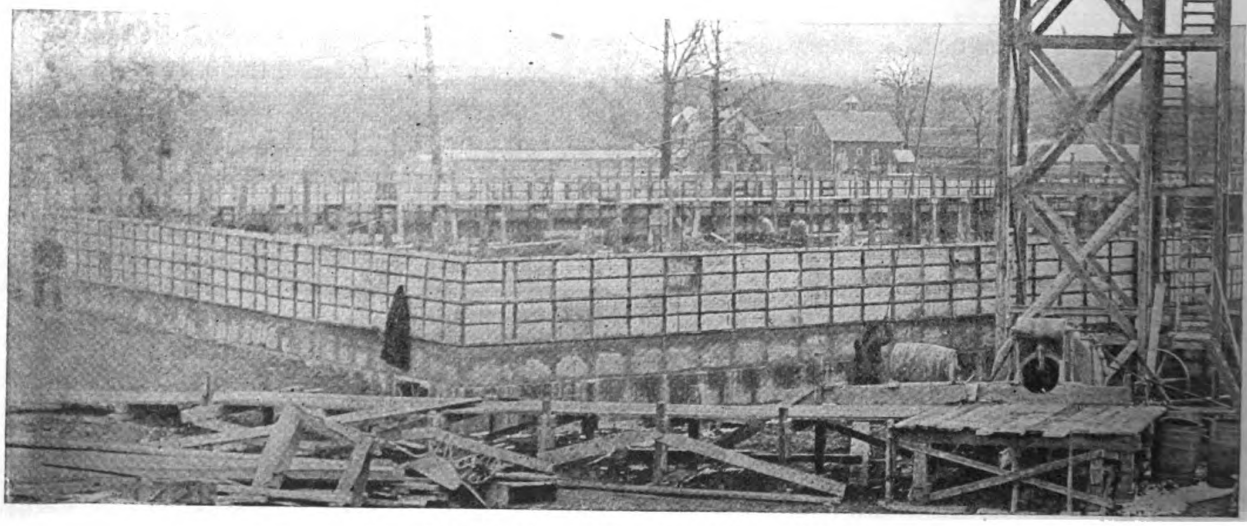
Meta

—a remarkably simple, practical application of common-sense principles in the interest of speedier, better, less costly concrete construction—

Metaform Methods



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form

NOW, as never before, you need Metaforms.

Form lumber costs top prices. **Metaforms** replace lumber—and eliminate all wastage.

Labor commands high wages—and even at highest wages, labor is hard to secure. **Metaforms** effect substantial payroll economies; not only in the number of workers, but in the class of labor.

Never before has the country needed such extensive construction. **Metaforms** speed up construction greatly. Also, they turn out better finished, more uniform concrete work.

Metaforms are standardized, interlocking, everlasting steel forms for concrete construction. Their extraordinary simplicity and adaptability make them equally profitable on the largest industrial construction and the smallest foundation work. And Metaform usefulness extends to other fields—Metaform circular equipment solves completely every difficulty in the building of grain elevators, storage tanks, chimneys, silos, and other circular structures.

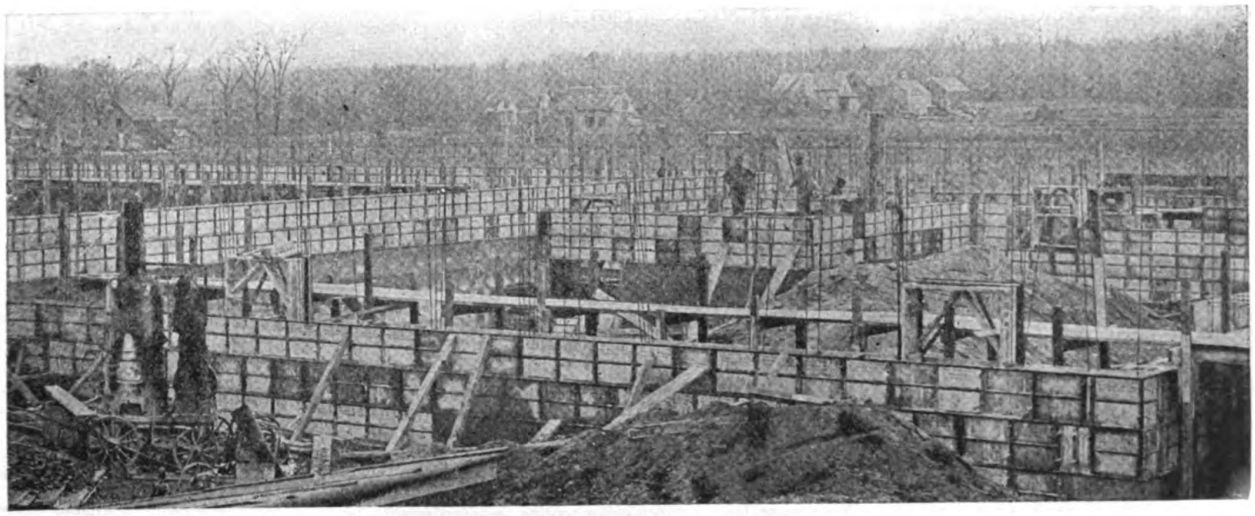
The Metaform books should be in the hands of every contractor and every construction engineer. They will be mailed free on request.



Metal Forms Corporation

Manufacturers of the original Reichert Metal Molds

1436 Booth Street Milwaukee, Wis.



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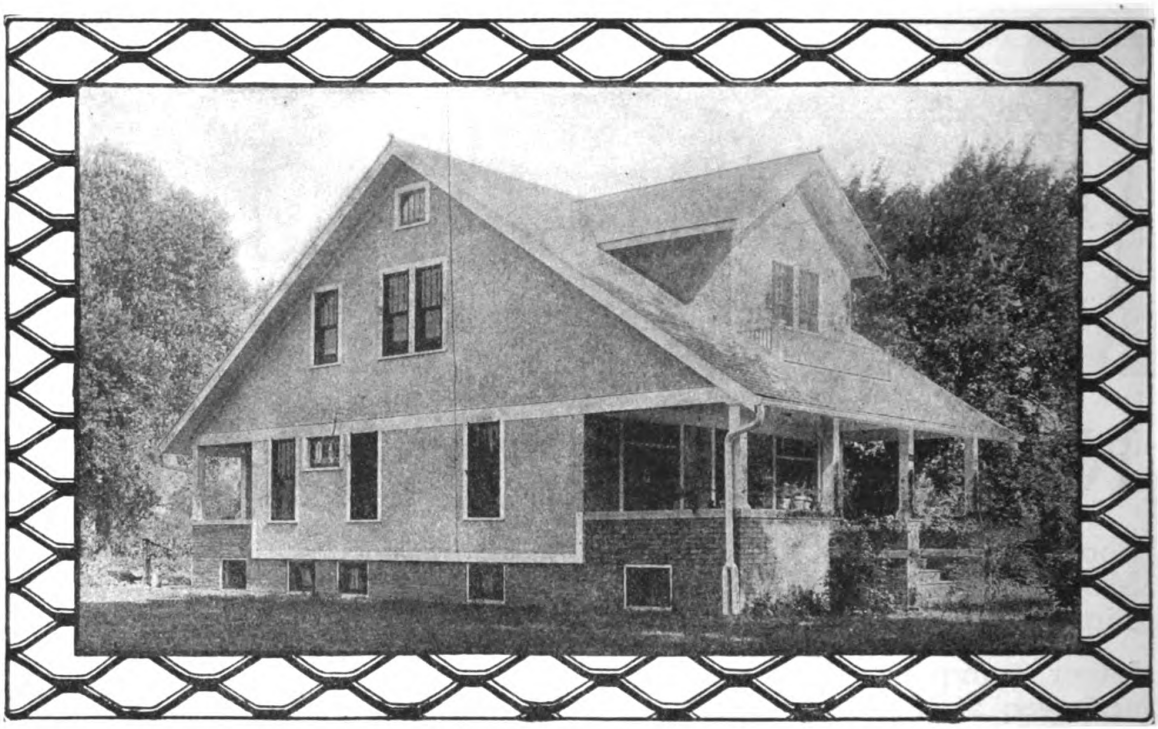

Fire-Safe Construction—*Quickly*

Use Kno-Burn Metal Lath as a base for your stucco, interior plaster, also for fireproofing steel. It means not only fire-safe but also quick construction.

Owners appreciate the security of stucco on metal lath—the strength—the fire-resisting qualities. Houses built in this way sell better.

Look at the "Reasons Why" for Kno-Burn Metal Lath. It is easily and quickly handled and *helps to speed up work.*

Metal lath as a base for stucco and plaster represents one of the most economical forms of fire-resisting construction.

Write for samples and free book, "Fireproof Construction," containing valuable data on the use of Kno-Burn and other Nemco products. Nemco products are carried in stock by most building material dealers.

The North Western Expanded Metal Co.

904 OLD COLONY BUILDING
CHICAGO, ILLINOIS

New York Los Angeles Boston

Why Builders Use *Kno-Burn* Metal Lath

A material that can be easily handled, cut or shaped.
Rigidity with a minimum amount of steel.
As small a mesh as will permit a perfect "key."
A mesh so shaped that it will imbed in the plaster.
A size of sheet that can be easily applied.
A mesh that will require a minimum of plaster.

North Western Expanded Metal Company

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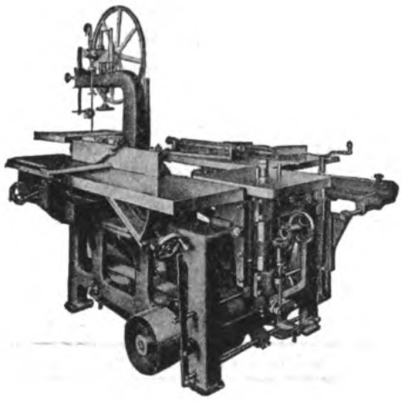
The Famous "31" Universal Woodworker

Not only sash, frames and other essentials to rapid and economical building progress may be turned out with the Famous Woodworking Machines, but a number of special millwork jobs as well. Famous Woodworkers save their cost many times over each season to the thousands of up-to-date builders and contractors using them.

Our interesting booklet on Woodworking Machinery is mailed on request. Write for your copy today.



The Sidney Machine Tool Co.
Sidney, O.

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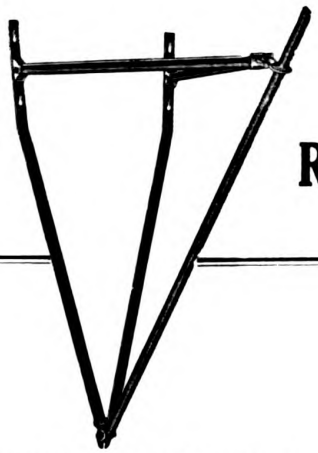
RELIABLE BRACKETS



FOR WALLS ROOFING, CHIMNEYS

No matter what part of a building it is, you can always use Reliable brackets. There's another important advantage, too, in that you can entrust your heaviest load to them without fear that they will fail, or even wabble.

Attached in a moment, Reliable brackets are firm and rigid, ready to support the heaviest load. They do not deface the surface of the building as is often the case with ordinary brackets.

Reliable brackets save their cost on the first job. Try them. They're a revelation.

Elite Manufacturing Co.
Ashland, Ohio

YOUR CUSTOMER WANTS
TIN PLATE OF KNOWN QUALITY
IN HIS ROOF

HE knows a roof does either of two things,—it merely *covers* or it absolutely *protects* his property investment.

Anonymous material does not assure him of full value of his dollars. Whitaker I. C. Old Style roofing plate does.

WHITAKER-GLESSNER COMPANY
WHEELING CORRUGATING DEPARTMENT
WHEELING, W. VA.

New York Chicago Philadelphia Chattanooga
Kansas City Minneapolis St. Louis Richmond



NAME, WEIGHT AND COATING STAMPED ON EVERY SHEET

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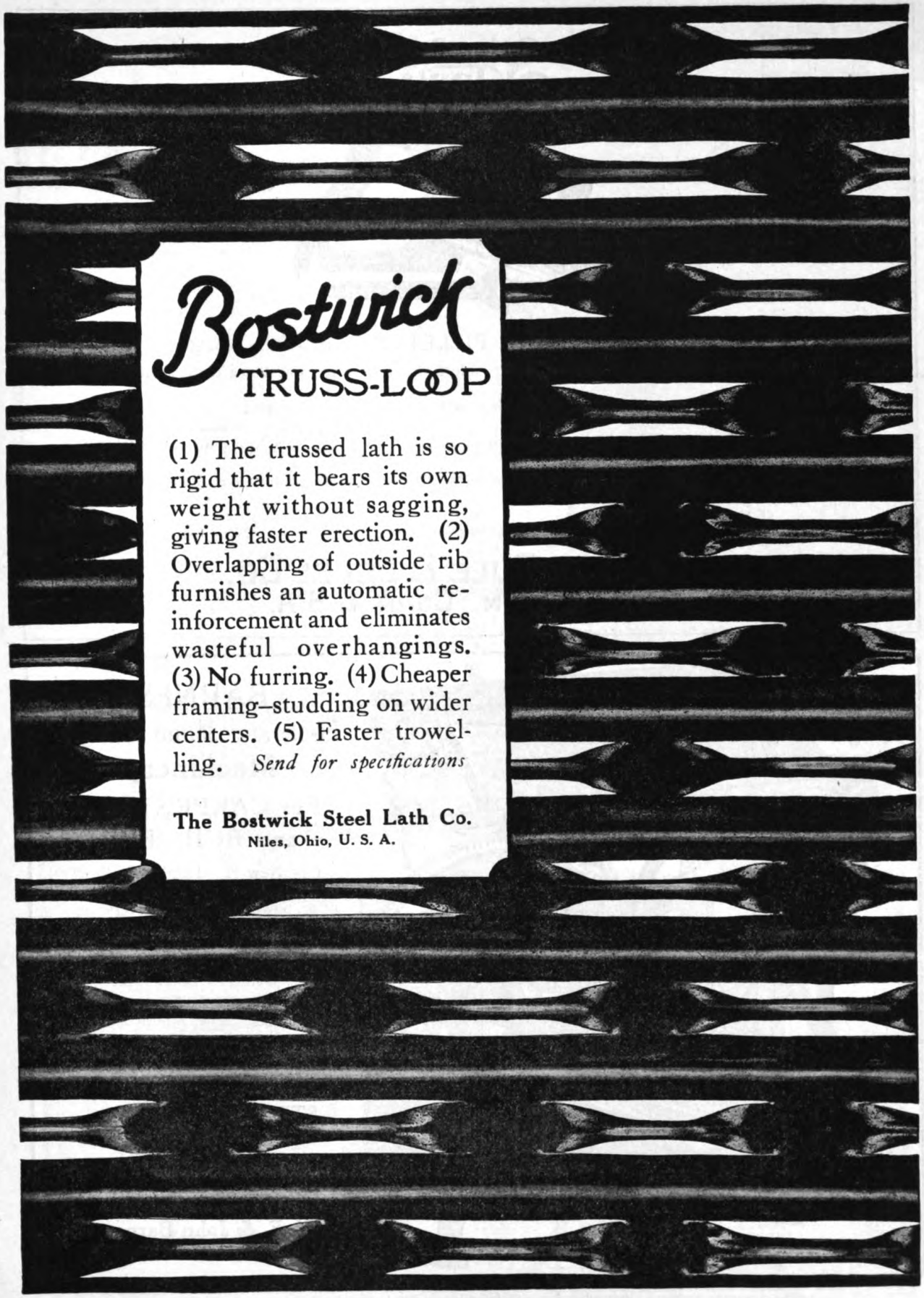

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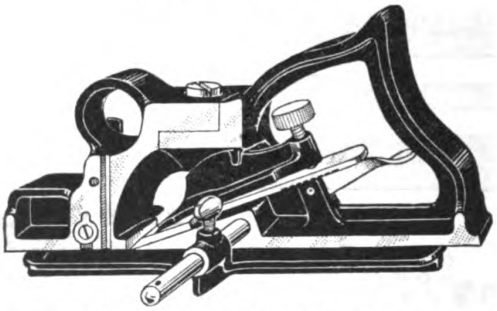
Stanley Tools



STANLEY RABBET AND FILLETSTER PLANE No. 278

This plane will lie perfectly flat on either side and has an adjustable fence for regulating width of cut.

It is fitted with two spurs, one on each side, for working across the grain—also an adjustable depth gauge.

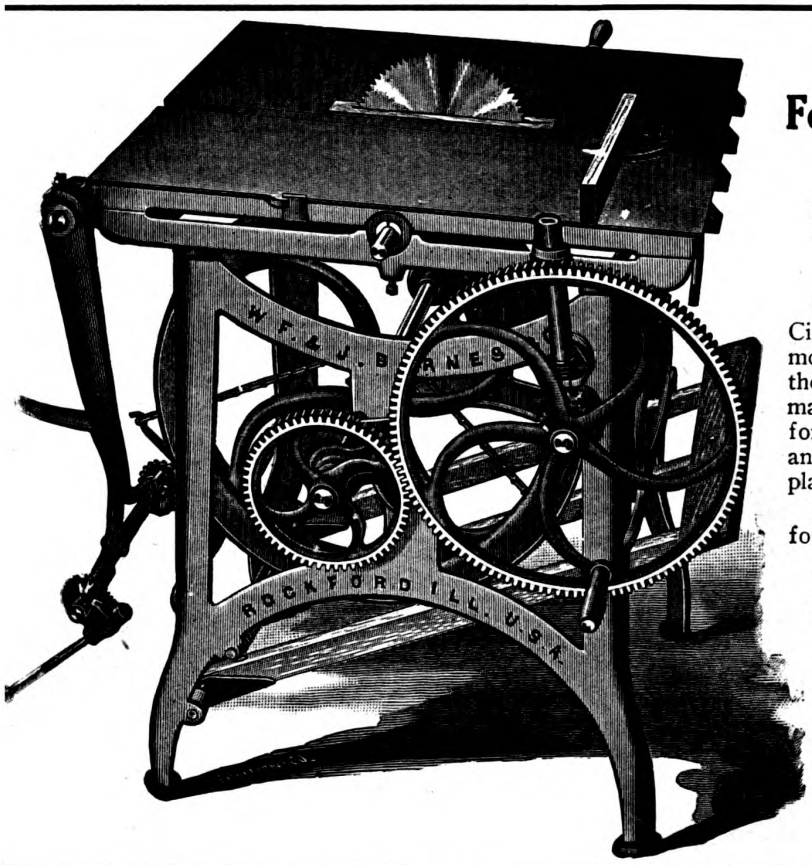
As both the fence and the depth gauge can be attached to either side, the plane is suitable for either right or left hand work.

The front part of the plane can be easily detached, thus providing a bull nose plane for working close up into corners or other difficult places.

The cutter is adjustable endwise.

Manufactured by

STANLEY RULE & LEVEL CO.
NEW BRITAIN, CONN. U.S.A.



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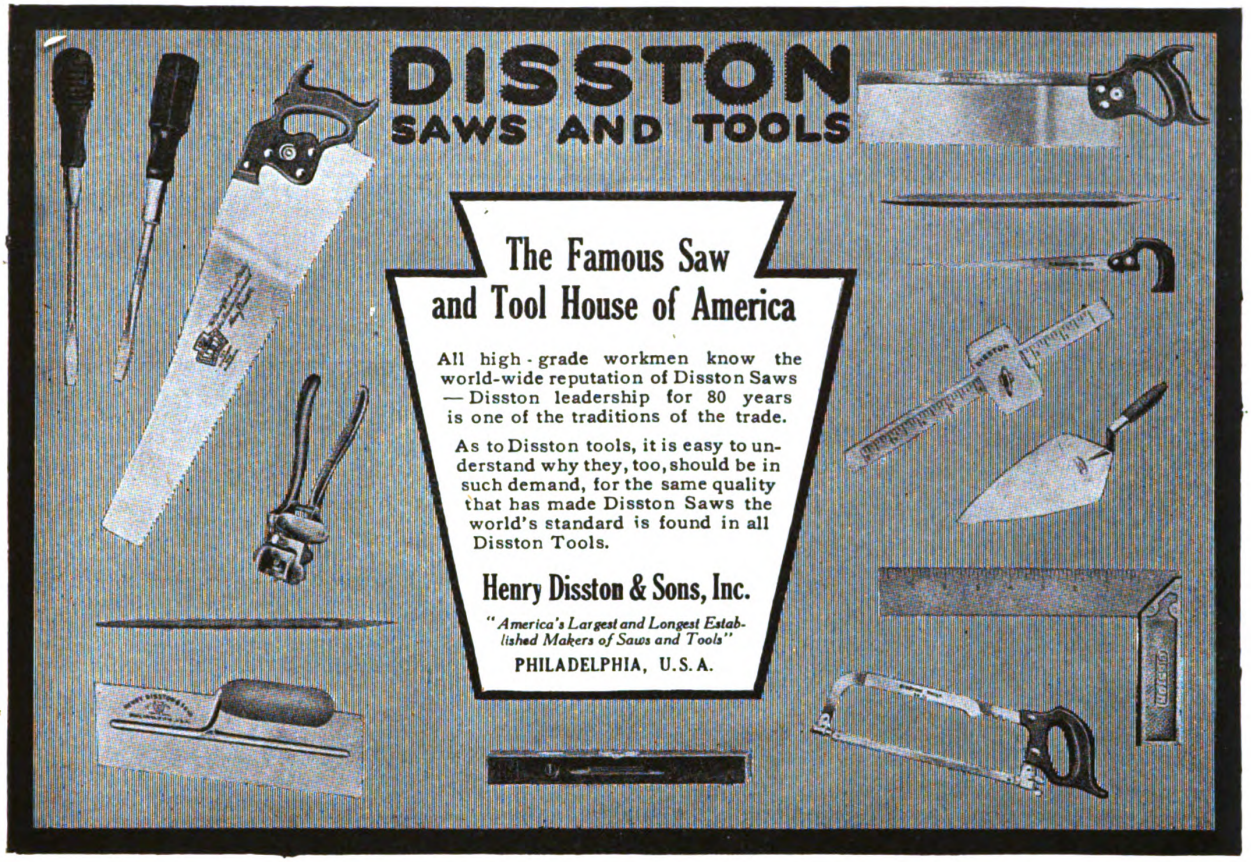

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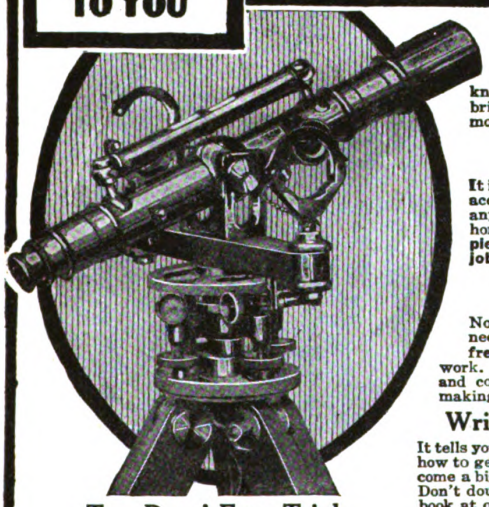

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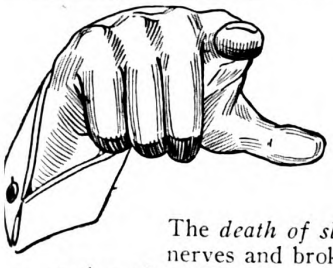

You can't be wide awake during the day unless you can be sound asleep during the night

The *death of sleep* which omniscient nature provides for the rejuvenating of your fatigued nerves and broken muscles at the close of each day, cannot result in the foreordained resurrection of mind and body at each sunrise—unless you sleep in fresh air.

An abundance of oxygen is one of the conditions necessary to make your restoration complete.

To get Oxygen, you must have fresh air

The simplest, most satisfactory, and most convenient means of having just the right amount of fresh air in your sleeping rooms or porches, under all weather conditions, is to equip your home with

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Multifold Casement Window Hardware

Enables you to have all the fresh air you want, without direct drafts—without unsightly architectural effects—without cracks between closed sash—without mullions in the open window—without restrictions as to size of window opening—without danger of wind slamming sash when open—without possibility of storm and cold entering closed windows.

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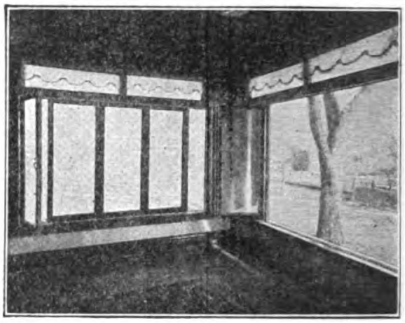
Illustrated booklet NC-2 will be sent without obligation to anyone interested



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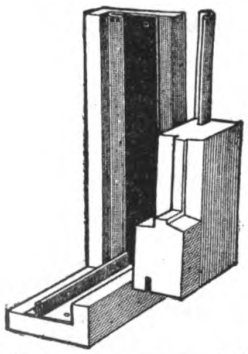

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$5000 per year clear profits, or more, can be made in handling Diamond Metal Weather Strips and Calking Compound.

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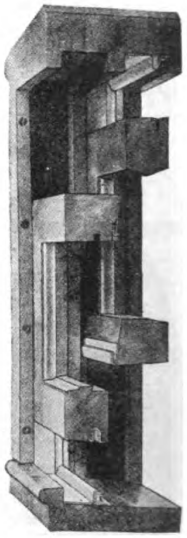

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THE DIAMOND METAL WEATHER STRIP CO.

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In this self-contained unit eighteen high-grade woodworking machines are combined, and so arranged that four men can work at it at one time without interference. Portable enough to be used by building contractors "on the job," it is also strong enough to be a profitable, permanent feature of the small woodworking plant. You can have it with gasoline engine or electric motor built in, or arranged for belt drive.

Read about it in Bulletin 77. Ask also for Catalog 20 describing the complete "American" line of Saw Mill and Woodworking Machinery

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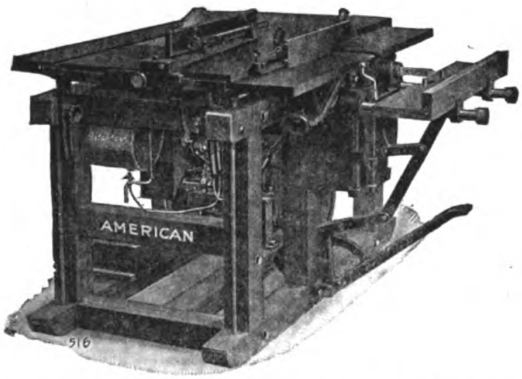

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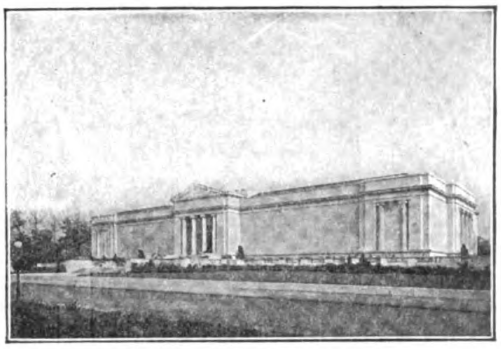

Cleveland Museum of Art, Wade Park, Cleveland, O.
Hubbell & Benes, Architects
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WATERPROOF THROUGHOUT

THAT is a very desirable thing to be able to say about any structure. It can be said with absolute certainty, however, when "R.I.W." Protective Products are used.

These materials are made for every type of material used in building—whether it's steel, wood or concrete—and for equipment.

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were selected by the architects of the Cleveland Museum of Art.

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WINDOW-WALL increases health and comfort in the home by providing proper ventilation with absolute weather protection and privacy.

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Also Manufacturers of
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There are several ways you can use concrete to build a maintenance-free, permanent garage.

Our booklet "Concrete Block Garages" will show you one way. Write for a free copy.

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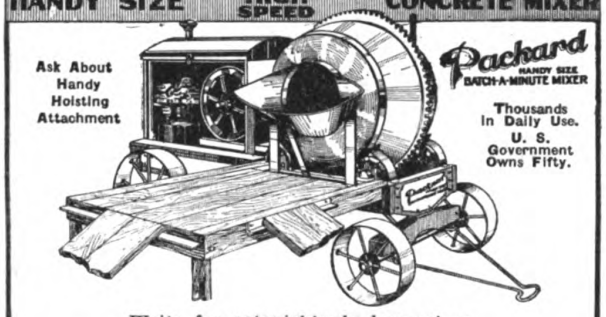

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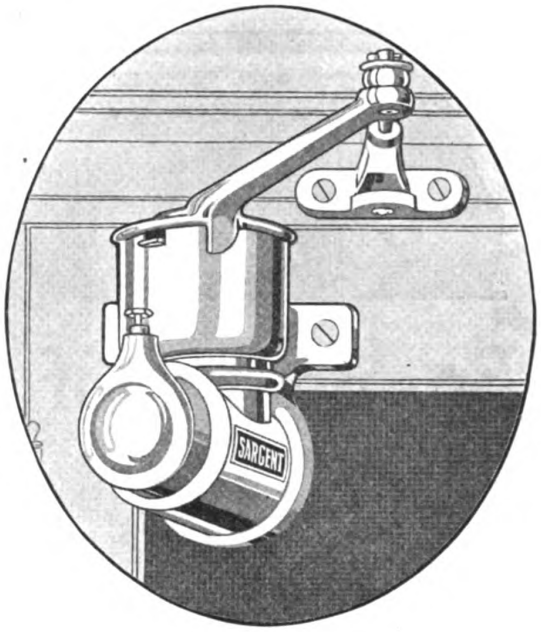

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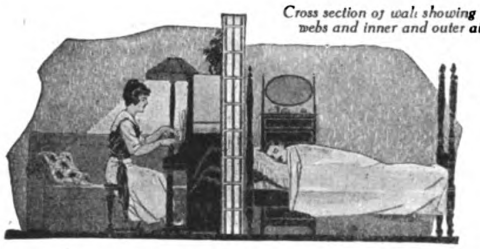

Cross section of wall showing the three webs and inner and outer air cells

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The piano banging in the next room or the romping youngsters upstairs have slim chance to disturb the man or family who live isolated from sound by the thoroughly modern construction of Natco in walls, partitions and floors.

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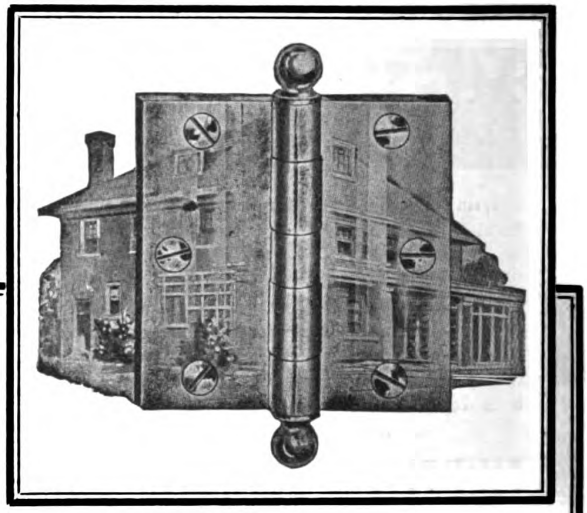

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ATTENTION!!

is called to the hinges on the door. To some people door hinges may seem rather small and unimportant—nevertheless, their mission in helping to make or mar the appearance of the rooms in a modern home is worthy of serious thought. The

GRIFFIN

"The Door Butt of America"

is designed along lines that insure both beauty to the home and *service* whenever the doors are opened and closed.

The Griffin operates freely and easily, it is amply strong for heavy doors and it is such a pleasing fixture that architects and home builders are glad to specify and use it.

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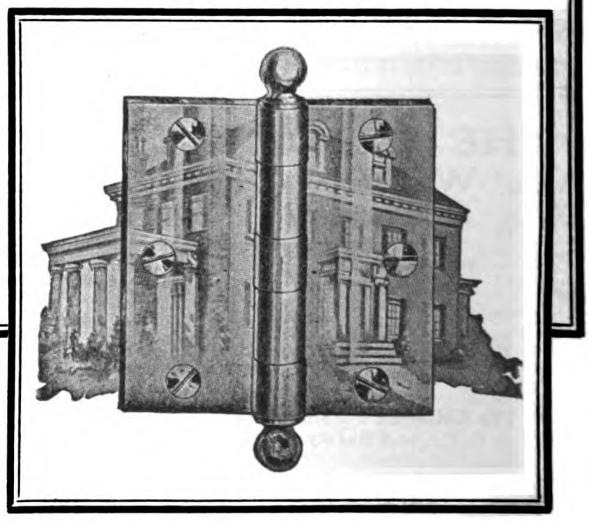

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Every Man at His Bench



No Man can do two things at the same time and do them both well — his production stops while he *walks* across the floor to the big power saw or jointer—but his pay goes on just the same.

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WHERE AND HOW TO SAVE MONEY

In knowing how to do things the quickest and cheapest way lies the secret of successful contracting. But one man's experience alone cannot cover the entire field—he must necessarily draw on the experience of others. The following list of books are those that a builder should own, for they put at his disposal the practical experience of thousands of other builders. Best look over the list and place at least a few on your book shelf.

Hick's Builders' Guide

This standard book has just been revised and brought thoroughly up to date by the addition of much new material. It authoritatively covers masonry, hollow tile, estimating, roof framing, etc. A section of the book is devoted to tables which save considerable time that otherwise would be spent in lengthy figuring. 360 pp., 5 x 6¾ in., 135 figs., cloth, $2.50.

Otter's Furniture for the Craftsman

Shows the design, construction and equipment of practically all articles used in furnishing and equipping modern homes. An invaluable help in meeting the demand for built-in features, for measurements and detail drawings are given. One of the chief objects of the book is to point out how to keep busy during dull months. 308 pp., 6 x 9 in., 297 figs., cloth, $2.50.

Cosgrove's Hollow Tile Construction

This is a reprint of the articles appearing in Building Age called "How to Build and Fireproof with Hollow Tile." Much new material has been added, especially in a section devoted to pictures and plans of houses built of hollow tile. The book covers hollow tile walls, floors, roofs, partitions, estimating, formwork, and in fact all that the builder may want to know about hollow tile construction. 256 pp., 4¾ x 7 in., 145 figs., 70 plates, flexible fabricoid, $2.50.

Crussel's Jobbing Work for the Carpenter

A book of deserved popularity, for it is full of short cuts that save time and material. Special attention is given to labor-saving tools and equipment which time has proved to be worth-while. The book shows how to match grains, prevent warping, cut dowel holes, build store counters, furniture, fences, etc. 273 pp., 6 x 9 in., cloth, $2.50.

William's Stair Builders' Guide

This book by a master stair builder explains clearly how to use the tangent method of the science in its present advanced stage. All types of stairs are explained in easily understandable fashion. The laying out of each working detail is carefully considered, being accompanied by such illustrations as will readily enable the explanation to be thoroughly understood. 256 pp., 6 x 9 in., 360 figs., cloth, $2.50.

McCullough's Practical Structural Design

A complete system for the design of beams, floors, girders, trusses, columns, walls, foundations, footings, etc. The big feature of the book is that no knowledge of algebra or higher mathemathics is necessary to understand the explanations, for all calculations, etc., are presented in the form of the ordinary arithmetic that every builder knows. A mastery of this book will enable any builder or architect to pass the structural examination for an architect's license. 320 pp., 6 x 9 in., cloth, $3.00.

Arthur's New Building Estimator

A reliable working guide for those who figure the cost of building, either in detail or approximately. It gives the actual time, labor and material required on all classes of residential and municipal work, the data being carefully checked by the author and other experts on thousands of jobs in all sections of the country. Special stress is laid on such items as may vary widely under different conditions, with the reasons therefore. The estimating of every operation is clearly explained, and is so arranged as to enable any point to be readily found. A valuable feature is the Wage Tables, enabling the builder to figure rates at a glance. 1200 pp., illustrated, leather, $6.00.

Portfolio of Building Designs

64 plates giving pictures, plans, elevations and details of 17 attractive houses. Eight of the plates are in color. In a handy portfolio, 9 x 12½ in., $1.00.

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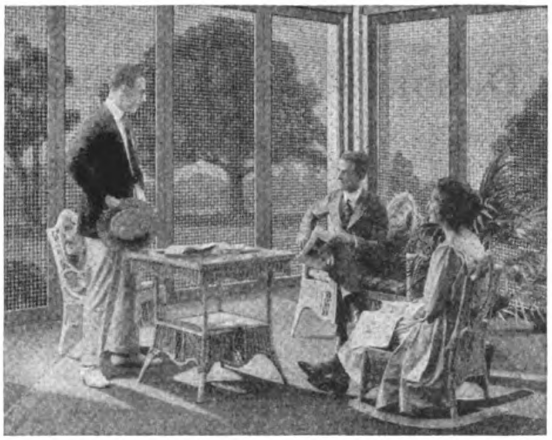

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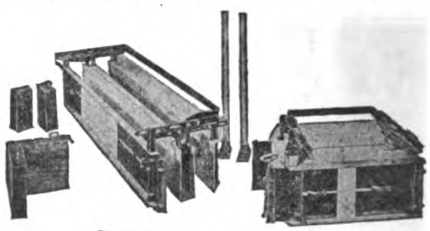

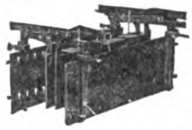

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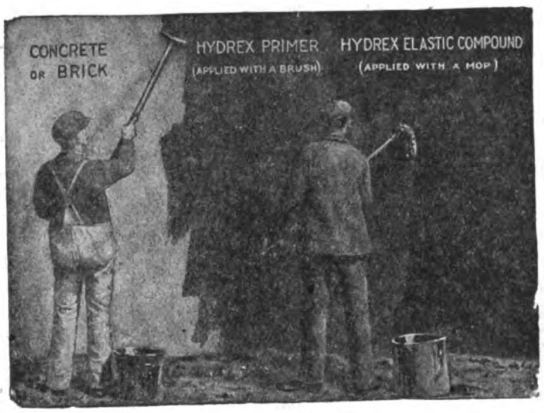

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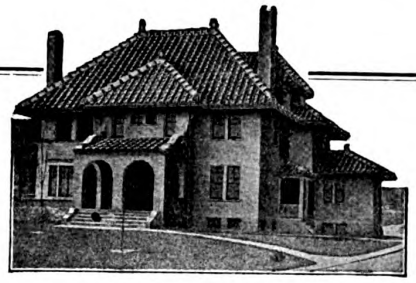

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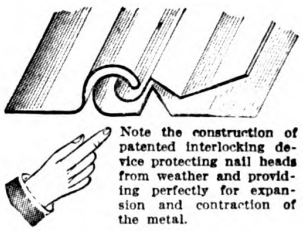

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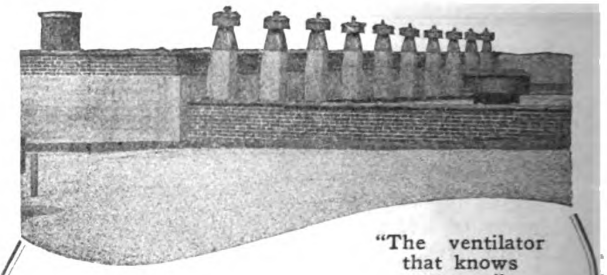

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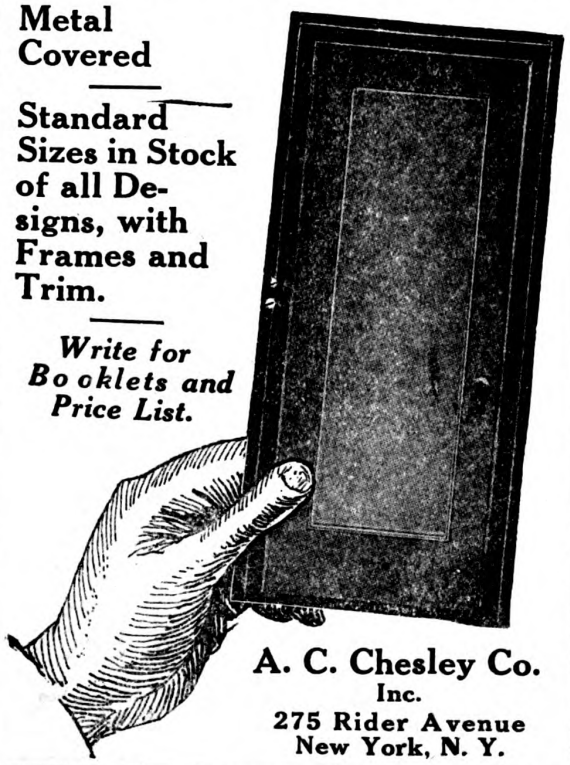

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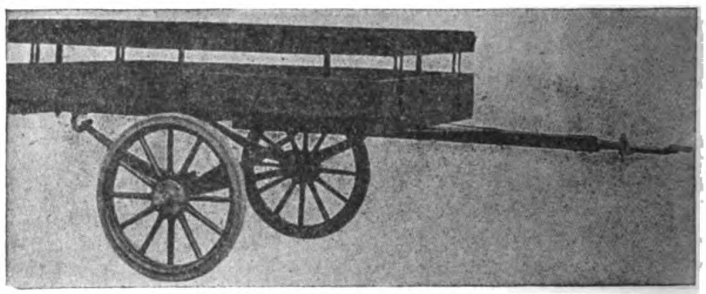

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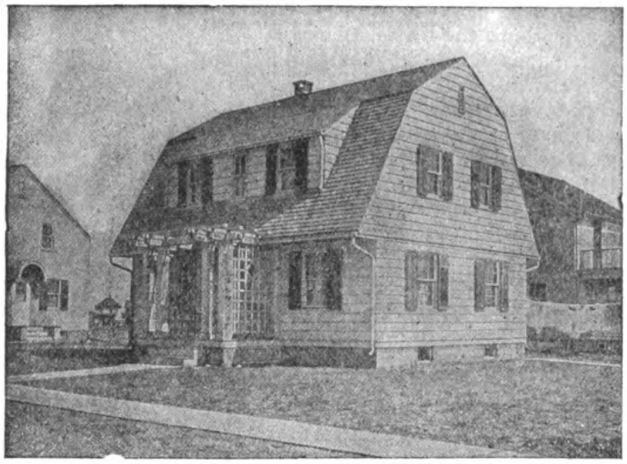

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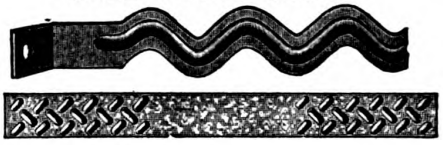

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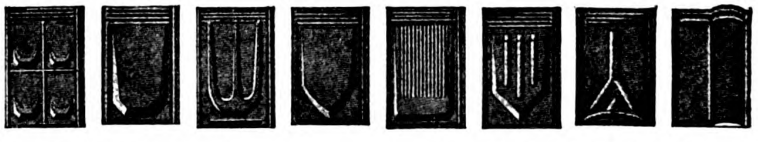

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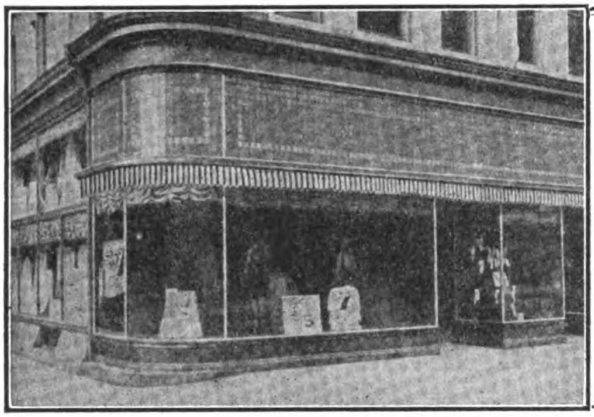

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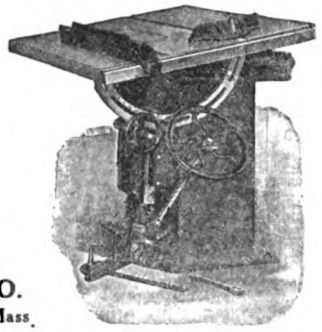

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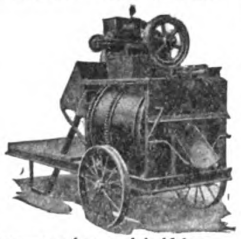

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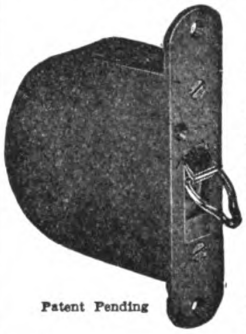

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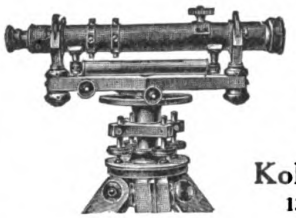

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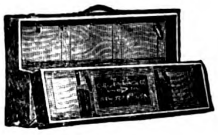



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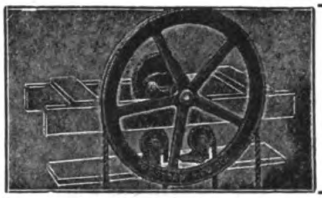

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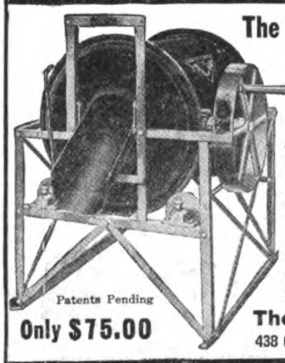
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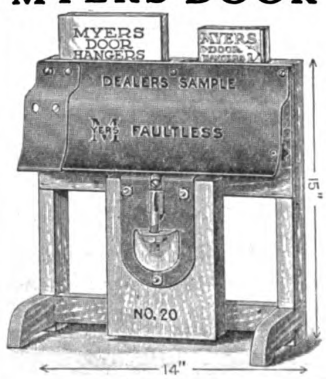

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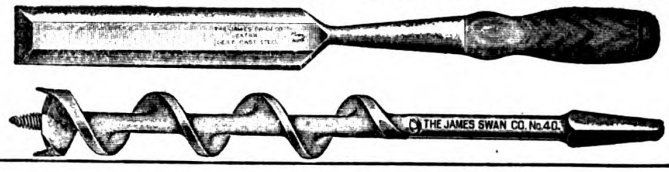

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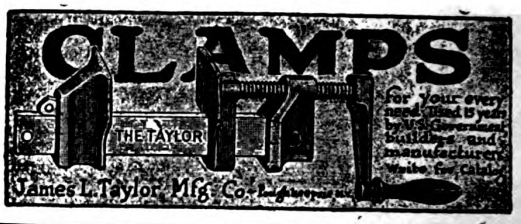

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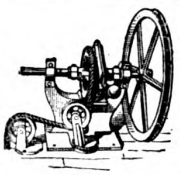

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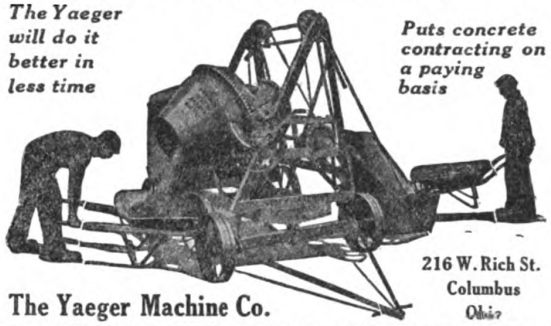

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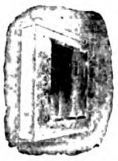

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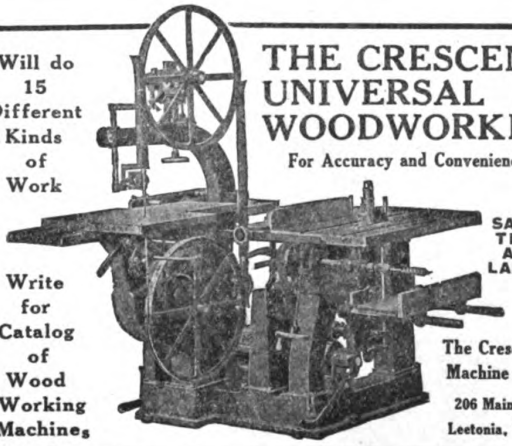

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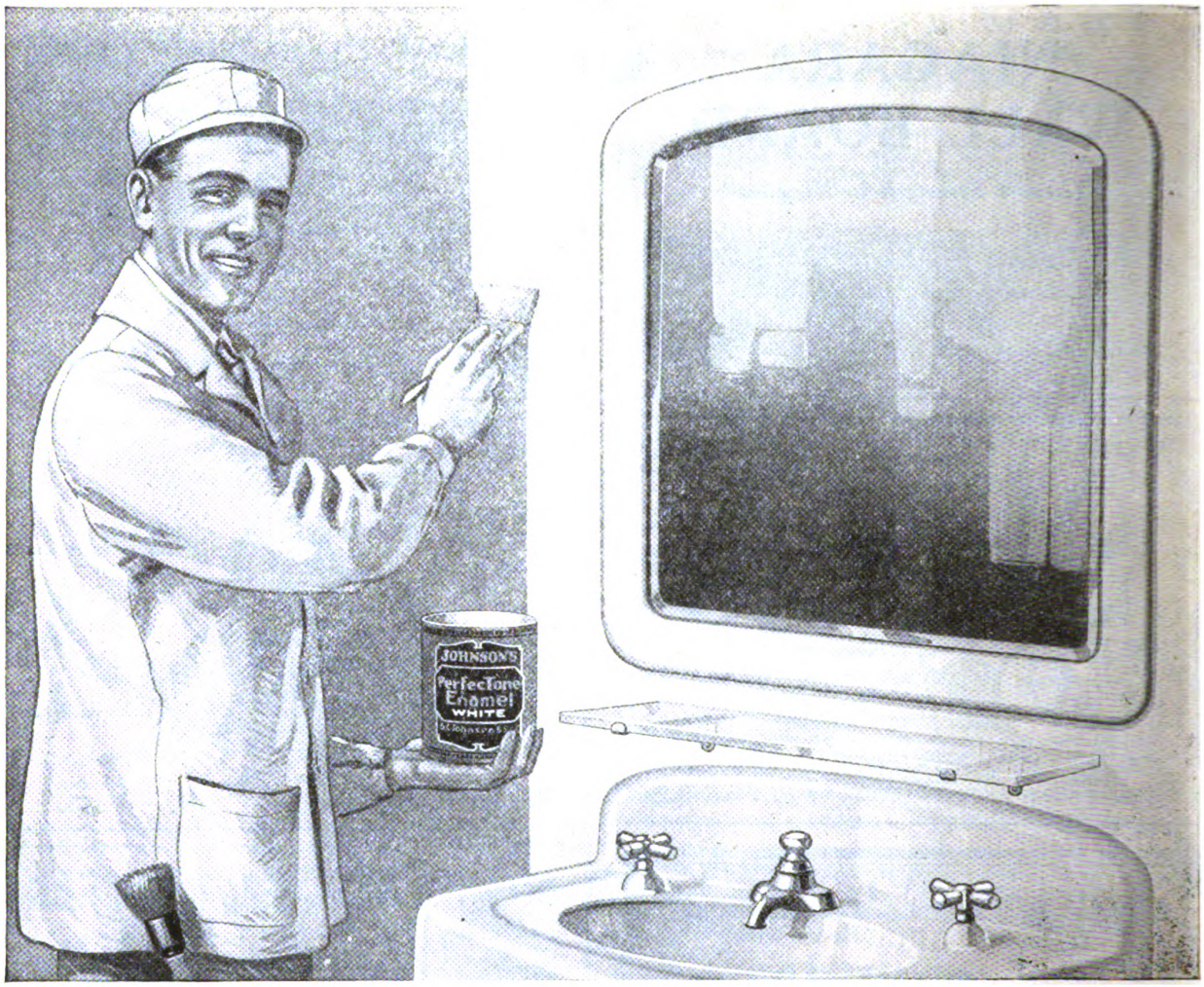

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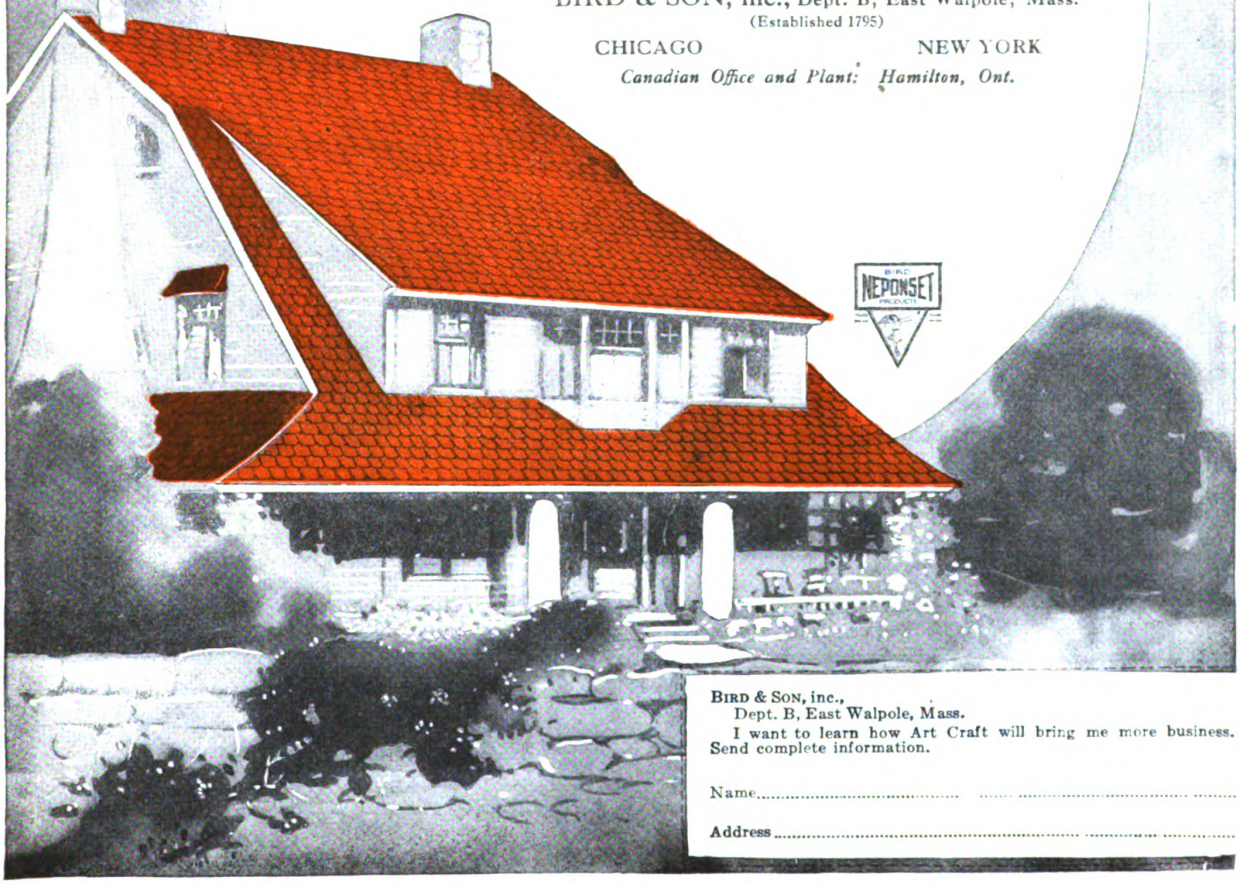

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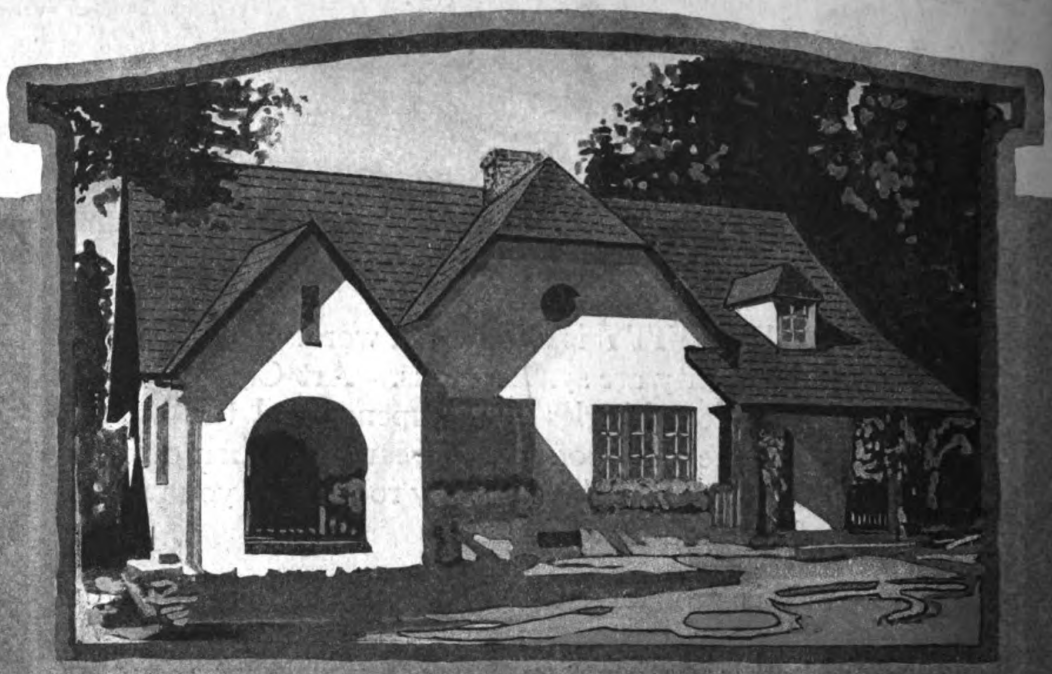

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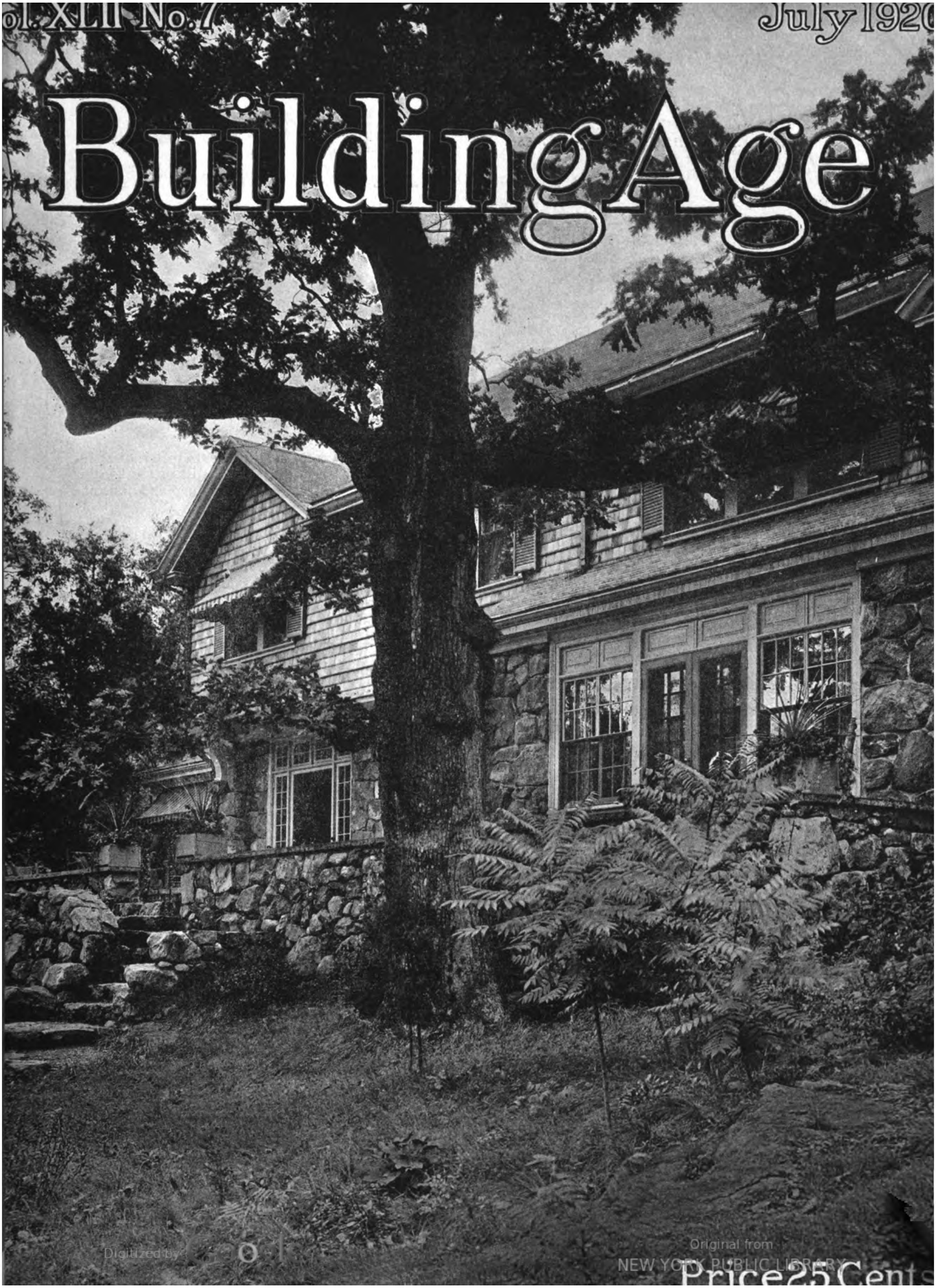

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July, 1920 Vol. XLII. No. 7

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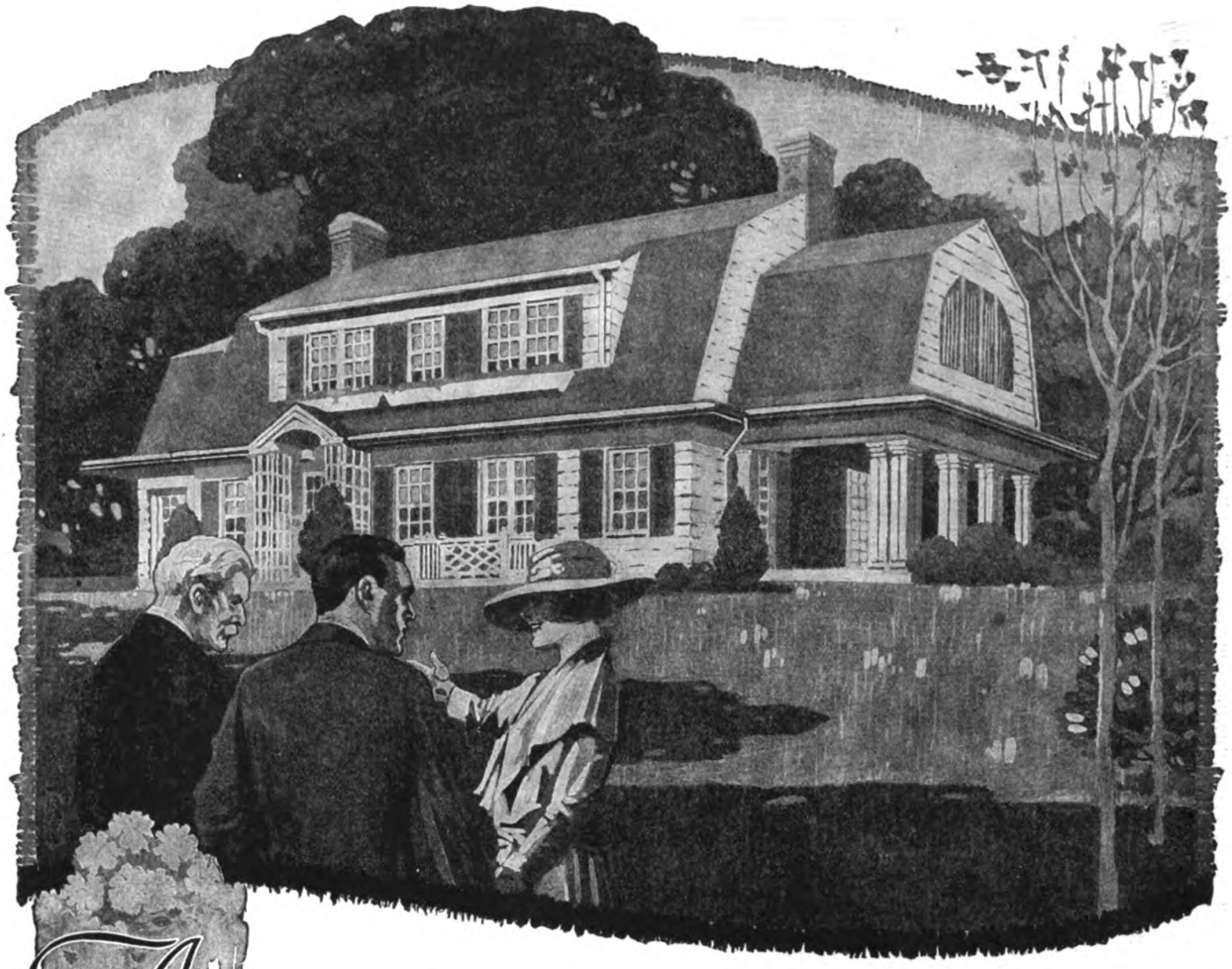

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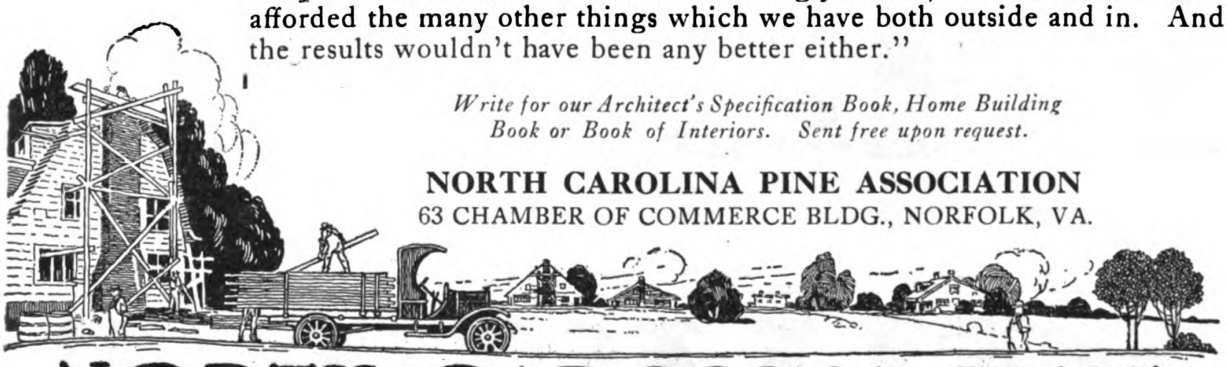

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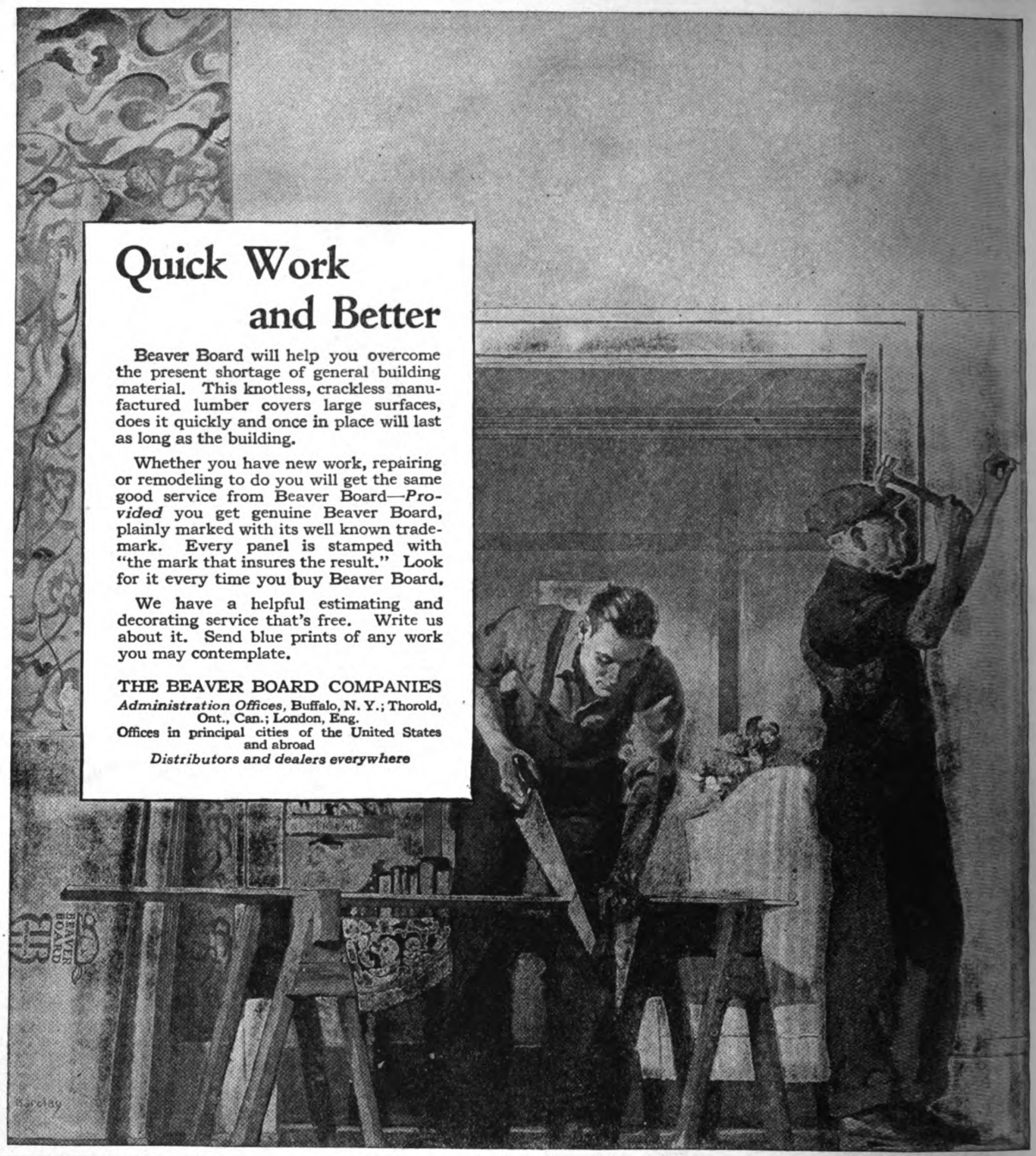

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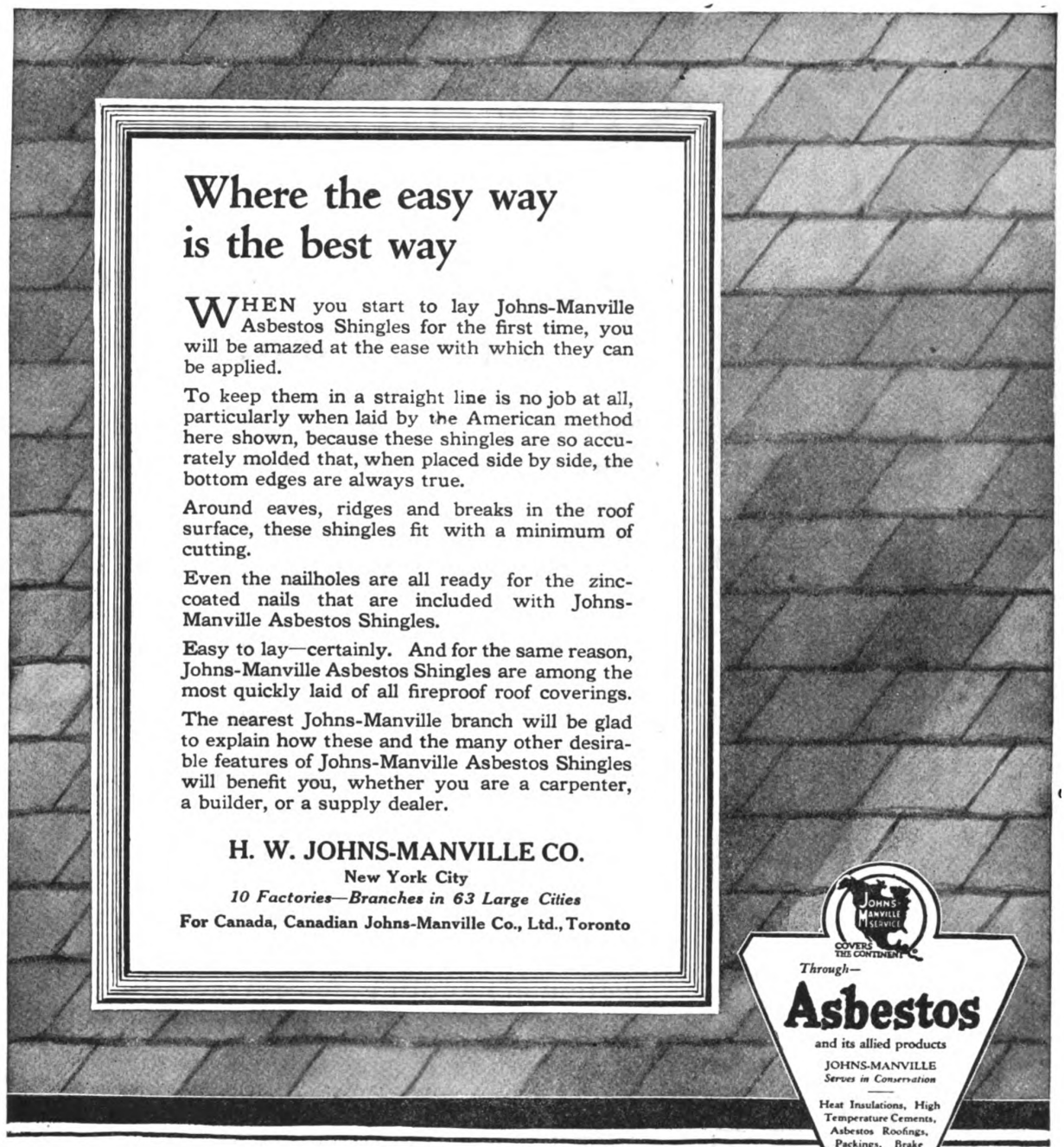

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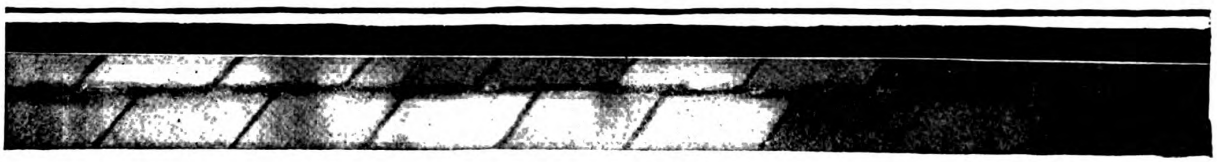

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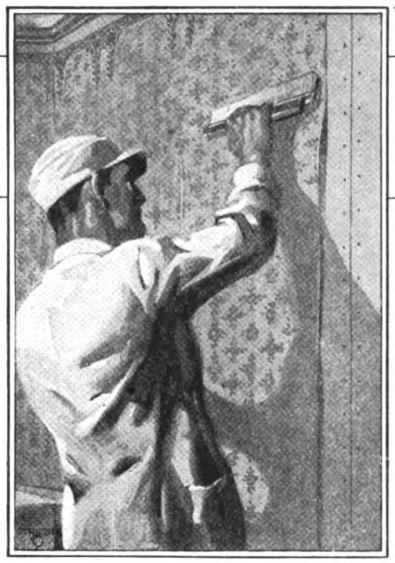

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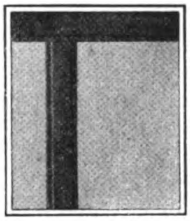

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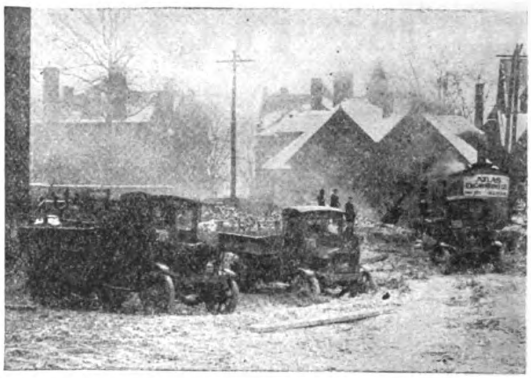

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Barrett Co	New York, N. Y.
Beckman-Dawson Rfg. Co	Chicago, Ill.
Bird & Son, Ltd	Hamilton, Ont., Can.
Bird & Son, Inc	East Walpole, Mass.
Philip Carey Mfg. Co	Cincinnati, Ohio
Flintkote Co.	Boston, Mass.
Ford Rfg. Products	St. Louis, Mo.
The Heppes Rfg. Division, The Richardson Co.	Chicago, Ill.
Keystone Roofing Mfg. Co	York, Pa.
McHenry Millhouse Mfg. Co	South Bend, Ind.
National Asbestos Mfg. Co	Jersey City, N. J.
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Reynolds Shingle Co	Grand Rapids, Mich.
Richardson Co	Cincinnati, Ohio
Safepack Mills	Boston, Mass.
Si Fo Products Co	St. Paul, Minn.
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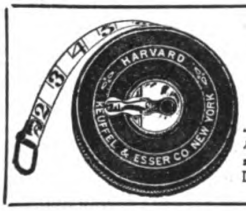

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BUILDING AGE

NEW YORK, JULY, 1920

The Apartment House

Do Present Conditions Warrant Its Construction?

TO a large extent land values and the character of surrounding improvements determine the type of building to be erected on a piece of vacant property. Due to high land values, it is often necessary, in order that an adequate return on the investment may be realized, to erect buildings to a greater height and covering a larger percentage of lot area than has been heretofore done. The inexorable demand for a certain proportion of income to land and building costs is responsible for the development of skyscrapers in congested sections of most of our larger cities.

Early dwellings in this country seldom exceeded two stories and an attic in height, and were as a rule surrounded by extensive grounds. A popular song of a few years ago recalls "When Broadway Was a Pasture." With the growth of our cities many suburban residents were drawn to them. There came a consequent increase in the area occupied by commercial structures, many, in the absence of zoning restrictions, invading former residence districts. The desire of people to live as near their places of business as possible, despite decreasingly available land area and increasing land values, made such residence in detached single-family houses impossible, and brought into existence in this country the multi-family dwelling, now commonly termed "an apartment house."

The rapid evolution from the tenement to the high-class apartment house has largely eliminated any distaste for the multi-family type of dwelling.

Probably this tendency has been largely due to the conveniences afforded to the tenants in such buildings. At the present time and due to lack of housing and high rentals, those who can afford to are seeking individual homes in more sparsely settled suburban sections.

When conditions are carefully studied and the apartment house is designed to meet the probable requirements of the tenants, this type of dwelling has proven financially successful. Since the high-class apartment house costs but little more to construct than the cheaper development, and brings far higher rentals, it becomes a more attractive investment. Thus, apartment houses of most attractive appearance, containing every modern convenience and designed to meet every logical need of the tenants, have been constructed.

An excellent example of modern apartment house design is illustrated. This building is four stories high, containing a total of 24 apartments, and was designed by Mr. E. Allen Wilson, architect. It is located in Philadelphia.

The arrangement of the rooms is practically symmetrical and grouped about a center line drawn through the entrance court. In each wing there are two three-room-and-bath and one four-room-and-bath apartment, a total of sixteen three-room and eight four-room apartments in the building. All rooms have adequate light, air and ventilation. From the public or stair hall a doorway on each side leads to a more private hall for each wing in each story. On these latter halls, which are about 7 ft. by 12 ft. in size, the entrance doors to the three apartments of each wing open. In each story a passage 3 ft. 4 in. wide leads from each hall to a rear balcony. An interior enclosed stairway of the "smoke tower" type connects these balconies in the various stories, furnishing an excellent secondary means of exit, far superior to the disfiguring exterior "fire escape" type.

The face brick is laid in Flemish bond with raked joints. The window sills are constructed of brick. Here and there a small amount of ornamental terra cotta is effectively used for decoration.

Due to the small number of apartment houses now being erected, it has been doubted whether an investor is warranted in placing his capital in such

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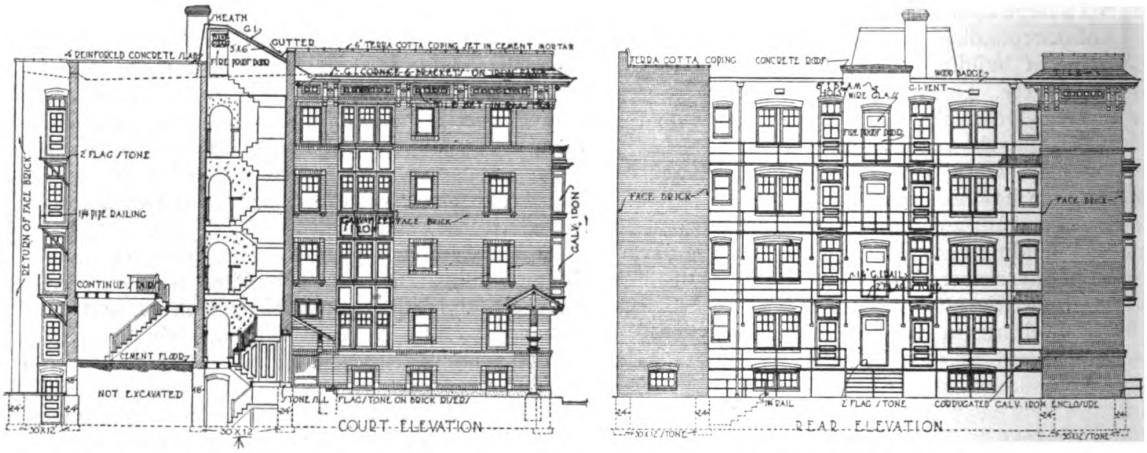
an improvement. A study of the problem would indicate that he is. There is a lot of unwarranted talk about the "bottom dropping out" of things and a "crash" coming. Those who are active in propagating such loose talk would do well to study conditions. All logical indications point away from such a contention. That a gradual decrease in prices of certain commodities will occur seems probable, but that pre-war prices will ever return or any great and sudden drop occur seems highly improbable.

At present-day prices a building such as that illustrated, should be possible of duplication for about $160,000, including the price of ground. Naturally, this amount will vary for different localities. In Chicago, for instance, where brick is much lower than elsewhere, it should be less. A first mortgage

an hour's travel from the business center, four-room apartments are renting for $120 per month. In very select neighborhoods, or those not so far distant from the business section, proportionately higher rents are paid.

In the older apartment houses, while rents have generally gone up considerably, they are not as high as in the newer buildings. Despite the high rentals there seem to be no vacancies.

In the case at point it might be fairly assumed that a rental of $60 per month could be obtained for the three-room, and $80 per month for the four-room apartments. This would fix the total annual rental at $19,200. Deducting the carrying charges, the net return on the investment of $64,000 would amount to $7,640, or approximately 12 per cent per annum.



ELEVATIONS OF AN APARTMENT HOUSE AT MASTER AND SYDENHAM STREETS, PHILADELPHIA, PA.

E. ALLEN WILSON, *ARCHITECT*

of 60 per cent or $96,000, could be obtained, the improvement thus requiring a cash investment of $64,000. The annual charges against the property would be somewhat as follows:

Interest on mortgage—6 per cent on $96,000	$5,760.00
Taxes	2,800.00
Fuel	1,800.00
Janitor service, repairs, fire insurance and miscellaneous	1,200.00
Total	$11,560.00

So far as rentals are concerned, it is difficult to fix an average. In an apartment house (5-story "walk-up") recently completed in New York City, located

Just when or to what extent a decline in rentals will occur is impossible to forecast. That any appreciable decrease will occur for the next five years seems improbable. Assuming that after the expiration of that period and covering another five-year period an average decline of 15 per cent occurs, the net annual income would decrease by $2,880. The operating expenses should also decrease slightly so that making an allowance of, say, $400 for this, the annual net average return would be $5,160 for the second five years, or 8 per cent on the investment. The total return for the ten-year period would be:

First five years=5x$7,640	$38,200
Second five years=5x$5,160	25,800
Total for ten years	$64,000

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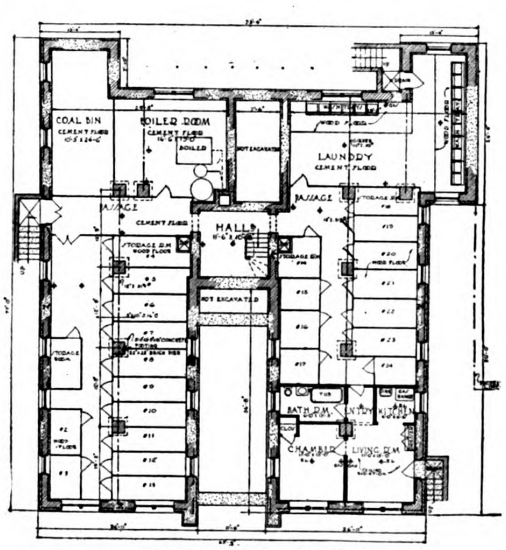
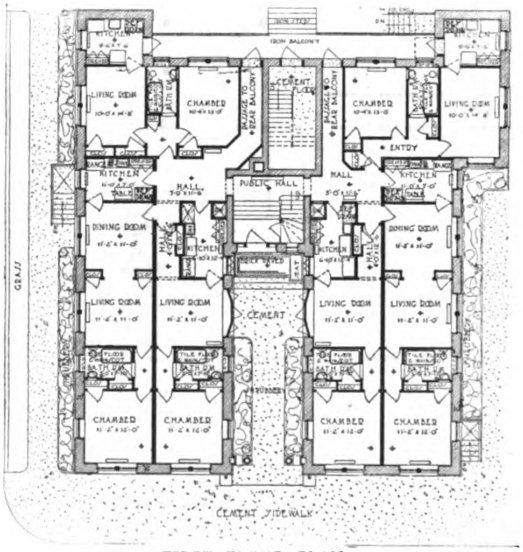


BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

APARTMENT HOUSE, PHILADELPHIA, PA.

E. ALLEN WILSON, *ARCHITECT*

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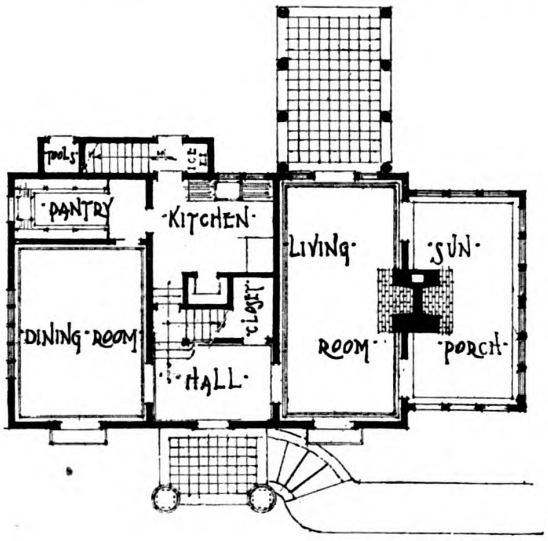

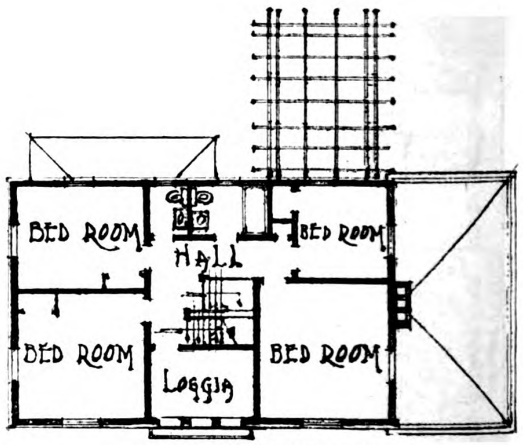

SECOND FLOOR PLAN

HOUSE OF F. A. FRASER
K. W. DALZELL, *ARCHITECT*

The stucco exterior, stone balustrade, iron balconies, arched doorways and loggia, and the general form of the building and roof are characteristic of the Italian type. The stucco is white, floated to a somewhat even but rough textured surface. The roof is surfaced with red slate. There is an open porch or pergola at the rear and a sun porch at the end. The porch sashes drop down into pockets, making an open porch which can be converted into a sun room with no more trouble than closing a window.

The interior trim is of oak. The dining room is panelled solid in wood and has a beamed ceiling. The living room fireplace is of Caen stone, with a wood over-mantel. The sun room fireplace is of red brick.

The second floor has four bed rooms, a loggia, bath and an extra toilet and lavatory. The third floor has one room and bath.

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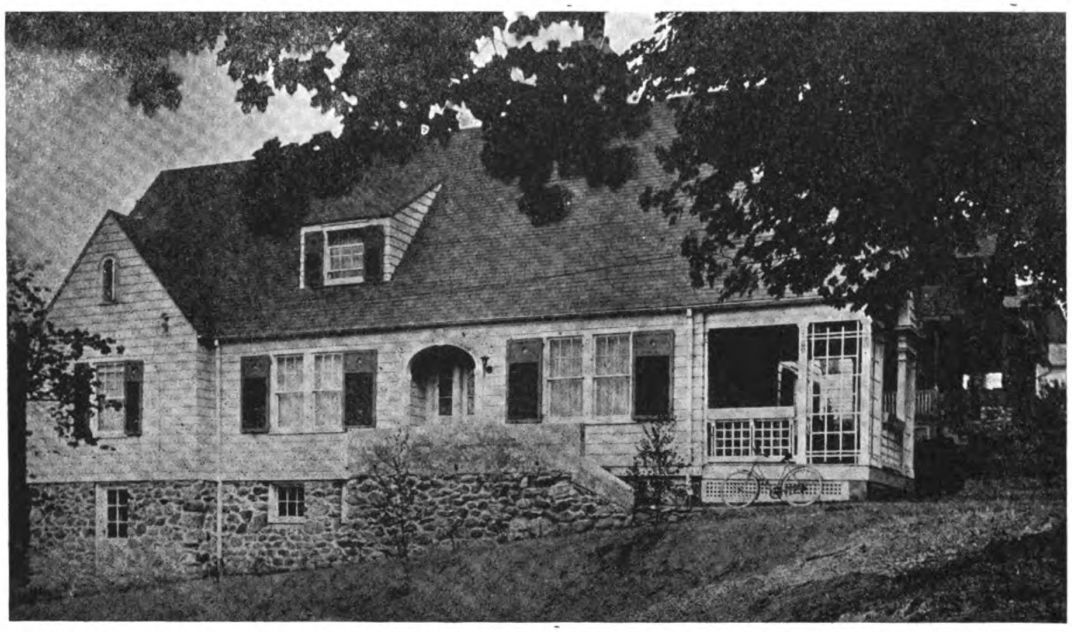
or 100 per cent. This represents an average annual return of 10 per cent on the investment, which is a much higher percentage than can be realized on any "gilt edge" securities.

It would, therefore, appear that conditions warrant the investment of capital in such improvements.

It is to be hoped that the bill for which Senator Calder was sponsor, relieving mortgage money up to a certain amount, from payment of income tax will at some future time—not too far distant—be enacted into a law so that additional mortgage money will be available to finance residence building.



HOUSE OF L. G. FRENCH, WHITE PLAINS, N. Y.
EUGENE HENRY KLABER, *ARCHITECT*

A House For Simplified House-Keeping

EVERY family that contemplates living outside of the great centers of population is today faced by the baffling problem of domestic help. Women are asking themselves, more and more, "How can I give my children the benefits of living out of town and have a household that I can manage unassisted?" This was the dominant thought in designing the house shown herewith. Mr. L. G. French, the owner of this residence, himself an engineer, and editor of the Journal of the American Society of Mechanical Engineers, naturally had some very definite ideas of his own on the subject. The architect has worked these out admirably.

The solution adopted was to place all the rooms necessary for the everyday needs of the family on one floor, giving over the upper story to those rooms that have only occasional use. The first floor is arranged with two distinct parts: Living, and sleeping quarters, so divided that each may be independent of the other.

To simplify dining service and avoid the maintenance of a separate large room, a dining alcove has been built off the living room. In it is a large built-in dresser for china, linen and silverware, which though a step from the dining table, is nevertheless concealed from the living room. Should it be desired to entertain a larger number of guests than can be seated in the alcove, the table is readily

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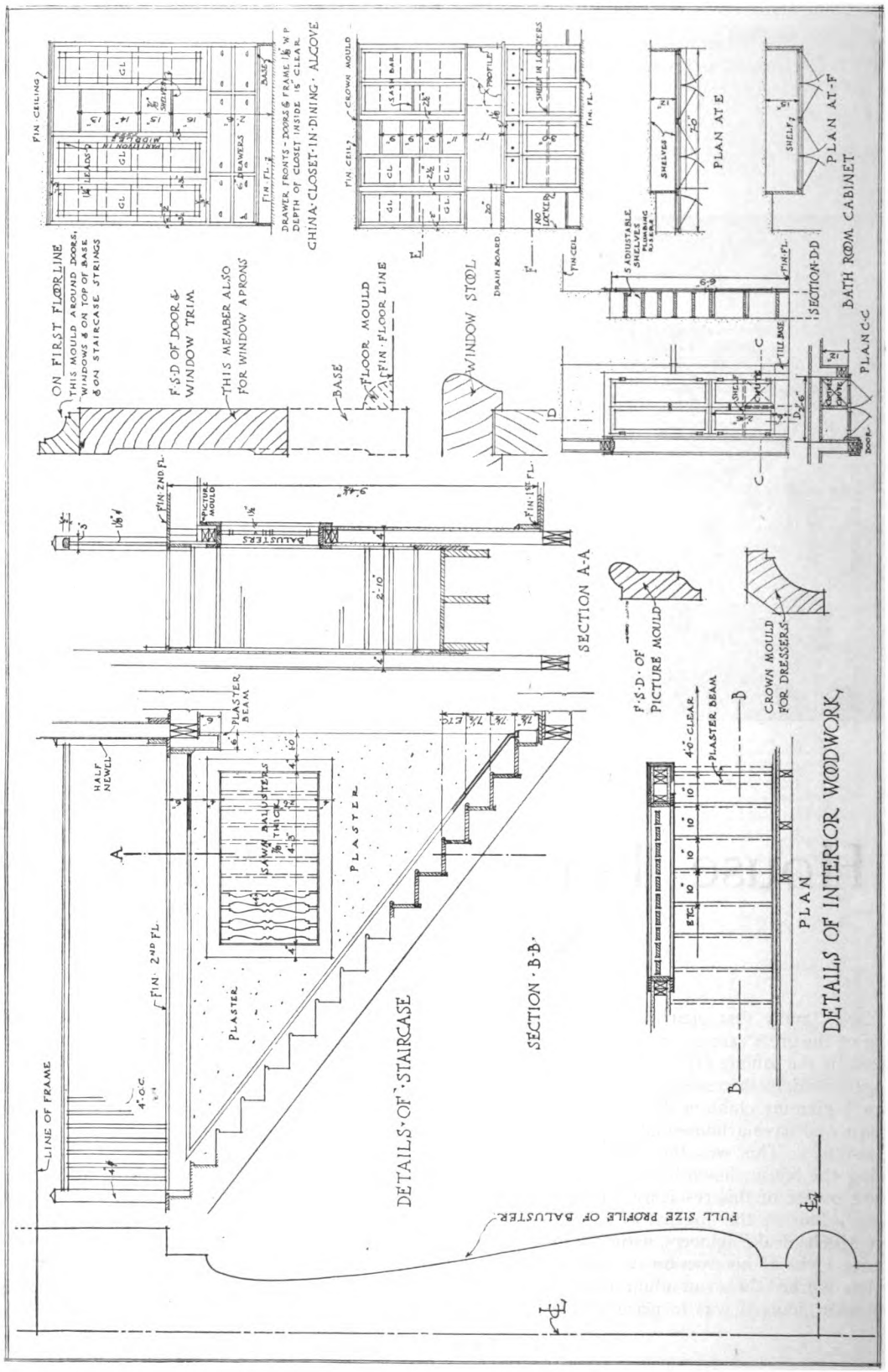

HOUSE OF L. G. FRENCH, WHITE PLAINS, N. Y.
EUGENE HENRY KLABER, *ARCHITECT*

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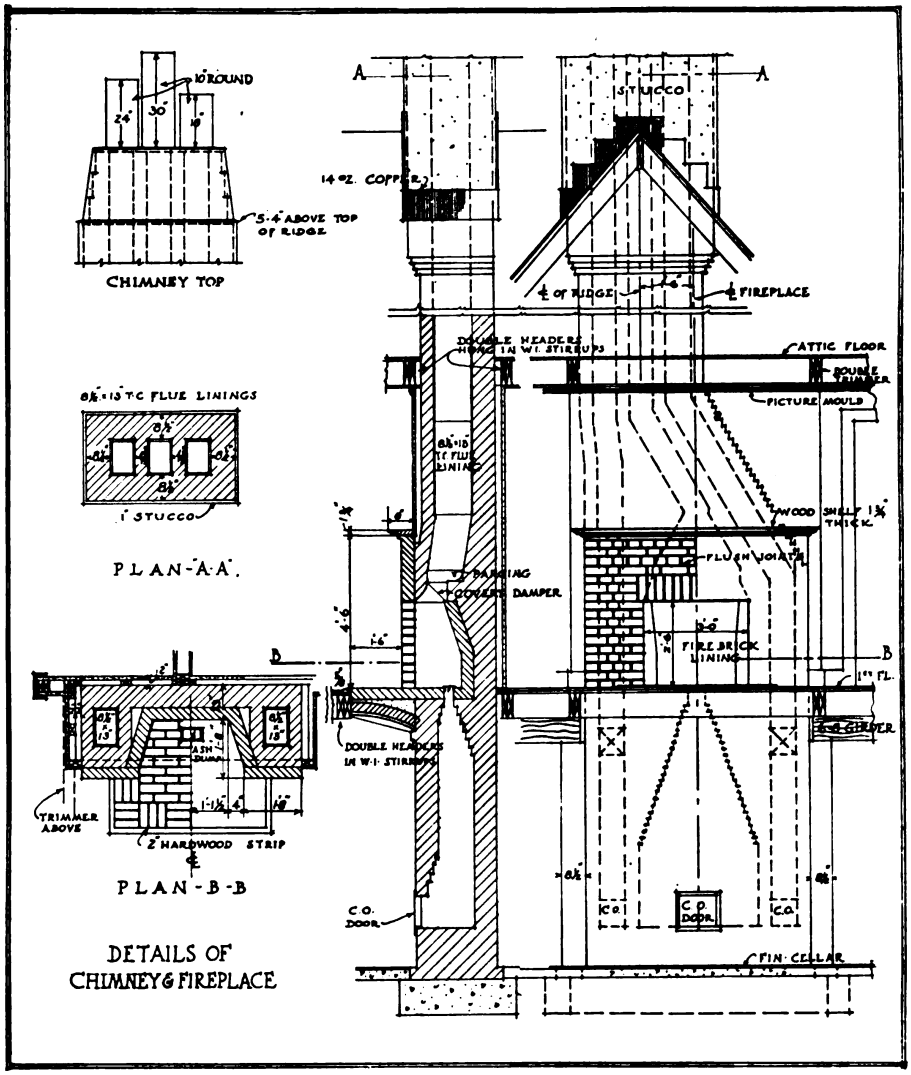
moved into one end of the living room, which has been made long for the purpose, and is still in close contact with the kitchen.

The kitchen has been arranged to facilitate the preparation of food and the washing and putting away of pots and pans with a minimum of walking. A dresser is placed next to the drainboard of the locker is here provided in a corner of the kitchen where it is about equi-distant from all corners of the house.

Although the bedrooms are on the first floor, the topography of the lot is such that they are well above the ground. The slope of the ground also brings the cellar entrance at grade and makes the



CONSTRUCTION DETAILS
HOUSE OF L. G. FRENCH, WHITE PLAINS, N. Y.
EUGENE HENRY KLABER, *ARCHITECT*

sink and pots and pans may be placed in it as they are dried, without preliminary stacking up. The refrigerator closet with vegetable shelves is conveniently near the range and working table, again eliminating steps. It is always well to make special provision for brooms and cleaning materials. A adjoining basement laundry a light pleasant room. In it is a closet for the clothes hamper which is placed open, directly under a clothes chute built into the medicine and towel cabinet in the bathroom above. Both stone and timber are employed in the construction of the walls, stone being used

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for the basement walls, which at the rear are a full story above grade.

The stairs to the upper floor run between partitions, with a grill on one side to give light to the first floor hall. This arrangement eliminates considerable expense in building the stairs and makes it possible to hang curtains in winter, to prevent the heat of the first floor from rising to the second. The upper floor has a large open hall, used by the owner as a work room, a large spare room, a second bath, a closet for clothes storage and a storage attic, part of which, if desired, can be finished to afford another bedroom.

In the exterior design an attempt has been made to get away from the "California" type, with its low-pitched roof suggestive of southern climate. Inspiration has been drawn from example of Northern Colonial work.

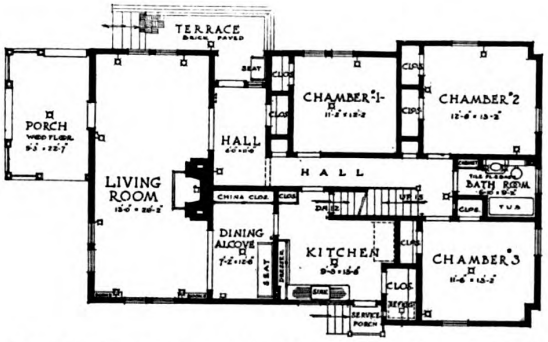
The house was designed by Eugene Henry Klaber, architect.



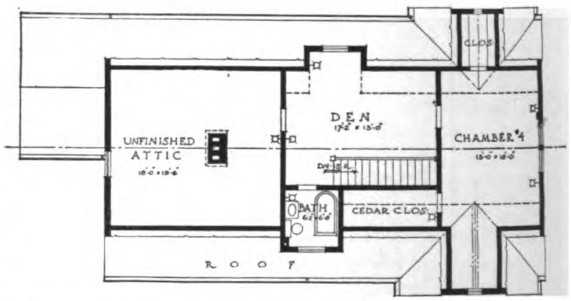
VIEW SHOWING LIVING ROOM END OF HOUSE, WITH WELL DESIGNED SUN PORCH



REAR VIEW, SHOWING EXCELLENT CONSERVATION OF OPPORTUNITIES AFFORDED BY A SLOPING SITE



THE FIRST FLOOR PLAN COMBINES EVERY GOOD FEATURE OF A LIVABLE HOUSE



NOTE THE LARGE BED-ROOM, DEN AND CEDAR CLOSET IN THIS ATTIC PLAN

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Good Salesmanship and Service Will Bring Business to the Builders.—I

By ROBERT F. SALADE*

IN THIS progressive age there is no need for any man to sit still and wait for business to come to him. The business man of today by following modern selling methods may have as many orders, or contracts, as he may care to handle. *Creative salesmanship* is the greatest of all selling forces. It is building towns, cities—yes, even nations. The wonderful industrial progress of the United States during the last few decades has certainly been due in great measure to creative salesmanship.

It is creative salesmanship that, for example, persuades a manufacturing firm to have a big "daylight" factory building erected. In many instances clever salesmen, by means of truthful arguments, and by offering helpful suggestions of a business-building character, have induced manufacturing concerns to have whole groups of new buildings erected. Again, in countless cases, owners of houses, stores, factories, theatres and other structures have had the buildings remodeled and improved after having held consultations with contractors, builders and architects. It was their practical suggestions that resulted in the work of improvement being carried out.

All of the nationally-known business houses of America have been built up to their present large proportions through creative salesmanship. The man who "sits tight," waiting for a position or orders to "fall into his lap," will have a very long wait. In rare instances success comes to one in spite of inactivity and lack of ambition, but in the great majority of cases success is to be had only by those who hustle after it.

No other business man is in a more advantageous position to be a creative salesman than the average master builder.

Property owners are ever ready to consider plans which offer the possibility of increasing the value of their homes, stores, factories, etc.

Builders in both the smaller towns and the larger cities may increase volume of their business by having practical talks with property owners, and by explaining to the owners why certain improvements should be made to the buildings in question. Here is a case in point:

In a small but live town near the city of Philadelphia there are two or three avenues along which are lined rows of small shops or stores. Not many years ago nearly all of the store fronts were of the old-fashioned type, having box-like bulk windows formed of several pieces of glass instead of the modern, single, large piece of plate glass. As the storekeeper of these days knows, a handsome, spacious plate glass window, with attractive displays of merchandise, is a powerful advertisement for the store, although some few years ago the matter of fine window displays did not receive such close attention as at present, and in the small town referred to, the storekeepers were satisfied with their quaint store windows until the time came when one of the merchants had the front of his establishment remodeled and a new style plate glass window constructed. After the improvements had been completed, and after the shop-keeper had arranged an attractive exhibit in the new window, his store was soon drawing increasing numbers of customers.

It was our friend, the builder, who had brought about this remarkable change. He had held a consultation with the dealer, had submitted rough plans for the proposed improvement, and had presented a good, strong argument giving reasons why the remodeled front would mean an increase of business for the store keeper. The builder gained the order for that job simply because he asked for it and worked for it. It was not long afterwards when the builder was putting in new fronts and modern display windows for several other dealers in the neighborhood. Today, nearly all of the stores in that town possess one-piece plate glass show-window-fronts in place of the ancient bulk windows. This has resulted in a considerable amount of new business for the town in general, as the attractive window displays are drawing people from nearby villages and towns.

Let the builder look around in any town and city and he will see store-fronts which are sadly in need of remodeling. Even in the larger cities one may see some of the old-time bulk windows still in existence. Here is where the builder may make ex-

*First of a series of articles by this competent writer on practical methods of increasing the builder's business.

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cellent use of his ability as a creative salesman. Study over the front of that unsightly building. You can tell at a glance what improvements are needed. Draw up rough plans for the proposed work. Compile an estimate. Then, call upon the owner of the place and make it clear to him that the changes would decidedly increase the value of the structure. If the owner of the building is a store-keeper, it will be easy to prove to him that a modern front and a larger plate glass show window would attract many new patrons to his store.

Builders, as a class of business men, have not been paying enough attention to the service idea. Many owners are hesitating about having various kinds of remodeling, additions to buildings, and other work of this class done. It is the builder's opportunity to tell property owners *why* they should have the improvements done *right now*. A tremendous volume of this variety of business is waiting for the contractors to come after it. The right "selling talk" on the part of the builder will do wonders.

Every builder can have a "Service Department," no matter how large or how small his office may be. It would be well indeed for the builder to employ a brainy salesman—a man with practical experience in the building and contracting lines—and to put such a man in charge of the Service Department. By following the suggestions outlined in this article, the service-man could "create" orders for many kinds of remodeling work, additions to old buildings, repairs, etc., and he could also influence numerous orders for new construction work. If the builder feels, however, that he could not afford to engage a trained salesman, he can follow up the service idea personally until such time as the business would warrant employing an expert.

The "service man" would work in this manner: He would be "on the street" several hours of each day looking for buildings which are greatly in need of repairs and improvements. He could easily locate such buildings on every side. Notes would be made specifying the work and materials which would be required for each job. The next thing would be to find the owners of the properties in question and have heart-to-heart talks with them, explaining the advantages of the proposed improvements, and quoting approximate prices for the contracts. There is no limit to the amount of new business that could be developed by following this system.

In cases where it would not be an easy matter for the service expert to call personally upon the owners of buildings in need of improvements, vigorous letters should be written to the owners, calling their attention to the poor physical condition of their property, quoting estimates for the work, and advising the owners to have the contracts awarded immediately for the reason that later on the proposed work would cost more on account of further deterioration or further rise in prices. This would doubtless cause the desired response on the part of the owner who would be pleased to avail himself of an opportunity so intelligently brought before him.

In cases where the builder is personally acquainted with the owner of property which is in need of repair, he could, of course, address the owner in familiar terms. A well-worded typewritten letter will always receive attention and consideration.

In addition to making personal calls upon property owners, trust companies having charge of property, and real estate agents, the service man would also write numerous letters of the kind suggested. Personal calls could be made later on upon the recipients of the letters in cases where no response to the letters had been received. Think of the countless numbers of orders that could be developed through this plan!

(To be continued)

Book Reviews

STRUCTURAL DRAFTING AND THE DESIGN OF DETAILS: BY CARLTON THOMAS BISHOP. CLOTH 8X10—PP. 338, ILLUSTRATED. JOHN WILEY AND SONS, INC.

WHILE this book has been prepared primarily to meet the needs of the engineering student and structural draftsman, it contains much valuable data for those of more mature experience. Part I, consisting of four chapters, contains a description of the organization of structural steel company and the manufacture and fabrication of steel. Part II, which is the main portion of the book, contains 25 chapters and treats very thoroughly of structural drafting, from an elementary description of the drawing, then leading up to complicated detailed drawings of structural members for both bridges and buildings, and ending with a description of the method of checking such drawings. Not alone actual drafting, but such allied subjects as the making out of material order bills, shop bills, etc., are also described. This section of the book is replete with illustrations, the plates covering practically all classes of work which the structural draftsman is called upon to do. Part III, containing 15 chapters, deals with the design of details. Engineering designing data, taking up in order simple beams, tension and comparison members, plate girders and grillages, comprises this section. Numerous tables of structural shapes and other useful data are contained at the back of the book.

This volume covers in an excellent way the scope of work performed by the structural draftsman, and will form a valuable addition to his library.

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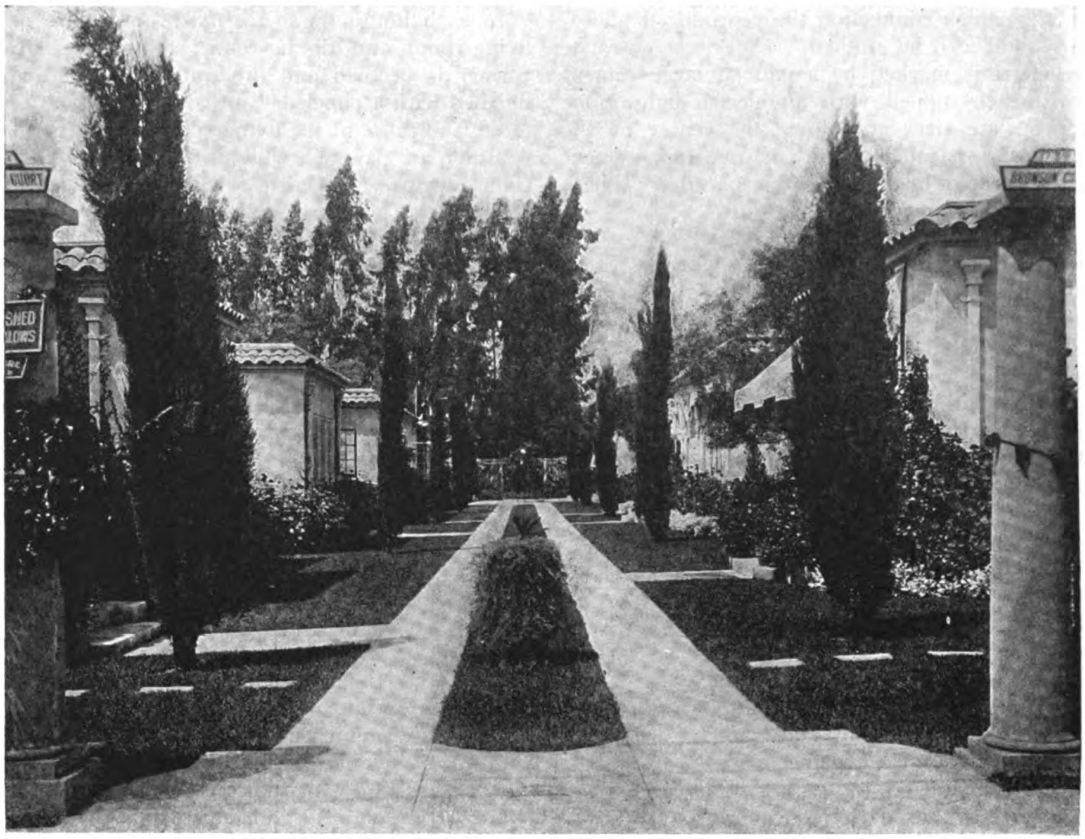

A COMMUNITY COURT AT LOS ANGELES, CALIFORNIA
ARTHUR ROLLAND KELLY, *ARCHITECT*

A Community Court of Exceptional Attractiveness

By CHARLES ALMA BYERS

ILLUSTRATED herewith is a particularly charming representation of the community court idea, as found interpreted in southern California, and as it can be carried out in any part of the country if given due and proper attention. This court is, in fact, a real work of art, both in style of architecture and in landscape gardening. As a result, the little houses of which it is comprised are always in keen demand, and were even in normal times, and therefore the investment thus represented yields to the owner a steady and highly satisfactory income.

Despite its impressive appearance, this community court neither utilizes an uncommonly extensive ground plot nor represents—since it was built several years ago—any very considerable construction cost, as computed on a unit basis. In ground area it is but sixty feet wide by two hundred feet deep; yet it contains a total of ten little houses, each a separate unit, besides allowing ample space for a most effective scheme of community gardening. Built a few years ago under the prices of material and labor then prevailing, the cost per unit or house was but approximately $1,500, or a total of about $15,000, which amount also included all cement walks. The building cost now, however, would naturally run considerably higher than this figure, possibly double, which, of course, does not include the ground.

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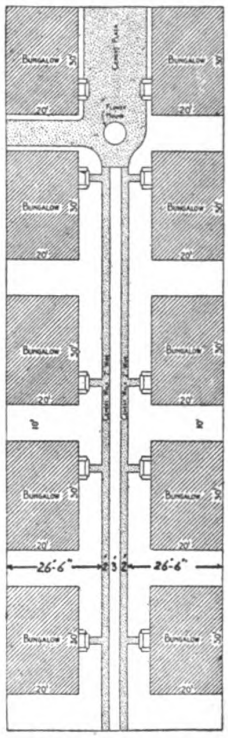
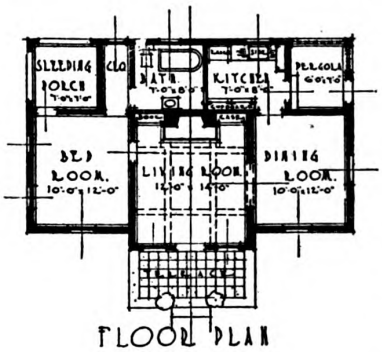
An accompanying drawing shows the general plot lay-out, in which connection the reproduced photograph should also be studied. The street entrance to the court is marked by a pair of large cement columns, each topped with an electric-light globe of appropriate size; and down the center of the space runs a paralleled pair of two-foot cement walks, separated by a three-foot parking. These walks terminate toward the rear in a sort of cement-paved plaza, with a circular flower mound in its forward end. From these two walks which traverse the center of the arrangement leads the short individual walk that forms the connection with each little home. The garden work consists of well-kept lawns and an artistic planting of graceful Italian cypresses, scarlet-blooming geraniums, "dusty-miller" borders and other plants and shrubs, while towering eucalypti, on adjoining property, constitute a very attractive background to the whole.



PLOT PLAN

The ten little houses differ from one another but very slightly in the matter of design. Outwardly, the walls of each are of light cream cement-stucco over metal lath and frame construction, free of ornamentation, and are finished at the top with a sort of cornice effect of dark red roofing tile, while the roof proper, hidden by this tiled cornice, is of the flat type and is comprised of tarred and sanded roofing paper. The windows are very largely of the casement kind, and the entrance of each house is characterized by a small open, cement-floored terrace, the front door itself being of glass.

A specimen floor plan, showing the actual interior arrangement of one of the houses, is included in the illustrations. While the arrangements are slightly varied, in some respects, each house is of practically the same dimensions, and contains the same divisions—living-room, dining-room, kitchenette, one bedroom, a small sleeping porch, a pergola-porch on a rear corner, and a roomy clothes closet. Each living-room also includes a good fireplace, with a built-in bookcase at one side of it and a writing-desk at the other side, and in the kitchen, or kitchenette, despite its limited dimensions, are found commodious cabinets of drawers and shelves, the customary sink, and many other built-in conveniences now popular with the tenant.



FLOOR PLAN

In each house there are hardwood floors in the living-room and dining-room; the ceiling of the former is beamed and the walls of the latter are finished with a paneled wainscot; all walls are plastered, and those of the living-room, dining-room and bedroom are papered, while in the kitchen and bathroom they are finished to a height of about six feet with a smooth, hard plaster coat which is enameled. Pine woodwork is used throughout, which in the living-room and dining-room is finished with a wood stain—more or less varied as to color in the different houses—and in the other divisions is either painted or enameled in white.

This community court is located in Los Angeles, California, and was designed by Arthur Rolland Kelly, architect, of that city. As may be guessed from its appearance, it was expressly planned for the better class of neighborhood, and it draws its patronage principally from well-to-do business men and tourists. Each house, although quite small, therefore always rents for a good price. The community court—often called a bungalow court—is intended as a sort of substitute for the common apartment house, with the added attraction that each unit constitutes a private little home. Naturally, in employing the idea, the builder should adapt the court, in the matter of construction cost and style, to the neighborhood in which it is to be located and to the class of tenants to be catered to; the one shown here excellently illustrates something of the degree of attractiveness to which the idea may be carried, to meet certain requirements.

There would seem to be no reason why this idea should not be extended throughout the country and become an active factor in solving the housing problem. Such a plan also provides a way of developing the lot of odd size. In this case the lot —60 ft. by 200 ft.—could not have been used to such advantage in any other way. The Community Court may be arranged to fit a lot of practically any size or shape and need not be confined to one of approximately the dimensions given. Attractive planting is essential to a development of this nature.

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Constructing a Winding Stairway

III—Laying Out Strings B and F

By RICHARD M. VAN GAASBEEK

School of Science and Technology, Pratt Institute, Brooklyn, N. Y.

TO LAY OUT STRING B:—The pitch of strings A-C-D and E are alike taken from the pitch board. The pitch of strings B and F if laid out to a similar pitch will necessitate considerable gluing of stock, owing to the steep pitch of the strings, especially string F, and when housed and finished the stock will be crossgrained and therefore weak. By determining the pitch of the string before laying out the treads and risers, they can be laid out on the same width of stock used for the other strings, and with a small piece of stock glued on either end to form an easement, all cross grain is eliminated, the string is stronger, and a saving of labor and material. Referring to Fig. 15, the pitch of string B can be determined by taking the run of treads 6-7-8-9 and 10 from the layout, (R to S, see Fig. 7, June issue) or 31¾". The total rise of 5 risers is 5x2" or 10". Lay down a line 31¾" long and at right angles to it produce a line 10" long connect these points with a diagonal. Set the bevel to the plumb line as shown in the illustration.

Apply the bevel to the top edge of the string and produce the first plumb line, riser 6. Take the width of tread 6 from the layout, Fig. 7, and produce another plumb line 6¾" from riser 6, locating riser 7. measuring the distance on a level line. Likewise

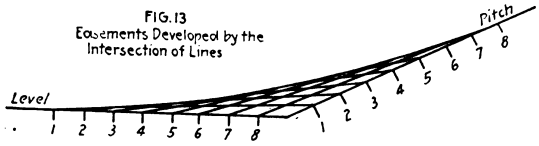

FIG. 13
Easements Developed by the Intersection of Lines

lay out similar plumb lines locating the remaining risers, taking the distances from the layout. From riser 7 measure off 6 1/16" on a level line and produce riser 8; from riser 8, measure off 6⅛" and produce riser 9; from riser 9, measure off 6 1/16" and produce riser 10; measure off 6¾" from riser 10 and produce riser 11. Owing to the variation in the width of the treads, it will not be possible to have a uniform nosing line. By averaging the distance up as described in finding the plumb of the risers, and starting to lay out tread 6 with a uniform nosing line over riser 6, provided the work has been accurately laid out, it will finish on tread 11 over riser 11, the same distance from the top edge of the string as at the starting point, but the intermediate points may vary but cannot be overcome owing to the different width of the treads. Use the template, Fig.

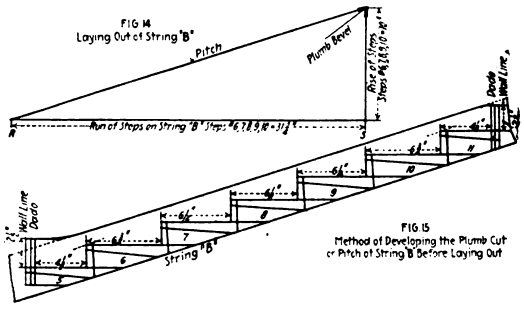

FIG 14
Laying Out of String "B"

FIG 15
Method of Developing the Plumb Cut or Pitch of String 'B' Before Laying Out

5 (See April issue), and mark on riser 6 and at this intersection produce a line at right angles to riser 6 until it intersects riser 7, measure up on riser 7 from this point 2" the height of the rise and at right angles to riser 7 produce a level line until it intersects riser 8; measure up on riser 8 from this line, the rise 2" and produce the level line or tread 8; measure up on riser 9 from the level of tread 8, the rise 2" and produce tread 9; measure up on riser 10 from the level of tread 9 and produce the level of tread 10; measure up on riser 11 from the level of tread 10 and produce the level of tread 11. The distance from the point of intersection of riser 11 and tread 11 to the top edge of the string should be the same as the distance from the top edge of the string and the intersection of riser 6 and tread 6. Measure off on tread 11, from riser 11 the width of the tread taken from the layout, Fig. 7, or 4⅛", to find the inside intersection of strings B and C. Add to this stock enough to receive string C and layout for a dado to receive the tongue worked on string C. The distance above tread 11 must correspond to the same distance above tread 11 on string C. Lay out an easement to finish the turn. Likewise at the bottom glue on a small piece of stock to form an

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easement. The distance above tread 5 must be the same distance as above tread 5, string A. Measure out on tread 5 from riser 6 as at the top of the string the width of tread 5, taken from the layout Fig. 7, or 4⅛", to find the intersection of strings A and B. Add to this stock enough to receive string A and layout for a dado to receive the tongue worked on string A. Having located the face of the

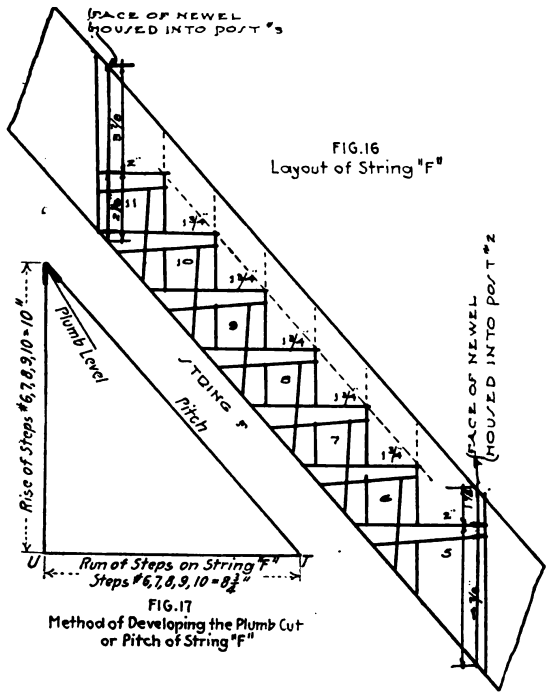

FIG.16
Layout of String "F"

FIG.17
Method of Developing the Plumb Cut or Pitch of String "F"

treads and risers and numbering them to correspond to the numbers on the layout, use the template, Fig. 6, for laying out the wedges as previously described. Bore a series of holes to start the housing and house similar to strings A-C-D and E.

TO LAY OUT STRING F:—It will be necessary to first determine the pitch, using the run and rise in a similar manner as previously described in laying out string B. Referring to Fig. 17, the pitch of string F can be developed by taking the run of treads 6-7-8-9 and 10 from the layout (T to U, Fig. 7) or 8¾", and the total rise of the same number of treads or 5x2". Produce a line 8¾" long and at right angles produce another 10" long, connect these two points with a diagonal. Set the bevel to the plumb line formed by the intersection of the diagonal and the rise line as shown in the illustration. Apply the bevel to the top edge of string F, Fig. 16, and line in riser 6. Take the width of tread 6 from the layout, Fig. 7, and produce another line parallel to riser 6, measuring on a level line the width of tread 6 or 1¾", thus locating riser 7. Likewise take similar distances from the layout and locate the remaining risers. From riser 7 measure off on a level line 1¾", locating riser 8. From riser 8 measure off on a level line ¾", locating riser 9. From riser 9 measure off on a level line 1¾", locating riser 10. From riser 10 measure off on a level line 1¾", locating riser 11. The nosing line on this string will be uniform, due to the fact that the treads are all the same width, but this does not follow that they will be uniform on all jobs.

By averaging the distance up as described to find the plumb of the risers and starting to lay out tread 6 with a uniform nosing line over riser 6 and the work has been accurately laid out, the nosing line will finish on tread 11 over riser 11, the same distance from the top of the string as at the starting point, but the intermediate point may vary, which cannot be overcome if the widths of the treads are different. In this particular job the nosing line should come regular.

Use the template Fig. 5, apply it to the top edge of the string and mark on riser 6. At this intersection produce a line at right angles to riser 6, until it intersects riser 7, thus locating tread 6. Likewise measure up on riser 7 from the level of tread 6, the height of rise or 2", and at right angles to riser 7 produce another level line at this point until it intersects riser 8. Measure up on riser 8 from the level of tread 7, the rise 2", locating the level of tread 8. Measure up on riser 9 from the level of tread 8 the rise 2", locating the level of tread 9. Measure up on riser 10 from the level of tread 9, locating the level of tread 10. Measure up on riser 11 from the level of tread 10, locating the level of tread 11. The distance from the point of intersection of riser 11 and tread 11 to the top edge of the string should be the same as at the starting point at the intersection of riser 6 and tread 6. Measure off on tread 11 from riser 11, the width of the tread taken from the layout, Fig. 7, or 2", and produce another plumb line, locating the face of angle post No. 3. Add to this length 5/16" of stock to allow for housing into the post. Likewise at the bottom measure forward on tread 5 the width of tread 5 taken from the layout, or 2", and produce a plumb line locating the face of angle post No. 2. Add to this length 5/16" of stock to allow for housing into the post. Having located the face of the treads and risers and numbering them to correspond to the numbers on the layout, use the template, Fig. 6, for laying out for the wedges as previously described. Bore a series of holes to start the housing and house similar to the other strings.

(To be continued)

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A Study of Balkan Dwellings

Efforts successfully carried out by American Red Cross retrieve the housing conditions in the Balkans.

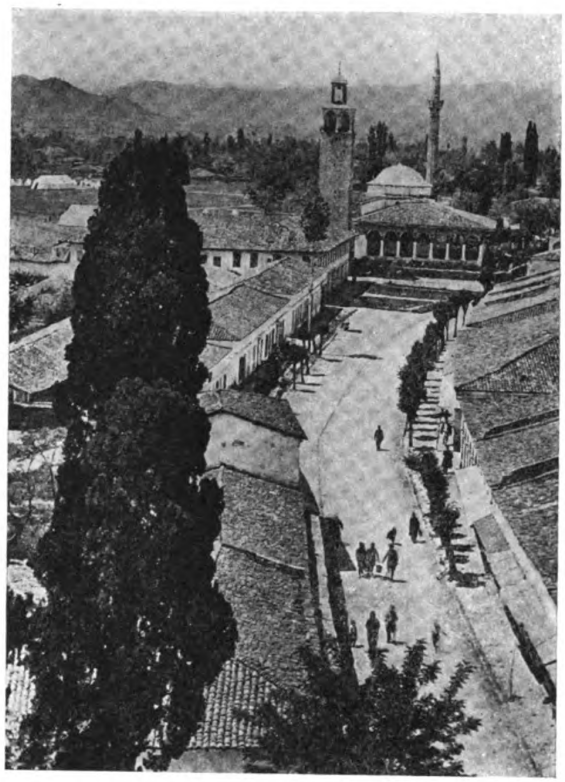
THE dweller in the Balkans, from prince to peasant, builds his home to last for centuries. And he builds something, whether by accident or design, which in some manner blends with the surrounding landscape and is, from the standpoint of picturesque beauty, an architectural gem. But these quaint homes, even if more beautiful to the eye than the faded, rain-washed frame houses of the American tenant class, are far more primitive and unhygienic.



A PEASANT HOME IN THE CARPATHIAN MOUNTAINS. THIS HUT IS OF CHINKED LOGS, WHITEWASHED AND THATCHED. TO THE CARPATHIAN MOUNTAINEERS A "PLACE IN THE SUN" MEANS JUST A DOORSTEP ON WHICH TO SIT AFTER THE DAY'S WORK IS DONE. THE WAR BROUGHT NOTHING BUT FAMINE AND DISTRESS TO THESE SIMPLE FOLK, AND IT WAS AMONG THEM THAT THE AMERICAN RED CROSS RELIEF EFFORT IN THE BALKANS WAS CONCENTRATED

In Rumania, even in the rich agricultural district, the farmer has few of the modern conveniences and comforts that exist in America. His farmhouse is built of adobe and thatched with straw. The American Red Cross relief workers call these peasant huts "pigeon coops," because of their small size and general appearance. They usually are comprised of but one room, with a floor of dirt to match the mud walls and straw roof. In these one-room houses nine to ten human beings live in close contact with the chickens and geese.

In the old war zone of Rumania, however, these huts would seem like luxurious palaces. For in the ruins of the battlefields the peasants have constructed shelters entirely from mud. Many are built on the old trench dugouts, the inhabitants living underground. Some of these huts shelter as many as five families. It is in this district that so much disease is found.



THIS PHOTOGRAPH SHOWS THE MAIN THOROUGHFARE OF TIRANA, ALBANIA, WITH A MOSLEM MOSQUE IN THE BACKGROUND. THIS SMALL CITY IS ALMOST FIREPROOF. THE ROOFING IS AN EXCELLENT VARIETY OF THE TILING THAT IS POPULAR THROUGHOUT THE BALKANS

The typical mountain home in the Carpathians is built of chinked logs, whitewashed and thatched. This also consists of but one room, where the entire family lives, eats and sleeps. To the ordinary peasant dweller in these mountains, "a place in the sun" means just a doorstep on which to sit after the day's work is done.

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In Montenegro, there is a vast difference between the types of buildings used to house the soldiery and the tumble-down homes of the citizenry. The barracks, usually built of cement and stone, are of good architectural construction, while the homes are hit or miss affairs made of rough stones and mud. In Podgoritza the contrast offered is very striking because the soldiers' barracks cover the high land above the little river that runs through the town, while the huts of the citizens are almost under them, clustered about the abattoir, or slaughter-house, down on the banks of the stream. These Montenegrin houses are built without windows or chimneys,



THIS VIEW OF PODGORITZA, MONTENEGRO, GIVES AN IDEA OF THE DIFFERENCE BETWEEN THE SOLDIERY AND THE CITIZENRY. IN THE BACKGROUND ARE THE BARRACKS IN WHICH THE GARRISON WAS HOUSED, WHILE ALONG THE STREAM, CLUSTERED ABOUT THE ABATTOIR, CAN BE SEEN THE TUMBLE-DOWN HOMES OF THE PEASANTS

little air finding its way in, while the smoke drifts out through the chinks and cracks as best it can.

Some of the shacks, put up to shelter the refugees that have poured into the town for assistance, are even built of tin from flattened out petroleum cans and scraps of old packing boxes.

The little country of Albania, in spite of its wild mountain inaccessibility, has at least one fairly well-built town. Tirana, nestling among the hills of this small nation, is almost fireproof. The roofing used throughout the town is an excellent variety of the tiling that is popular all over the Balkans and the buildings are constructed almost entirely of cement, plaster and stone. In spite of the clean exterior of Tirana, however, it was not until the American Red Cross mission came that the disease-breeding interiors were cleaned out in order to make Tirana typhus proof as well as fireproof.

The Red Cross workers in the Balkans have accomplished a great deal in improving the housing conditions there and teaching the inhabitants sanitation and hygiene. In fact, the work of the American Red Cross was largely directed, after the life and death emergencies of feeding and clothing were met, toward helping the population develop health agencies and instructing them in the right methods of working and living.

Milwaukee in Housing Venture

The Board of Estimates of the Common Council has included in the 1920 budget a $50,000 appropriation, to finance the initial steps of the proposed municipal housing venture. The appropriation was included in spite of the protests of members of the real estate board, who asserted the plan would tend to create a tenant class rather than a home-owning class.

May Spend Million for Houses

The Poughkeepsie Housing Corporation issued a statement proposing that a million-dollar housing project be entered into, with a charter giving broad powers to make mortgages, purchase and sell lumber and building materials, own, hold and sell real estate, build, sell and lease houses. It is planned to have stock divided into 40,000 shares at $25 per share. Charles Mitchell, director, stated if Poughkeepsie could build 2,500 houses every one would be filled by next fall. He said local industries want homes for 2,500 more workers as quickly as they can be furnished.

To Stop the Decay of Trees

Whenever the limb of a tree is blown off or becomes diseased the stump should be sawed off even and painted with creosote or tar paint, otherwise decay will set in and spread to other parts of the tree.

Oftentimes even a nail hole will so injure the bark that it will come off, leaving the wood underneath unprotected. If these spots are left bare, decay will set in and seriously endanger the tree. A coat of creosote or tar paint will prevent spread of decay and gradually the bark will grow over the bare spot.

Cotton Warehouses: Their Construction and Fire Protection

A profusely illustrated book of eighty pages on this subject, containing an appendix covering cotton warehouse plans, has been prepared by the U. S. Department of Agriculture. Those interested in cotton storage or cotton warehouse design who desire a copy may obtain one by sending fifty cents to the Superintendent of Documents, Government Printing Office, Washington, D. C., asking for Department of Agriculture Bulletin 801.

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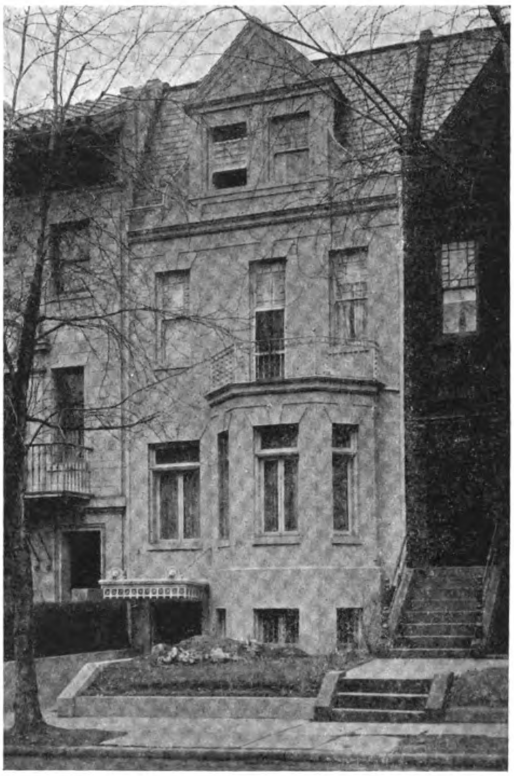
New Developments in Surface Treated Concrete and Stucco

Extract From a Paper Presented at the 1920 Annual Meeting of the American Concrete Institute

By J. C. PEARSON of U. S. Bureau of Standards and J. J. EARLEY, *Sculptor*

STUDIES of the experimental stucco panels at the Bureau of Standards led to the general conclusion that by adherence to well established practice, structurally sound and durable stucco could be secured, but that a great deal could be, or ought to be done to improve its appearance. Crazing and map cracking are common to most stuccos, and are especially objectionable on surfaces of fine texture; the monotony of the cold grey cement color is objectionable, and is only partly relieved by the use of white cement and mortar colors; and finally the muddy appearance (due to cement, or cement and pigment, being too much in evidence) is objectionable from an artistic standpoint. * * * * The question finally arose whether by careful attention to gradation of the aggregates the improvement in appearance might not be so enhanced that the cost would be a secondary consideration.

This idea came from the fact that Mr. Earley had succeeded in making complicated casts of concrete from specially graded aggregates in such manner that a very large percentage of the area of the treated surface (first wire brushed and then washed) was aggregate, and a very small percentage cement. Possibly due in part to the higher reflecting power of the surfaces of the exposed aggregates, the color of the concrete surfaces thus produced was determined almost wholly by the color of the aggregates, and only very slightly affected by the cement itself. A most convincing demonstration of this fact was obtained by constructing two concrete slabs containing exactly the same proportions of specially graded aggregate, the one being mixed with gray cement, the other with white cement. After the surface treatment of brushing and washing had been applied, only an expert could have determined which slab contained the grey cement and which the white.



OLD BRICK HOUSE OVERCOATED WITH EXPOSED AGGREGATE STUCCO, WASHINGTON, D. C. THIS IS THE FIRST INSTANCE IN WHICH THE MOLDINGS WERE BUILT OF STUCCO OF THIS TYPE

To digress still further for a moment, this method of obtaining permanent and very pleasing colors in concrete surfaces is such an important item in the development of the processes here described that it is worthy of fuller explanation. Before color in concrete surfaces can be under artistic control a technique must be developed which has for its medium the elements of the concrete itself. Although in problems involving appearance, aggregate is by reason of its greater bulk the major

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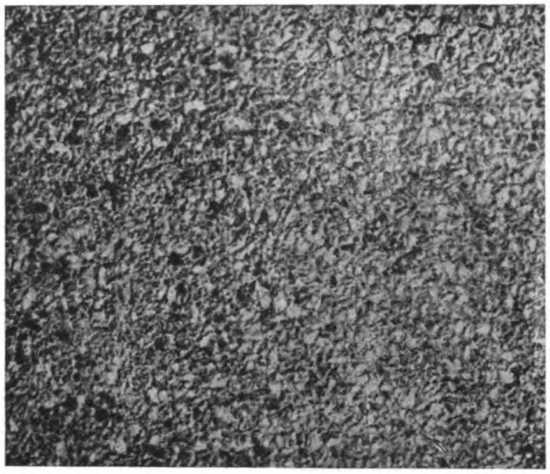
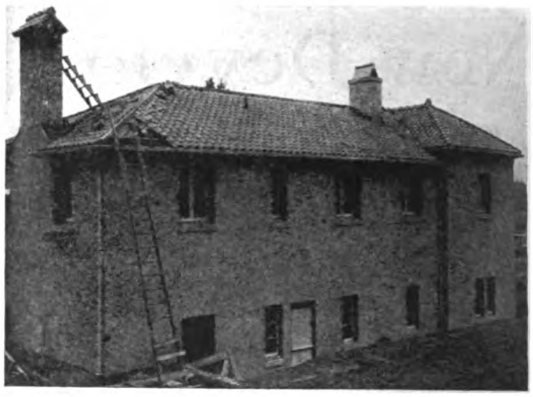
element and cement the minor, it is, nevertheless, the color of the cement which is the natural color of normal concrete. The reason for this is that the cement is finely ground and deposits itself, paint-like, over the surfaces of the aggregates and colors the whole mass. If, therefore, concrete is to receive its color from the cement paste, variation must be obtained by the addition of pigments to the cement, following the well established practice of mixing paints; but if the aggregate is to be the source of color, the concrete must be so designed and manipulated as to deposit in the surface the greatest possible amount of aggregate. Any great degree of success can hardly be expected in coloring



A CLOSE-UP VIEW OF CONCRETE SURFACES BY EARLEY-PEARSON METHODS

concrete through the cement. The choice of colors is restricted by chemical reaction with the cement, which causes them to fade or change; depth of color is restricted by strength requirements of the concrete, which limit very closely the amount of pigment which may be added to the cement. Therefore with the choice of color limited by one requirement and the depth of color by another, the cement itself must remain dominant. On the other hand, in coloring concrete through the aggregate all such restrictions are removed, and colors may be obtained from white to black through all the range of possible aggregates. An examination of drawings done in hard pastels and of paintings of the impressionist school suggests a technique in coloring which is peculiarly adaptable to the coloring of concrete by means of the aggregate. In the pastels tones are produced by hatching and cross-hatching with lines of pure color without blending on the surface of the drawing; in the paintings by spotting with pure colors one beside the other, and without



GATE LODGE, FORT LINCOLN CEMETERY. EXPOSED AGGREGATE STUCCO ON TERRA COTTA TILE. THE UNIFORMITY IN COLOR AND TEXTURE OF THE STUCCO SURFACE IS EXCELLENT

blending. In both cases the tones are effected by the blending of the light rays reflected from the picture to the observer. Wonderful depth and clarity of tone are characteristics of this school of coloring, and in it are to be found a great deal of exact knowledge and valuable precedent. When this knowledge is translated in terms of concrete aggregates, it is obvious that, if the aggregates are carefully selected and carefully placed, all the elements are present for the successful coloring of concrete surfaces. The results obtained in practice bear out the theory given above, and there is every reason to believe that the aggregate is the proper source of color for concrete.



DETAIL VIEW OF ENTRANCE TO MERIDIAN HILL PARK, WASHINGTON, D. C., SHOWING EXPOSED AGGREGATE SURFACES

Hence it was a most important conception that a similar result might be obtained with stucco. The success of this depended, first, upon securing a suitable gradation of the stucco aggregate, and, second, upon being able to apply such a mixture,

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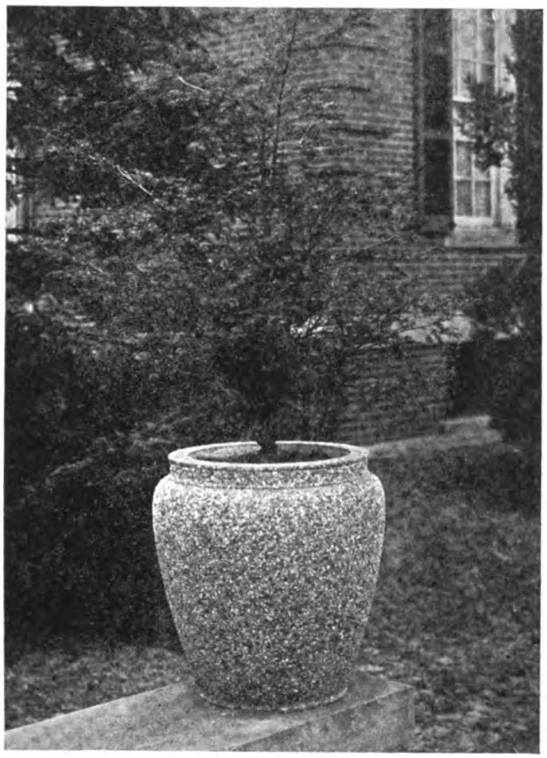
once it were satisfactorily compounded. It was known at the outset that these mixtures would be harsh, therefore plasticity no longer played any part in the calculations.

The laboratory program was fairly simple. The plan consisted simply in working first with concrete mixes in miniature, in which the sizes of cement particles, sand particles and coarse aggregates particles were reduced from the normal sizes in the ratio of about 1:10. * * * To make a long story short these experiments in the laboratory with the miniature concretes were very successful. Not the least important part of the laboratory work was the microscopic examination of the structures of these little concretes, which yielded many valuable suggestions for the gradation in size of particles, and for the proper proportions of the various sizes to yield the desired effects in the treated surfaces. The first attempt to apply the new product to a vertical wall was not wholly discouraging. Small areas were treated successfully, and eventually a terra cotta tile penthouse on one of the new laboratories of the Bureau of Standards was coated with the exposed aggregate stucco. This example was the forerunner of the work illustrated in this paper, and while it is not as free from imperfections as the more recent work, it has attracted most favorable notice. Fortunately, the mechanics who were selected for this work developed a real interest in the new type of finish, and subsequently a pride in the results of their work, which made for very rapid progress in the development of the methods of application and treatment. New requirements in thoroughness of mixing, consistency, and control of the absorption of the undercoats were met, and other improvements in the general process were gradually introduced as essential parts of the routine. Not all of the problems have been solved, but there has been very gratifying progress in the comparatively short time that the new stucco has been applied commercially.



CONCRETE FLOWER POT. NOTE THE DELICACY OF FORM AS COMPARED WITH THE MASSIVE CONSTRUCTION PREVIOUSLY ILLUSTRATED

The writers believe that the work here described shows progress in the development of concrete and stucco as materials worthy of a place in the highest type of buildings or structures. It is to be noted especially that none of this work is an imitation of stone. Close inspection shows at a glance that it is concrete, with textures that vary widely, but always characteristic of concrete. Furthermore, the material may be cast in any form the architect may desire, with all details complete; no cutting, tooling or dressing is required other than the prescribed treatment of cleanly exposing the aggregate. Finally the material provides a medium for the expression of color in infinitely greater variety than that which obtains in the natural building stones.



SOUTH PORTICO OF THE FIELD HOUSE, EAST POTOMAC PARK, WASHINGTON, D. C. THE PORTICO IS OF STUCCO ON TERRA COTTA TILE. BOTH CONCRETE AND STUCCO ARE OF THE EXPOSED AGGREGATE TYPE AND ARE OF THE SAME COLOR AND TEXTURE

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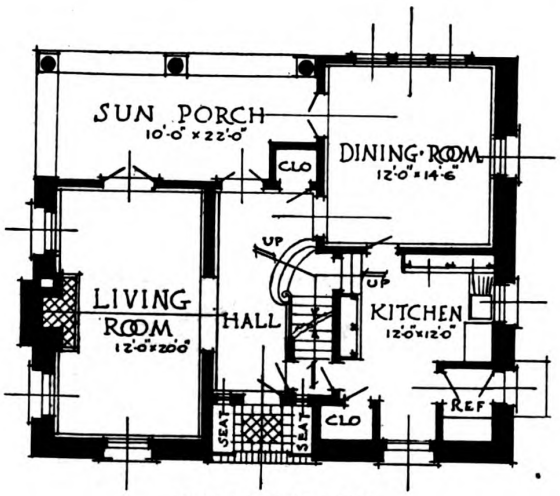
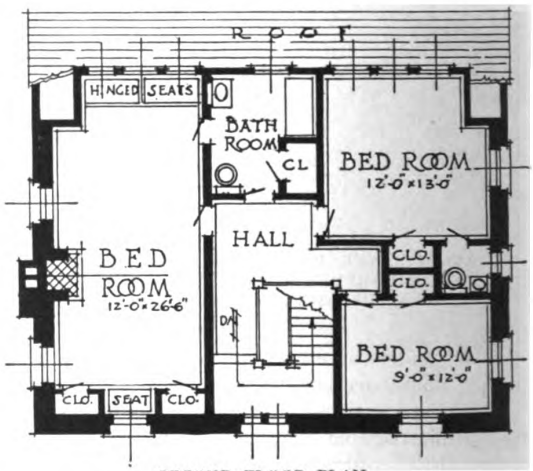


FIRST FLOOR PLAN



SECOND FLOOR PLAN

HOUSE OF E. LESLIE WINPENNY, ESSEX FELLS, N. J.

K. W. DALZELL, *ARCHITECT*

The home of Mr. E. Leslie Winpenny at Essex Fells, New Jersey is constructed with walls of local stone, a large portion of which was taken from the excavation. The stone is laid up in cement mortar with rather a wide joint, and varies in color from granite to rusty brown. The shutters are faded green and the rest of the exterior woodwork is white.

The site commands an extensive view to the rear for a distance of some twenty miles, with mountains in the background. Because of this, the principal rooms were placed to face the rear, the kitchen and maid's room being in the front. The hall extends the full depth of the house and opens onto a living porch. The dining room and living room also open to this porch. The owner's bed room and guest room likewise are at the rear, while the guest room has a private toilet and lavatory communicating with it, the owner's room connecting directly with the bath. There is a maid's bath room in the basement, near the laundry.

A Colonial effect has been carried out in the interior. The stairway is wide with relation to the size of the house. Over the entrance is a broad platform on which there is an old spinning wheel and rush bottom chair. A Grandfather's clock brought from England by Mr. Winpenny is placed in the lower hall and completes the picture. The living room fireplace, which is of brick, has a Colonial wood mantel. Over it is a family portrait.

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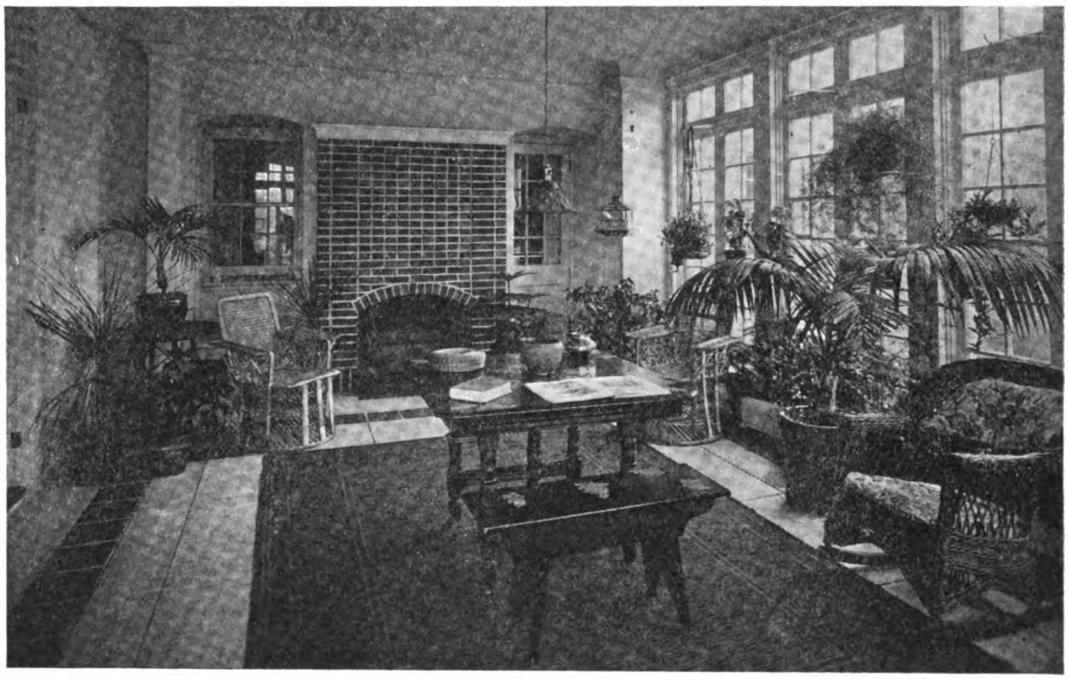
Decorating and Furnishing the Low-Cost House

Housing the Plants and Flowers—Part I.

THAT flowers in and about the home may become a most attractive decorative feature and one that shows the refinement and good breeding of the family, everyone will concede. In every well ordered household there is, to a greater or less degree, a certain regard for the decorative possibility of plants and liking for their care and propagation. This care need not be confined to seasons when flowers in these latitudes will grow out of doors but may extend throughout the entire twelve months of the year. To people who desire plants and flowers about them, it becomes necessary to provide in the house a suitable place where plants may be grown; where their location may be convenient and accessible and where at the same time the decorative features of such a location will add to the charm of the domestic interior.

In building the new home it is well to bear in mind that if there is in the family a predilection or a strong love for plants and flowers, there should be such structural provisions made as will add convenience and efficiency to the propagation of plants. It is therefore proposed in this article to deal more directly with the receptacles, accessories and subdivisions of certain rooms in the house where flowers may be raised rather than with the horticultural and decorative aspects of the subject. To the member of the family who sincerely cares for flower culture, these features will be as interesting and in a sense as essential as the selection of the heating



OBSERVE THE CORRECT USE OF THE JARDINIERE ON THE TABLE. SOIL SHOULD NOT BE PLACED IN A JARDINIERE, BUT THE POT CONTAINING THE SOIL. IT THEN SERVES TO CATCH THE SURPLUS WATER. IF THE SOIL IS IN DIRECT CONTACT WITH THE JARDINIERE, THE GLAZED SURFACE KEEPS OUT THE AIR AND KEEPS IN THE WATER, MAKING THE SOIL SOGGY AND SOUR. THIS ROOM MAY ALSO BE WELL VENTILATED. THE HANGING BASKETS ARE PARTICULARLY WELL PLACED. HEAT FROM A FIREPLACE IS NOT RECOMMENDED. IT IS LIKELY TO BE POORLY DISTRIBUTED AND TO SUFFOCATE THE PLANTS WITH ESCAPING GASES. HOT WATER HEAT MORE CLOSELY APPROXIMATES THE NATURAL CONDITIONS UNDER WHICH PLANTS GROW

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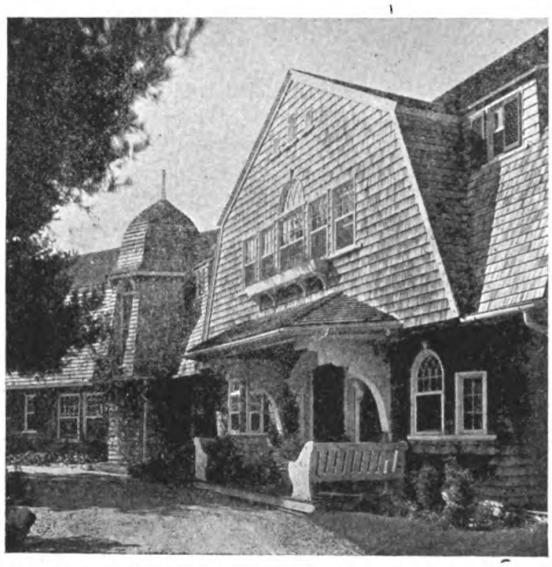
system, the character of the plumbing or the design of the electric fixtures in the house itself. It is hoped that what is set down here may form a basis of suggestion and prevent errors that are always costly in later correction.

LOGICALLY, the place for a window garden is in the bay windows of living rooms or those that are a feature of the large halls sometimes built



TYPE OF STRUCTURAL WINDOW BOX. WOULD BE BETTER IF EXTENDED THE WHOLE WIDTH OF THE SPACE UNDER THE WINDOWS

in the modern house. It will be necessary to give certain consideration to the construction of these spaces. Like any other place designed for special usage, the window garden can be more economically and conveniently installed at the outset than later on as a troublesome alteration.

A southern exposure is preferable, but a western or eastern, are also desirable. If it is possible to install a bay window off the dining room as a window garden, it is best to extend it beyond the usual space; it should be made at least four feet deep.



A WINDOW BOX OF THIS KIND IS SCIENTIFICALLY THE BEST THAT MAY BE PROCURED. NOTE THE SPONGES (CC) THROUGH THE RESERVOIR (E) WHICH RETAIN AND PROPERLY DISTRIBUTE MOISTURE AS NEEDED. RESERVOIR IS REACHED DIRECT BY POURING WATER INTO THE TUBE AT THE RIGHTHAND CORNER. SEE PAGE 42 FOR COMPLETE DESCRIPTION



STRUCTURAL WINDOW BOX HARMONIZING WITH THE WOOD TRIM OF THE HOUSE. SHOULD BE SET LOWER, AS THE GROWING FLOWERS WILL LATER SHUT OUT AIR AND LIGHT FROM THE ROOM

The floor of this space should be laid with square, red tile set in cement either inclined in one direction or centrally with a drain so that all the water used in sprinkling the plants may be readily drained away and no place left where dampness may ensue. It is also well to use tile on the wall from the floor to the window sills. Boxes should be made to fit the space allotted for them and should be lined after the



STRUCTURAL WINDOW BOXES, BUILT AS PART OF THE HOUSE. THE TALL-GROWING FLOWERS PREVENT THE USE OF SHUTTERS. TRAILING OR DROOPING FOLIAGE WOULD BE BETTER

fashion shown elsewhere in this article as in the case of window boxes. Provision should be made for double windows to exclude the cold drafts of winter, with ventilating panes in the double window at the top and bottom. There should also be placed in the ceiling as a ventilator some small form of register with cords leading into the room so that it may be opened and shut to secure a proper movement of air. Perhaps the best means of heating the window garden is by hot water heat, as this more nearly approximates the character of the outdoor atmosphere, but as most small houses will not be

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equipped with this somewhat expensive heating system, any method selected should be placed so as to maintain the most equable and easily regulated temperature controlled preferably by a thermostat. It is desirable to have a glass door in front of the bay window. This serves to regulate the temperature about the plants when that in the main part of the room is too warm or cold. Window shades are also desirable. They should be drawn down at night to keep out the cold air. The Venetian type, with wooden slots, is recommended.

The outside window box is an artistic feature of every window. It adds greatly to the exterior appearance and is a source of interest and pleasure to those within. A window box may be, of course, unrelated to the structural aspect of the house, in which case it is likely to be more troublesome and less interesting than if it were built into the outside wall below the window. The material of which the house is built is also appropriate for the window box, whether it be wood, brick or concrete, and its possession will be a source of interest and education



NOTE THE VENTILATORS ON THE LEFT SIDE. SEE THE DETACHABLE SAUCERS UNDER THE PLANT POTS. THE TILE FLOOR IS GOOD, BUT THE LARGE RUG IS SUPERFLUOUS. THERE IS PROBABLY A DRAIN AT THE LEFT, AS THE FLOOR SLOPES TOWARD THAT SIDE. A DOOR AT THE RIGHT FACILITATES REGULATION OF TEMPERATURE. THE HANGING BASKETS ARE FIRMLY SUSPENDED. THE LARGE RADIATOR AT THE REAR SHOULD GIVE PLACE TO PIPES RUNNING HORIZONTALLY AROUND THE ROOM. THE PLANT STAND IN FRONT OF IT IS FULLY DESCRIBED ON PAGE 43

Flower pot brackets add much interest to the window garden. They may be attached either to the walls or the ceiling and should be very strongly made of wood and capable of holding double the weight to be put into them. They should have movable arms that may be swung out of the way of curtains. The absence of all metal likely to rust should, as far as possible, be secured.

for the young people in the family that may profitably be availed of. Once flowers are planted, their further care requires little expense. Food and shelter to the plant are only water and light, and protection from extremes of temperature. Hardy species may be selected that will serve through the major part of the year.

A typical example of the value of window boxes

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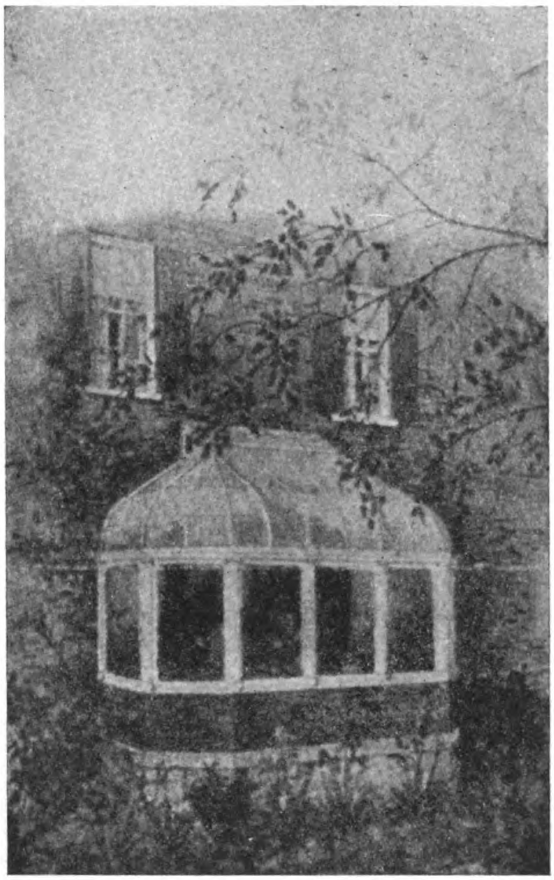
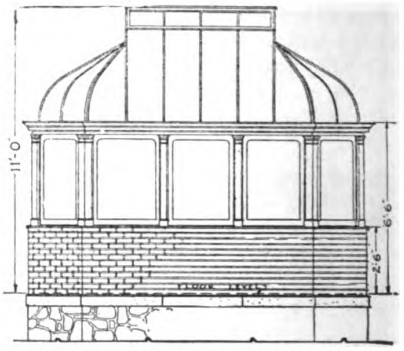
or plants was recently brought home to the writer. In a block of old brownstone fronts in the city, where the houses had seen better days but had now degenerated, a single house had window boxes. In no other way was it different from any other in the block. But the fresh touch of color was not only a delightful respite in viewing the drab monotony and uncared for appearance of the block, but bore with it a suggestion of personal pride and thrift that distinguished it from all its surroundings.

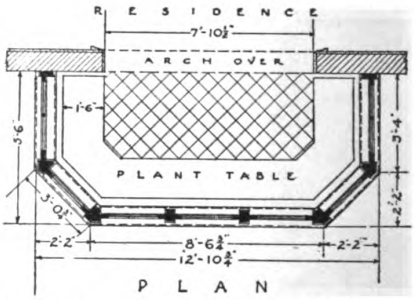
The outside flower box should be placed well below the window. Drooping or trailing vines, and sprays, or very short-stemmed flowers are most satisfactory. Tall flowers or high-growing foliage will obstruct light and air from the room, and will be broken by the action of shutters where they exist. The best type of window box, for either inside or outside use, is represented by the accompanying illustration. This shows the water reservoir (E), the false bottom (D), sponges through the false bottom (CC), soil (B), and body of box (A). In the right hand corner of the box will be noted a tube which extends from the reservoir upward through the false bottom and soil. This is for the purpose of pouring water into the reservoir as needed. The sponges draw up the water slowly and feed the roots of the plant in exactly the right amount to make its growth a certainty. Drainage, of the utmost importance in plant culture, is provided by a small opening in one end immediately above the line of the false bottom, preventing any danger of drowning out the plants from a heavy downpour of rain. This plan is known as sub-irrigation and is conceded as among the best ever devised for the growth of plant life. This method of under watering prevents the surface of the soil from becoming hardened or baked as in the surface-watered box or pot, one fact which alone saves the lives of many valuable plants. A liberal supply of air to the roots is constantly maintained through the sponges. The soil



THIS IS ABOUT 5½ FT. DEEP, 12 FT. 10 IN. LONG AND 11 FT. FROM FLOOR TO RIDGE. THE PLANT TABLE WHICH EXTENDS ENTIRELY AROUND NEXT TO THE GLASS IS 18 IN. WIDE, AFFORDING AMPLE ROOM. THIS CONSERVATORY MAY BE PLANNED FOR RIGHT ALONG WITH A NEW HOUSE OR ADDED AFTERWARD. IT HAS ALL THE NECESSARY ELEMENTS FOR SUCCESS



THE FRAMEWORK IS STEEL WITH CAST-IRON SILLS ON TOP OF THE FOUNDATION



EXTERIOR AND FRONT ELEVATION OF THIS COMPACT CONSERVATORY ARE SHOWN ELSEWHERE. AMPLE PROVISION IS MADE FOR PROPER HEATING, VENTILATING AND WATERING

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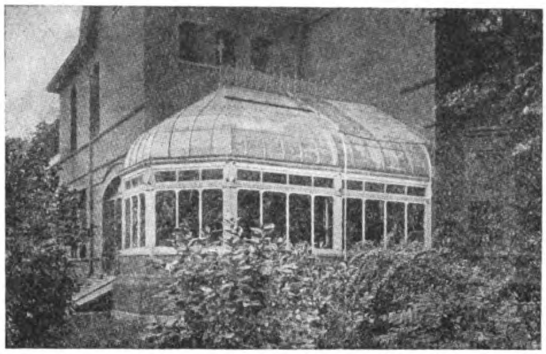
will always be found workable and loose, and the moisture evenly distributed.

Simpler plant stands of mahogany, wicker or other materials, the shape of window boxes, are available for indoor use. These are about nine inches deep, on stands of any height and width. The hollow part into which the plant is placed, is lined entirely with suitable metal provided with holes for drainage, and there is a space between the metal and wood into which surplus water filters. The metal part has handles that permit of its ready removal. Wooden window boxes should not rest directly on the window sill. The holes which should invariably be at the bottom of the box are for drainage of the surplus water. In the absence of an inside metal lining, the box should be raised an inch or so by strips at the ends, so that there is a space of about an inch between the bottom of the box and the surface upon which it rests. Otherwise it stands in water, contrary to the best interests of the plant. Jardinieres are not made to hold soil, but to hold pots into which the soil is placed. They are nearly all glazed and are never provided with outlets for water. In addition to being ornamental they also serve to catch the drip from the pot and to prevent excessive evaporation. Whatever the type of vessel in which plants are grown, there should always be openings in the bottom to permit the escape of the surplus moisture in the soil after watering. When the proper drainage is not supplied, the soil becomes water-soaked, the air is prevented from coming in contact with the roots, the soil becomes sour, the roots decay, the plant begins to droop, lose its leaves, withers and finally dies.

For individual plants, a saucer of the same material as the pot is part of the equipment. Some pots come with such saucers attached. These are highly undesirable, for the purpose is to catch the surplus water and remove it, and this will inevitably be neglected if the whole heavy plant has to be carried away and turned upside down. It is also proper to place the plant in a pan of gravel. This absorbs the surplus water from the pot and slowly evaporates it into the room, keeping the surroundings suitably moist.



THIS IS A GOOD TYPE OF CONSERVATORY WELL LOCATED ON THE SOUTH SIDE OF THE HOUSE. AFFORDS FACILITIES FOR VENTILATING, HEATING AND ADMISSION OF SUN AND LIGHT

Hanging baskets lend a grace to the decorative treatment of the house and living porch. They should be hung firmly on strong, small galvanized chains or wire strong enough to support the plant treatment of the house and living porch. They should be hooked into a material strong enough to sustain the weight of the filled basket, not, for instance, into a plaster ceiling sure to crack and cause the hook to loosen. The hook should have a decided "s" termination to prevent the chain from slipping off.

Hanging baskets are apt to become a nuisance when it comes to watering them. Hanging free, as they do, and high up in the warmer parts of the room, they dry quickly and need a large amount of care. Ordinarily they must be carried out of the house for the purpose, and need rewatering again almost as soon as they are ready to be carried back. The "Illinois" hanging basket is an ideal type. It is built on the principle of self-watering flower boxes for windows described above. This arrangement does away with the usual splashing and spilling of water. It holds moisture for days and neither drips nor leaks.



THE SIMPLEST AND MOST SUCCESSFUL WAY TO WATER A HANGING BASKET. SEE TEXT FOR FULL DESCRIPTION

The window garden will not only serve to add a very attractive decorative feature to the interior during the winter and fall months, but if the arrangement of boxes and pots for propagating plants is correctly carried forward, these window gardens will serve as places where seeds may be sown and the flowers transplanted out of doors as soon as it is safe to do so and thus secure at the earliest moment a most attractive out of door floral display.

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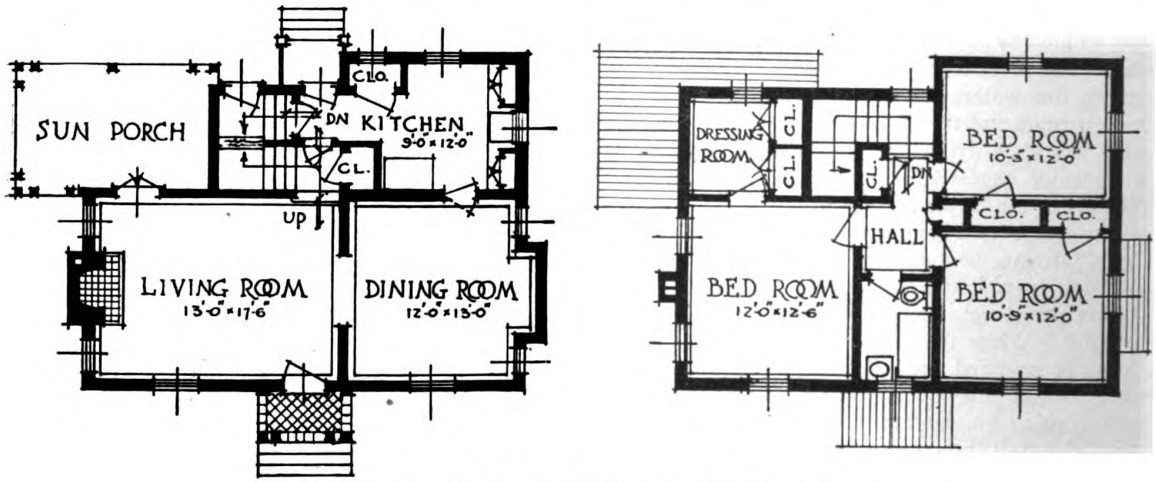

HOUSE OF FRANK A. LYON, MAPLEWOOD, N. J.

This house is sided with large shingles painted white and has green shutters and green stained roof. The house faces east. This provides the morning sun in the dining room and both a southeastern and western exposure for the living room. The kitchen is situated in the northwestern corner and the sun porch in the southwest, thus affording an ideal exposure to all rooms. Placing the living room lengthwise with the house and in connection with the dining room gives an appearance and feeling of space in a really small house, the foundation area of which is only 614 square feet. The bay or recess in the dining room for the sideboard, and the fireplace in the living room are on the same axis and terminate in an interesting vista from either room. The stairs are enclosed with the exception of the first two steps. There is a coat closet on the stair platform. The platform can also be reached from the kitchen practically making a back stairs.

The second floor has three bed rooms, all of good size, a bath and dressing room, an unusual feature in so small a house. If necessary the dressing room could be used for a small child's room, there being room behind the door for a crib. A ventilated air space is located above the second floor, thus preventing excessive heat in the second story rooms.

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The Possibilities of Brick as a Home Building Material

PART II.

By VICTOR D. ABEL

ONE of the most successful results of the housing constructed through the agency of the large Governmental organizations during the war was thoroughly to explode the old fallacy that groups or rows of houses if built of the same materials must necessarily be monotonous. Because of the extreme necessity of exercising all possible economy in the manufacture, transportation and use of building materials, it was usual for the War Department at Washington to allocate the materials in such manner that only brick, tile or frame, as the case might have been, could be used for the construction of exterior walls. There were only a few developments where a combination of materials was at all permissible and then only in small measure.

As a result, the problem as presented to the Architects and Town Planners was based on having to overcome a fancied drawback, so considered because of the too-familiar monotony of row after row of solid brick houses such as is seen in Philadelphia, Chicago or Baltimore. It was soon found, however, that the forced use of only one material became an advantage, for the proper placing of the buildings in relation to each other and to the street assumed its proper function. This was caused by the variation in position and grouping of the individual house units so as to give added interest to the entire grouping of buildings as well as to the individual units in the building. This is well shown in Fig. 1, a particularly interesting example of block arrangement.

Because of its availability and because it so well came within the category of the permanent housing

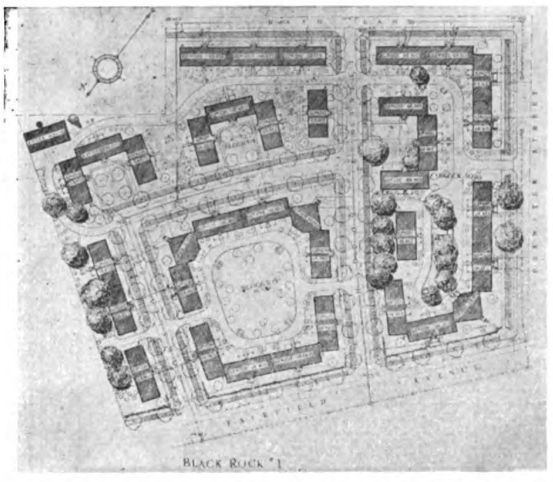

FIG. I.—PLOT PLAN, DEVELOPMENT AT BRIDGEPORT, CONN. R. CLIPSTON STURGIS, *ARCHITECT*

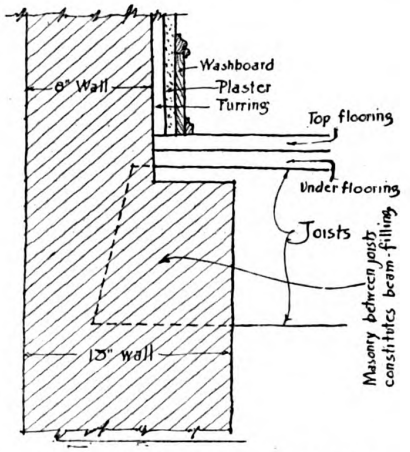

FIG. 2.—BEAM FILLING OF JOISTS

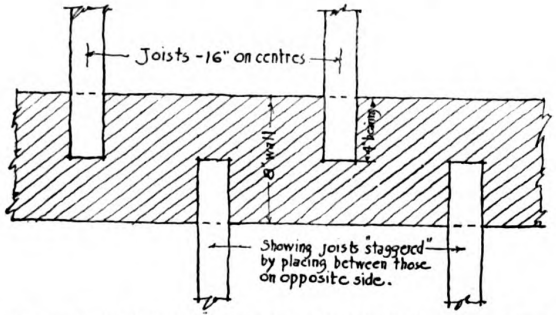

FIG. 3.—PLAN OF PARTY WALL, SHOWING HOW TO STAGGER JOISTS

called for by the enabling act of Congress creating the two large War Housing Departments, as well as in the study of the same problem by the individual housing corporations in such cities as Bridgeport, Chicago and Philadelphia, brick was repeatedly allocated or selected as the material to be used. The

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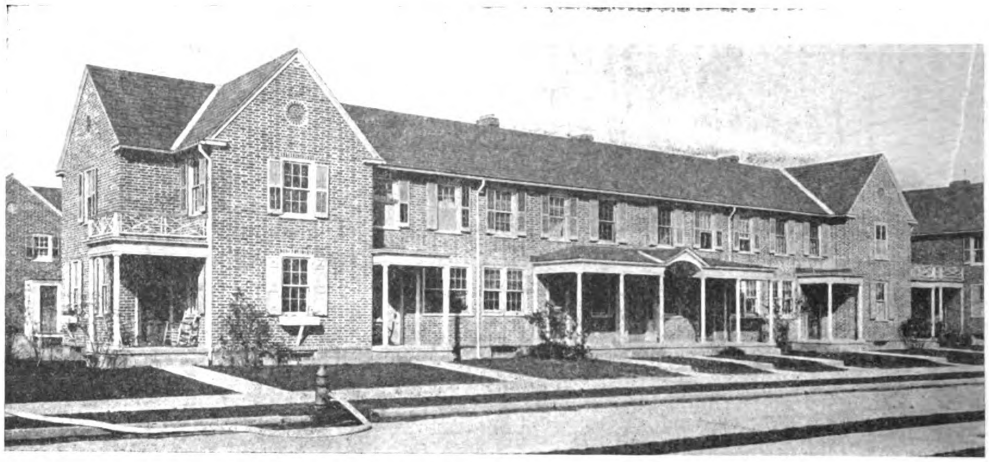

FIG. 4—FAIRVIEW VILLAGE—TYPICAL ROW OF HOUSES
ELECTUS D. LITCHFIELD, *ARCHITECT*

result at Camden, N. J.; Chester and Philadelphia, Pa.; Portsmouth, N. H.; Bath, Me., and Newburgh, N. Y., as well as the many private developments, has more than proved the wisdom of the choice.

As the experience of the Housing Departments added so much that is new to the advancement of knowledge in the construction of the small house in large numbers, the methods and results can be well taken as an example. So much of it is of real value and quite applicable to the building of homes for the private owner, either singly or "en bloc." Unfortunately for their final appearance, the photographs have necessarily been taken before the planting has had time to grow into the setting desired.

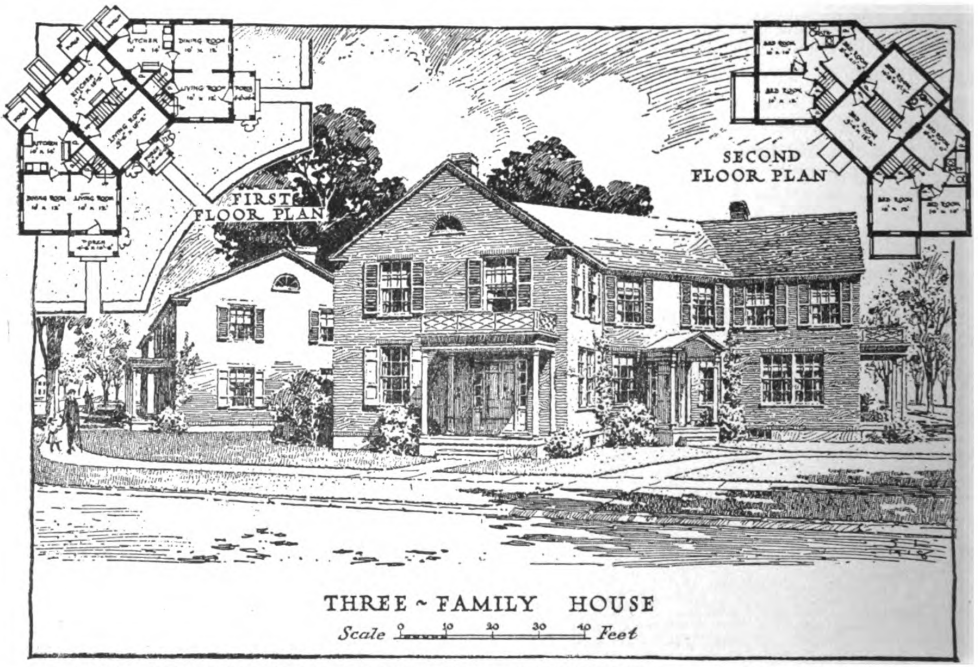

FIG. 5—FAIRVIEW VILLAGE—TREATMENT OF CORNER HOUSES, WITH PLAN
ELECTUS D. LITCHFIELD, *ARCHITECT*

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FIG. 6—FAIRVIEW VILLAGE—SINGLE HOUSE
ELECTUS D. LITCHFIELD, *ARCHITECT*

In the construction of houses for war workers the extreme necessity of using a minimum of materials wherever possible resulted in the building of thinner walls, together with other features of construction not directly related to brickwork, such as had never before been accomplished under normal conditions where permanent and good houses have been the sought-for results. Carrying out this economy it was found that brick walls, both bearing and non-bearing (if not in conflict with local building laws) could be built 8″ thick above the first story instead of the previously accepted minimum of 12″. It was considered and proved that such thickness in a properly constructed wall was quite sufficient in strength for the small houses of brick. This was particularly true if built as the most of them were, in groups and rows of varying lengths. The economy of such construction is quite evident when it is considered that 50 per cent of material alone was saved in every such wall.

While the width of the foundations was also sometimes decreased, it was only as an extreme war measure, for good practice has found it advisable to build a wall beneath the surface of the ground for



FIG. 7—BRIDGEPORT, CONN.—VIEW AT CORNER
R. CLIPSTON STURGIS, *ARCHITECT*

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enclosing cellars of not less than 12″ if of brick or concrete and 16″ if of stone. This thickness is desirable because the problem of an ordinary foundation wall is not so much the load of the wall as it is in keeping out the dampness and in resisting the horizontal pressure of the surrounding earth. For the same reasons a foundation wall should always be a solid wall.

With the use of the 12″ wall for foundations the necessity of wide footings is eliminated, unless the earth is soft or of a kind not able to bear a load of at least two tons per square foot, which is the usual allowable minimum bearing capacity of good soil. As the cheapest foundation wall is generally built of the materials most easily secured at the site, the present slight difference in the price of home building materials makes brick more and more available for this purpose when it is *ready at hand* or being used in the upper walls.

In the construction of foundation walls of brick, cement mortar in the proportion of three parts of sand to one part of Portland cement, should be used, adding thereto not more than 10 per cent by volume of lime. The addition of the lime makes the mortar



FIG. 8—BATH, ME.—TWIN HOUSE
R. CLIPSTON STURGIS, *ARCHITECT*

more easily worked, as straight cement mortar is too "short" (as it is termed when too stiff to spread smoothly) for brick work.

Above the first floor level a mortar composed of cement, lime and sand is most used. This mortar, known as cement-lime mortar, consists of six parts sand, one part well-slaked lime and one part Portland cement. The lime and cement are mixed separately, each with one-half the total quantity of sand and the entire batch mixed together. In some sections straight lime mortar is used. This makes a good wall, if the lime is well slaked and the mortar properly mixed, but it takes longer to reach its final "set." Any coping walls above the roof should, however, be laid in the same mortar as the foundation walls.



FIG. 9—NEWBURGH, N. Y.—STREET VIEW
LUDLOW AND PEABODY, *ARCHITECTS*

Wherever joists rest in exterior brick walls care should be taken to see that they are properly beam filled (as the masonry filling between timbers or iron work is called —see Fig. 2). If this is not solidly done, particularly in an 8″ wall, it does not afford good bearing for the wall above and weakens the entire construction. In case of fire there is also more likelihood of danger to the wall should the joists be burned and the ends drop out.

Where joists rest on 8″ thick party walls, careful placing of the joists is essential to strengthen the wall and reduce the fire risk. The joists should be "staggered" or set not directly opposite each other so as to leave at least 4″ of solid masonry between the ends of timbers in adjoining buildings. The



FIG. 10—NEWBURGH, N. Y.—GROUP OF FOUR HOUSES
LUDLOW AND PEABODY, *ARCHITECTS*

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proper way to accomplish this result is shown in Fig. 3. Where the 12" wall is used (and this is advisable in all houses of over 18 ft. frontage) the joists can be placed opposite each other as there will still remain the 4" of masonry between the ends in addition to 4" bearing on each side of the wall.

An additional and not fully realized advantage in the brick party wall is in the fact that, if a house is built, and the next house will be later added or altered, it is possible to cut out the existing wall for the bearings of joists with less trouble or weakening of the wall, perhaps, than in any other material. less the house is of a size requiring such thickness, it is an added precaution which could well be taken and it depends entirely upon the conditions under which the house is built and the appropriation available.

With the problems of construction simplified and standardized and the plans fixed upon with a minimum of variation, study of the exterior design ranked next in importance. It was found that in brick as in frame, interest was gained without noticeable increase in expense by variation in the external use of the material. In brick it consisted in

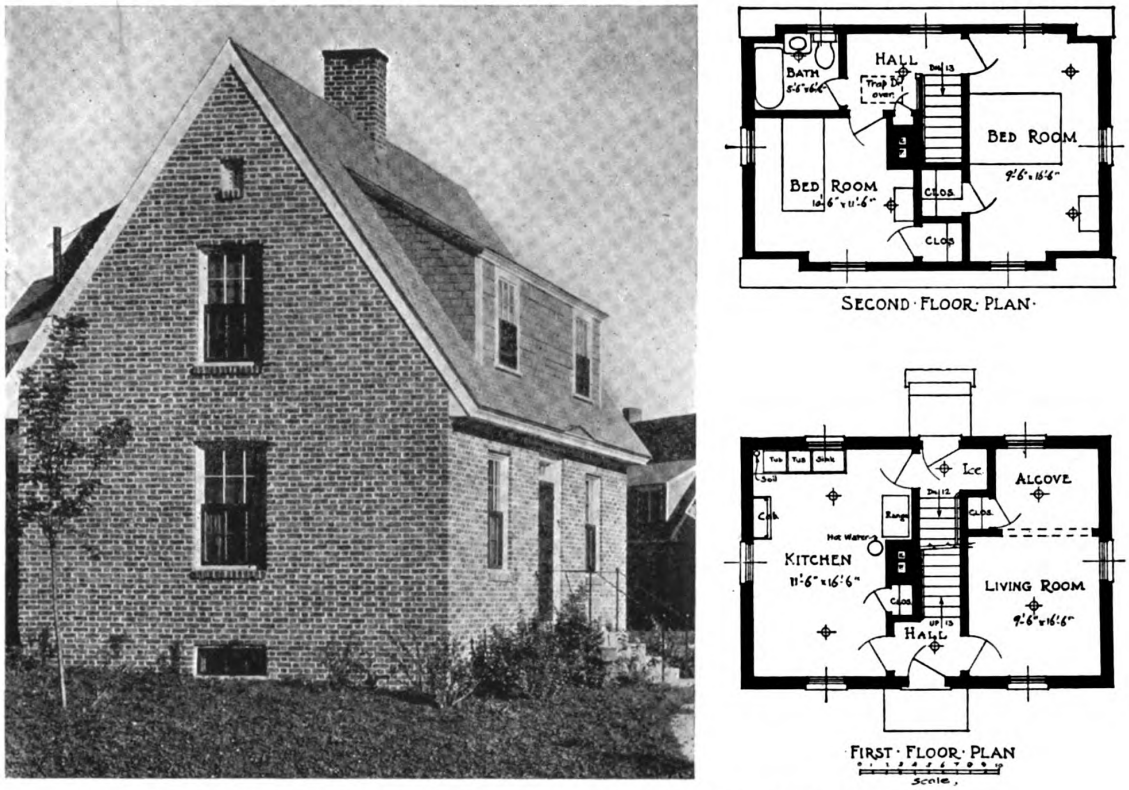

FIG. 11—PORTSMOUTH, N. H.—SINGLE HOUSE, WITH PLAN
KILHAM AND HOPKINS, *ARCHITECTS*

This feature has been recognized in the building laws of Philadelphia, which permits party walls, common to two properties to be constructed of brick as the only permissible material.

In the building of a separate house, where the gable wall runs up into the third story, the thickness of the first story walls under such gable ends should be increased to 12".

Where the individual is building his own house, it might also be well to consider constructing all bearing walls 12" in thickness. While not essential, unthe method of bonding and jointing as well as in the distribution and proportion of openings. Especially is this most successful in Yorkship, or Fairview Village, as it is now officially known, near Camden, N. J., the largest of the housing projects brought near its proposed completion as a development. It is laid out as a self-contained village, with its own community centre, stores, athletic field, amusement buildings, schools, apartments, etc. In view of the rich traditions of the neighborhood it was felt that the exterior walls could be none other than brick,

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as a result of which this is carried out in by far the greater number of buildings.

Fairview contains some few single and twin houses, but the greater part are in rows of varying length, such as shown in Fig. 4. The layout of the village afforded excellent treatment of corners at



FIG. 12—BUCKMAN VILLAGE, CHESTER, PA.—ROW OF TYPICAL HOUSES
G. EDWIN BRUMBAUGH, SIMON & BASSETT, *ARCHITECTS*

the main streets radiating from the central square, by the unusual plan and the locations of the porches as is well illustrated in Fig. 5. Sometimes these corner houses are made the beginning of rows instead of being individual units of three houses.

With a superintendent particularly sympathetic to the use of brick, it was possible to vary the exterior walls by changing the bonding and jointing in the different groups, and in some instances where it was possible to place a single house at the end of a vista (see Fig. 6) to make a distinctive change. In some few cases this was carried to the point of using a diaper or other pattern instead of a regular bond. It was in this development that it was found that such changes in bonding and jointing made no appreciable difference in the final cost of the brick-

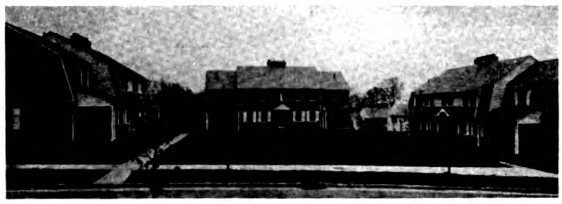

FIG. 13—BUCKMAN VILLAGE, CHESTER, PA.—GROUP OF APARTMENTS
G. EDWIN BRUMBAUGH, SIMON & BASSETT, *ARCHITECTS*

work. While most of the woodwork in these houses was painted white, variation was also obtained by the use of different colored blinds and doorways.

In Bridgeport, Conn., where the housing situation was acute even before the war, a housing company which erected a number of houses decided, after consideration of all materials, that brick was the most desirable for use in permanent construction. This having been settled before this country entered the war, the same policy was continued when the Government erected the series of houses and apartments scattered throughout the city. Fig. 7 shows the type of buildings built here, the view being taken at a corner of one of the main streets. The English bond was used in the majority of buildings in these developments, of which the plan in Fig. 1 shows the relation of the houses to each other.

Mr. R. Clipston Sturgis, the architect for the Bridgeport projects, also designed that at Bath, Me., of which the twin house shown in Fig. 8 is a particularly good example. The common bond, with wide white joints, was here used.

At Newburgh, N. Y., with the added charm of a wonderful natural setting it was quite possible to develop vistas by the placing of houses at the ends of streets in such a manner as not to give the ap-



FIG. 14—SUN HILL, CHESTER, PA.—VIEW ALONG TYPICAL STREET
BISSELL AND SINKLER, *ARCHITECTS*

pearance of lack of space. It is not possible to imagine a more attractive view than that shown in Fig. 9 with the end of a double house facing on an adjoining street, and with brick apartment houses to the right and left. The type of buildings forming the short rows is well illustrated in Fig. 10. The arrangement of porches and of roofs combined with the setbacks of the two centre houses is one of the best types of grouping without additional expense. In this development the common bond was used in combination with a dark mortar joint, and the woodwork painted in varying colors, dark and light.

While the necessity of building the most of the houses in any industrial development results most naturally in the use of twin houses and rows of varying lengths, yet there is also the necessity of introducing single units of low cost for the foremen and higher paid men. Such a house is that used in

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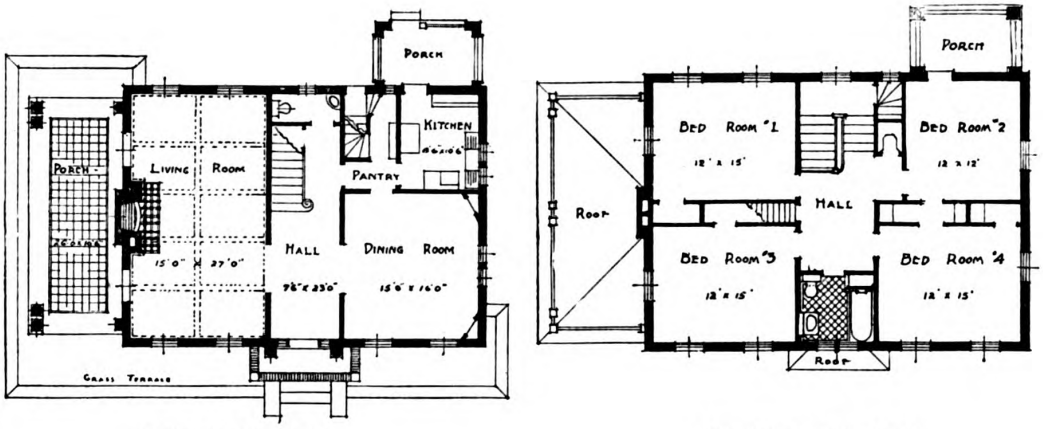

FIRST FLOOR PLAN

SECOND FLOOR PLAN

FIG. 15—HOUSE AT MILTON, PENNSYLVANIA
WALLACE AND WARNER, *ARCHITECTS*

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Portsmouth, N. H., Kilham & Hopkins, Architects, shown in Fig. 11. As the plan of this house is also particularly good because of its compactness, it is shown with the house. The brickwork is laid in Flemish bond in contrast with the English bond shown in the twin houses in the background which was the bond used in the majority of buildings in this project.

The row of houses shown in Fig. 12 indicates the charming character of Buckman Village, near Chester, Pa. The exterior walls are varied by the introduction of some clapboarding in one of the end houses. Apartments being an essential part of any development the treatment of these groups in Buckman is of particular value in the consideration of materials for housing projects. A fire resistive permanent material is here desirable, even more so than in the case of houses, and the arrangement of the brick buildings in Fig. 13 indicates how well they can be treated. In fact, the grouping here shown



FIG. 16—HOUSE AT FOREST HILLS GARDENS, LONG ISLAND
GROSVENOR ATTERBURY, *ARCHITECT*

with the lawn in the centre can well be used also in the placing of houses and this has been used with effect in a portion of the plan in Fig. 1.

The view of a street in Sun Hill, near Chester, Pa., shown in Fig. 14, is a most unusual and successful solving of the problem of very inexpensive houses located upon what is practically a hillside and which was the only site available. The terracing of the houses, together with the simple roof treatment is of particular interest, and well met the requirements of the lowest possible cost without being forced to resort to the deadly monotony of solid rows from street corner to street corner.

The housing development alone, however, is not the only field for the small house of brick. To the man who understands the material and appreciates its mobility of expression there is no end to the variety of treatment of the brickwork. Two particularly good examples of brick houses, of widely different types are shown in Figs. 15 and 16. The first, by Wallace & Warner, Architects, is a simple and dignified colonial house, where the white of the woodwork is very effective against the dark red of the brick. This is the house built of the discarded brick mentioned in the first of this series. The brick is laid in a running bond, similar to the common, but with the rows of headers which otherwise occur at every seventh course, eliminated.

The house in Fig. 16 at Forest Hills Gardens, Long Island, is by Grosvenor Atterbury and is typical of the excellent treatment of brick in the wall throughout this community. The brick are laid in a common bond, with header courses every fifth course, with wide joints of the natural color of the sand.

While no attempt has been made to select the illustrations in this article with this point in view, it is interesting to note that many of the buildings shown are built of the so-called "common" brick, without more selection than is necessary at the site to use only the best and hardest burned brick in the outside face of the wall. A consideration of the types shown indicates that, after all, much of the success of the appearance upon completion is due to the bonding and jointing.

This feature is important whether either selected common or face brick is used for facing the wall. The latter type of brick can, of course, be used to advantage when the appropriation permits.

(To be continued)

Insurance Company to Lend 50 Million for New Homes

For aiding, financially, the smaller home owners of the United States, The Metropolitan Insurance Company has lately announced that a fund of 50 million dollars is available for loans. This company has practically withdrawn from the big real estate investment field and is devoting all its investment resources to loans on homes to cost not more than $10,000.

Loans will be made only for new homes and amounts up to 50 per cent of the value of the land and improvements will be loaned. Fifteen years is the duration of loans and the interest of 6½ per cent is payable semi-annually. Valuation will be made on a basis of bare costs, the cost to be determined by a local bank or organization acting as agent for the company.

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Editorial

Just Ahead—What?

TRUE prophets to-day are relatively as scarce as in the past, but there may yet be found on many a street corner those who claim to have a sure tip as to what will happen next. Beware of such wiseacres. There are *no sure tips* on the future of building construction. So many factors enter into the present unsettled conditions, and these are so constantly being added to, that predictions may be upset by the slightest change. Out of the haze of this uncertainty features may be discerned which seem to point to the right path of future development.

Increased production was correctly believed to be the solution of the high cost problem. The law of supply and demand cannot be altered; therefore, it seemed but logical, when the demand exceeded the supply, to plead for increased supply. Relief has come unexpectedly from another quarter. Almost simultaneously, several causes have acted to decrease the demand. Unfavorable rates of exchange curtailed foreign demand, and prices had reached such a stage that the public struck. They refused to buy. Merchants, unable to realize much needed cash from stocks in hand, and finding rates on loans excessive, reduced the retail prices on their goods from 20 to 50 per cent to quickly turn them into cash. And then, a peculiar thing happened. Material which had been accumulated during the last few years and held in warehouses for higher prices, the existence of which was almost unknown, was suddenly dumped upon the market for whatever it would bring. Immense halls have been used for these "direct to the public" sales. And so, for the time being, for certain essential commodities, lower prices reign. A view of other industries reveals conditions which will also tend to a lowering of prices.

The great building boom, confidently predicted last Spring, has not materialized. Several causes contributed to this, but chief among these were high prices. A house which could be built for $5,000 in 1914 now costs two to two and one-half times this amount. Yet houses were never so greatly needed. These very high prices, however, have deterred the financial institutions from lending the former 60 to 80 per cent. margin on mortgage. Second mortgages are practically unobtainable, and so those willing to build are unable to do. This present difficulty must correct the evil which caused it. No manufacturer or dealer in building materials can afford idleness. Better by far to accept less profit than to have the market dead.

UNTIL now, manufacturers have not had to face the problem of marketing their products. They have been sold up for months ahead. A careful study of construction and production figures shows that this condition will soon end. Were it not for transportation trouble, it is doubtful whether it would not already have ceased. Rail transportation is improving but slowly. If supplemented by motor truck auxiliary as urged by this journal, the freight congestion will soon be relieved. The monthly lumber review, printed elsewhere, shows that for the first time in months the production of lumber in many districts exceeds the demand.

The curtailment of production in certain industries, such as the shoe factories, where we unconsciously had created a large surplus, will release men for employment in other industries where they are now needed. Thus gradually relief from the labor shortage will occur. The great industrial city of Detroit, which has gathered workmen to her boundaries until her population is probably one million, is now losing many of them. Figures obtained from storage warehouse men and moving van operators, and also from the public school enrollment records, show that families have been leaving the city during the last three months at the rate of about 500 a month. It is estimated that about 26,840 persons, counting single persons, have left Detroit since March 1, while in the same period about 1312 families and a total of about 11,808 persons moved into the city. This would leave a direct loss of approximately 14,672 persons. The school enrollment records conclusively show that the exodus began about three months ago.

Mechanics included in this exodus, as well as those released from other centers, can find useful employment where a real shortage now exists.

A confident feeling prevails that the peak in prices has been reached and that we are now on the price down grade. A reasonable steady decrease in prices of essential commodies to a point where only a legitimate profit can be realized, with all inflation squeezed out, will undoubtedly bring about healthy business conditions. A careful engineering of the descent will eliminate all chances of panic.

Like a trip in an airplane, to those who rode the trip has been delightful and the heights reached almost brought intoxication, but now the journey is about over and the most difficult part—a careful landing—is just ahead. A careful clear-headed pilot is needed, and America has at no time been so poverty-stricken in great men as to fail to produce one in an emergency.

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A Semi-detached Four Family House

By G. A. LUCKEY

This Attractive Multi-family House Built in Los Angeles, Cal., Represents a Type Popular on the Pacific Coast

IN many respects the flat building here shown is worthy of more than passing study, by reason of its convenient, compact and well arranged plan combined with the simplicity and economy of its construction. The arrangement involves four flats of five rooms each, and as the four are practically alike in their arrangement it will be sufficient to describe the accommodations of a single family. The entrance to the second floor flats are placed together in the center of the building and are protected by a small porch. The first floor flats are entered from large porches at either side of the building, these porches being quite private, having separate entrances from the street.

Each flat has in addition to the five rooms a bathroom and a screened porch. The living-room in the case of the first floor flat is entered directly from the porch, which is 8x13 ft. in size. The floor is cement. The living-room is 13x16 ft. in area; has high casement windows and so has plenty of light and ventilation. There is a tiled open fireplace on one side, with a well designed mantel finished in ivory enamel to match the rest of the woodwork.



ARTHUR S. HEINEMAN, *ARCHITECT*

The dining-room is 12x14 ft. and is separated from the living-room by an arched opening with a bookcase on one side, while on the opposite side, which is similar in detail, is the gas radiator which supplies heat for these two rooms. The dining-room

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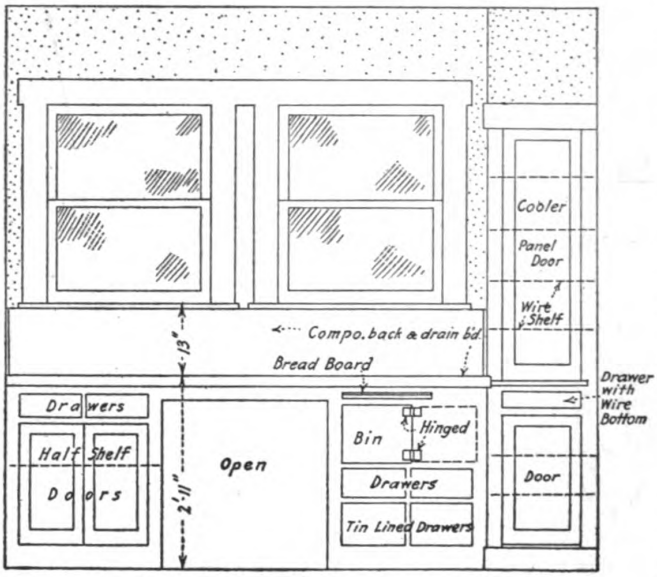
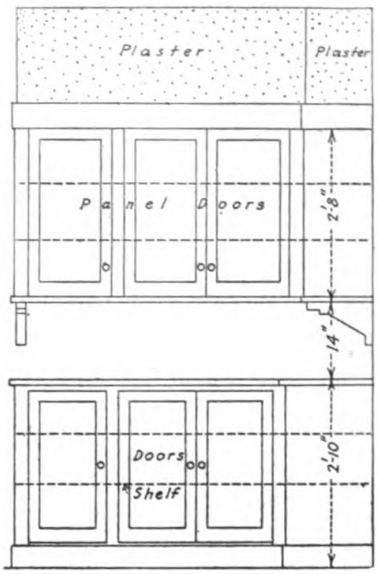


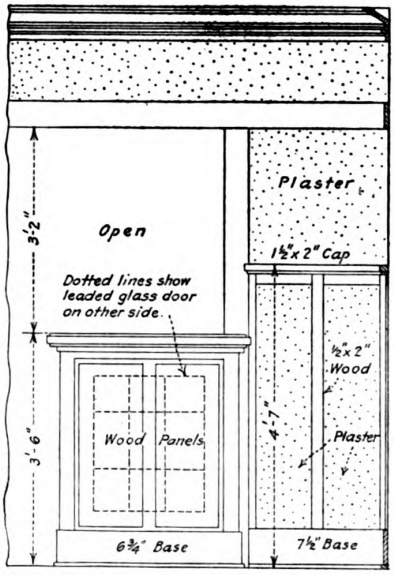
Elevation of Windows, Sink and Cooler in Kitchen. Scale **⅜ in. = 1 ft.**



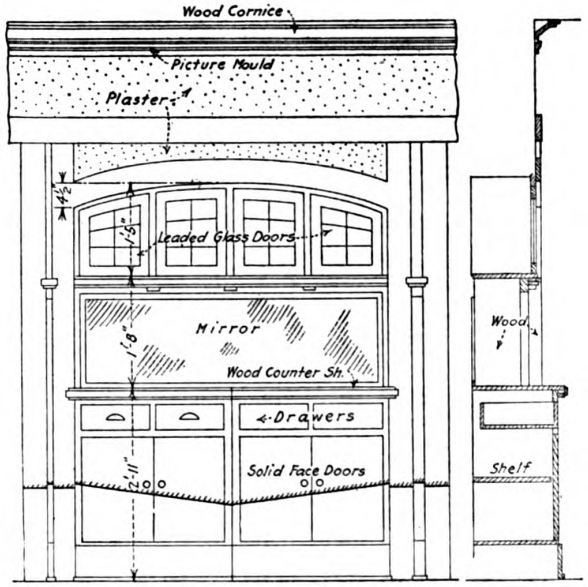
Plan of Bin



Elevation of Kitchen Cupboard. **Scale ⅜ in. = 1 ft.**



Elevation of Book Case and Dining Room Wainscot. Scale **⅜ in. = 1** *ft.*



Elevation and Section of Dining Room Buffet. **Scale ⅜ in.=1 ft.**

INTERIOR DETAILS

A SEMI-DETACHED FOUR FAMILY HOUSE IN LOS ANGELES, CAL.

ARTHUR S. HEINEMAN, *ARCHITECT*

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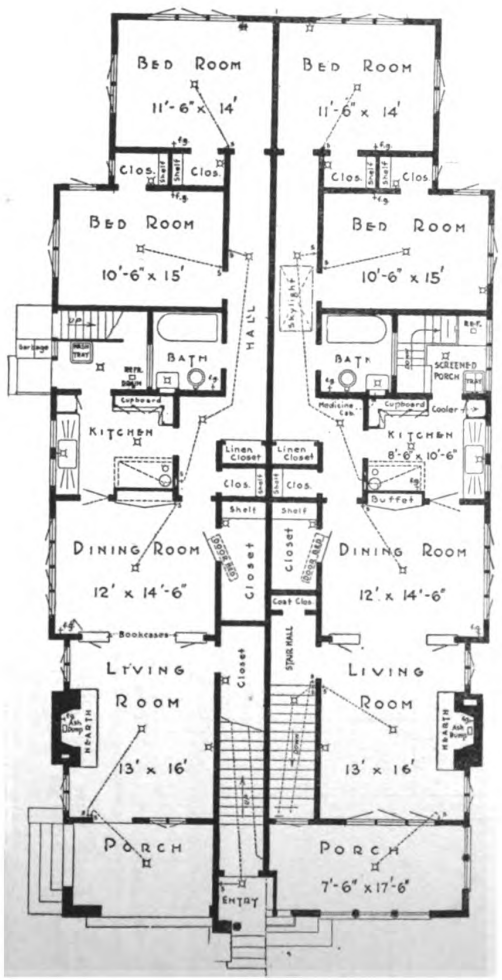
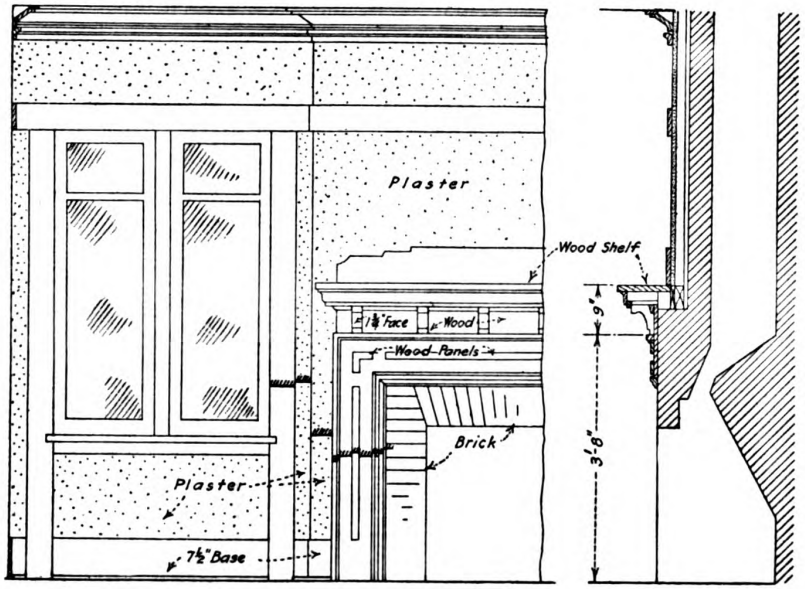


Scale $\frac{1}{16}$ *in.* = 1 *ft.*



ABOVE, ELEVATION AND SECTION OF FIREPLACE IN LIVING ROOM.
Scale $\frac{3}{8}$ *in.* = 1 *ft.*

AT LEFT. HALF PLANS OF FIRST AND SECOND FLOORS. SCALE
Scale $\frac{1}{16}$ *in.* = 1 *ft.*

A SEMI-DETACHED FOUR FAMILY HOUSE IN LOS ANGELES, CAL.
ARTHUR S. HEINEMAN, *ARCHITECT*

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has a group of casement windows at one end, a built-in buffet of interesting design, and in the large closet opening out of one side of the room is a disappearing bed. The woodwork of these rooms is Oregon pine finished in ivory enamel, the trim being simple without moldings, the only molded woodwork being on the mantel buffet. The doors are brick veneered of the two-panel type, finished mahogany, and the hardware is cut glass and brass.

There is a door at either side of the buffet, one opening into the kitchen and the other into the hall. The kitchen is 10x11 ft. in size and though small is very complete. The sink board in front of the windows is of composition, is 3 ft. above the floor and has drawers and cupboards underneath. There is a "cooler" at one end, as indicated on the floor plan. On one side of the kitchen are cupboards and drawers and on the other is the space for the stove with ventilating hood over it. The woodwork is finished in gray enamel.

The screened porch opening off the kitchen has a laundry tub, a trapped drain for refrigerator waste and for a Humphrey No. 40 cottage heater, which supplies all fixtures.

Opening from the hall are two bedrooms, bathroom and two closets, one of which is for linen. The bathroom is 6x7 ft. in size. These rooms as well as the hall are finished in ivory enamel and the walls are covered with dainty light-toned paper. There are large casement windows in the bedrooms. The floors throughout are oak, slightly colored and finished with shellac.

As the building is in California, the problem of heating it is simple. The living-room has an open fireplace, and there is a gas radiator in the bookcase, which furnishes heat to the living-room as well as to the dining-room. The two bedrooms and bathroom are heated by portable gas stoves.

There is a speaking tube from the second floor flats to the entrance on the first floor; also an electric automatic door opener, operated from the second floor.

The foundation walls are of concrete 8 in. thick and the porch floors and steps are also of concrete. The structure is frame, the outside studs being 2 in. x 4 in. and the partition studs 2 in. x 3 in.; the first floor joists are 2 in. x 6 in. and the second floor joists 2 in. x 10 in. The mud sill is 2 in. x 6 in., the girders 4 in. x 6 in. and the posts 4 in. x 4 in. The frame is thoroughly well braced and there are fire stops at each floor.

The exterior is covered with metal lath to which the cement stucco is applied and finished white. The roof is composition.

All the exterior woodwork was treated to three coats of white paint.

The building was designed by Architect Arthur S. Heineman, Los Angeles, Cal.

Manufacturers of Common Brick Adopt Standard Size for Their Product

Uniform Standard Size Now Realized for Practically All Brick

AT the Second Annual Convention of the Common Brick Manufacturers' Association of America, recently held in Columbus, Ohio, a paper was read by William Carver, Assistant Secretary of the Association, on "Why There Should Be a Standard Size for Common Brick." Among other things Mr. Carver said:

"Taking up in detail the advantages to the architect, the engineer and the contractor in having a uniform, standard size, it is now recognized that in most localities common brick are entirely suitable for facing purposes. In making working drawings for brick buildings the architect finds it impossible to dimension such things as window and door openings and pier and pilaster sizes until he knows the size of the brick which will be supplied for the project. This means much lost time and motion, and if it is decided to change over to another brick, a great deal of money is lost in changing dimensions all over the drawings.

"From my own experience, I can assure you that the architect will welcome heartily a standard size brick, so that no matter where the building is that he is designing he can go right ahead with his working drawings.

"The considerations which affect more particu-

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larly the engineer are also of great importance to the architect. The structural engineer is interested especially in the strength of a building and its parts. He must have definite formulas of strength of his materials. These formulas are derived from actual tests generally made by concerns specializing in such work, or by universities, etc. He can obtain formulas covering the strength of wood, steel or cement down to the last fraction of the pound. When he comes to brick, however, he is forced to do some guessing, owing to the variation in the sizes of the bricks which are tested.

"When common brick are used to back up face brick, both the face brick and the common brick should be of the same size. The weakest part of a wall is the mortar joint and where the mortar joint has to be increased the wall is weakened just that much. Where the face and backing are of different sizes the courses must be evened up by increasing the mortar joint either on one side or the other.

"A bricklayer cannot work fast when the brick are of different sizes and any factor which tends to increase the cost should be eliminated as far as possible.

"When a contractor is figuring a building he should be able to know beforehand just how many brick go into a wall. Upon this depends also the amount of bricklayers' time required to lay the brick, and the amount of material in the mortar.

"There is, I believe, great value in having one standard for all bricks, whether face or common.

"When speaking of the standard size I refer to the size 3¾x2¼x8. There are several reasons why, in our opinion, this size should be adopted by our own association. Figuring with a joint of ½" two-headers plus a joint just equal the length of a stretcher. This makes it possible to use almost any bond or pattern desired on the face of the wall without difficulty.

"The same consideration would also hold true in regarding the thickness of the wall. With a wall 8" thick there would be a vertical joint ½" thick between each 4" thickness of wall, and all Building Codes throughout the United States will be able to call for an 8 or 12 or 16-inch wall without fractions.

"Another very important reason is that this size has already been adopted by the American Face Brick Association and the National Brick Manufacturers' Association."

Letters were read by Mr. Carver from Prof. A. V. Bleininger and Warren E. Emily, of the United States Bureau of Standards, expressing themselves favorably toward the adoption of a uniform standard size for brick.

After some discussion on the part of manufacturers and the reading of extracts from various specifications, governmental and others, by D Knickerbacker Boyd, Consulting Architect of the Association, showing the further necessity for a common standard, the size 2¼x3¾x8" was unanimously adopted as the standard size brick of the Common Brick Manufacturers' Association of America.

The report of Committee C-3 of the American Society for Testing Materials presented at the Twenty-third Annual Meeting (June 22-25), contains the recommendation that their tentative size be changed to meet the size adopted by the Common Brick Manufacturers' Association. Thus the standard size of that society, the American Face Brick Association, the Common Brick Manufacturers' Association of America and the National Brick Manufacturers' Association will be exactly the same, 2¼x3¾x8", making this size the national standard.

Houseboat on Land

The housing shortage in Cincinnati is presenting some unique problems to the building commissioner. The owner of a houseboat on the Ohio River asked permission to transfer the cabin of his boat to a foundation which he has prepared on Southside Avenue. In the summer he plans to restore it to the boat, thus using the cabin as an all-year-round home. The purchaser of a number of discarded cottages built for the Government nitrate plant at Ancor, near Cincinnati, has applied for a permit to bring them into the city and erect them into flat buildings by arranging them three on top of each other. He contends that this can be done with safety and convenience.

Now Comes the Cylindrical House

A house can be no wider than its lot, but it may be wider than its foundation, and roomier by several feet than the dimensions of its side would betoken. In proof of this, says the *Popular Mechanics Magazine*, a Kansas City man has built a 22-foot house on a 25-foot lot, and has seven feet of yard left—three and a half feet on each side. He accomplished this remarkable feat by making his house cylindrical. Far from sacrificing any element of beauty to the unusual design, the appearance of this novel dwelling is entirely pleasing, outside and in. The foundation measures 18 feet wide by 36 feet long, with its walls vertical up to the swell of the cylinder. The basement windows are round port holes, giving a nautical effect, and perched in the centre of the room, like a turret, is a little sleeping porch. The roof itself is a segment of a cylinder, extending over the front porch. Inside are four good-sized rooms and a large hall, which serves as a spare room by virtue of a built-in bed, occupying the curve of the wall.

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Heating Equipment for the Low-cost House

FURNACE HEATING, PART I.

By CHARLES L. HUBBARD, *Heating Engineer*

IN order to secure satisfactory results in warm-air heating the furnace must be of ample size and the pipes so arranged and proportioned as to reduce frictional resistance to a minimum. The supply of cool air for carrying the heat from the furnace to the rooms above is another important item which should receive careful attention in laying out a system of this kind. The air, in this case, is the medium of heat transmission, the same as steam and water in others, and we know that the radiators cannot be kept hot unless the pipes are of ample size to convey the steam or the water from the boiler to them. In taking up the details of furnace heating let us design a system for the house shown in the previous article, and for which the heat losses were computed for the different rooms.

For convenience we will include the total losses in the present article, as these quantities are necessary in determining the size of the various parts of the system. These are for an outside temperature of zero and an inside or room temperature of 70 degrees.

TABLE II
HEAT LOSSES PER HOUR FROM THE DIFFERENT ROOMS

	Room	Thermal Units loss per hour.
First Floor	Living Room	17,189
	Hall	2,880
	Dining Room	8,480
	Kitchen	7,160
Second Floor	Large East Bed Room	13,292
	Bath	2,678
	South West Bed Room	7,107
	North West Bed Room	7,415
	Hall	3,535

CHANGES IN BUILDING CONSTRUCTION.—After deciding upon the type of system to be used, the building plans should be carefully studied to determine if any minor changes are necessary to make the heating system more efficient, and to check up any decided faults which might interfere seriously with the operation of the plant. One of the first of these is the chimney, the study of which should include the location, size of flue and position of top with reference to surrounding roofs. An inspection of the exterior view of the building in the previous article shows the last point to be satisfactory. The size of flue can only be checked after the size of furnace is determined.

The location of the chimney at the extreme end of the building is not well adapted to furnace heating, because the furnace should be centrally located and the smoke pipe comparatively short. The architect's plans call for a gas range, and therefore no kitchen flue is provided; a condition which also calls for furnace heat in this room. It is proposed in this case to call for a second chimney, as shown in Fig. 3, having two flues, and to use a combination coal and gas range, which will eliminate the need for furnace heat in the kitchen and also make it possible to place the furnace near the center of the basement. It might be said in this connection that an outside chimney is not, in general, well adapted to a furnace or boiler flue, as the cooling effect tends to check the draft and interfere with the combustion of the fuel. If it is considered necessary for architectural effect to place the chimney outside, the boiler flue should be protected by an air space around the outer sides. Another change which is frequently necessary in the building plans is the thickening of partitions which carry hot-air pipes leading to important rooms. This phase of design will be considered in a later article when the pipe sizes have been determined.

SIZE OF FURNACE.—The first step in computing the size of furnace is to determine the thermal units it must supply per hour in the coldest weather. In the present case we will assume the kitchen is to be provided with a combination coal and gas range, which will serve to heat this room during the winter. The total heat loss from all of the rooms, from the above table, excluding the kitchen, is 62,576 thermal units, which, increased 10 per cent for roof losses, amounts to $62,576 \times 1.1 = 68,834$ B.T.U.

If the cold air inlet is closed in zero weather and the entire air supply re-circulated from the building the furnace must be proportioned to supply simply

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the above amount of heat. If the entire air supply is taken from out of doors and delivered to the rooms at 130 degrees, then the amount representing the loss due to transmission must be multiplied by 2.1 to make up for heating the entering air up to 70 degrees, the normal temperature of the room. If it is desired to take half the air supply from outside and the other half from the inside, then we must multiply by 1.5 (very nearly) and so on for other proportions. In the present case let us use a furnace of such size that one-fourth of the air supply may

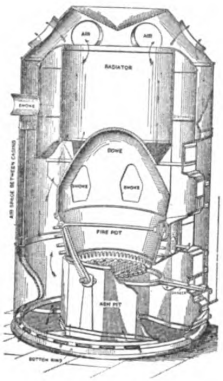

FIG. 1.—INDIRECT DRAFT FURNACE

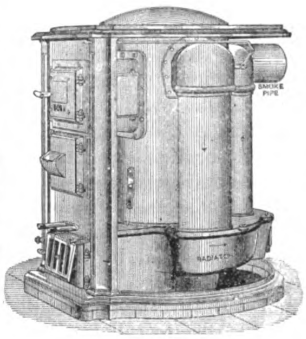

FIG. 2—DIRECT DRAFT FURNACE

be taken from outside in zero weather while the remaining three-fourths is taken from the inside. This will call for a total of 62,576 x 1.25 = 78,220 thermal units per hour.

One pound of anthracite coal will give off about 13,000 thermal units in burning, of which about one-half, or approximately 7,000 will be utilized in warming the air under ordinary operating conditions. The amount of coal burned per square foot of grate surface will run from about 3½ pounds in the smaller sizes up to 5 pounds in the larger sizes.

For grates 18 and 20 inches in diameter we may assume a combustion of 3½ pounds of coal per square foot of grate per hour, which will supply 3.5 x 7,000 = 24,500 thermal units.

In like manner, 22 and 24 inch grates will have a combustion of 4 pounds and produce 28,000 thermal units per square foot per hour; 26 and 28 inch grates 31,500; and 30 and 32 inch grates 35,000.

The following table giving areas in square feet of fire pots of different diameters (in inches) and the thermal units produced per hour, will be found convenient in computing the size of furnace.

The diameters given include the sizes commonly used in house heating. This table may be clipped out, mounted on a piece of cardboard and kept handy for reference when needed.

TABLE III

FIRE POT AREAS AND CORRESPONDING AVAILABLE THERMAL CAPACITY

Diameter in inches	Area in sq. ft.	Coal Combustion Lbs. per sq. ft. grate area per hr.	Available Thermal* capacity in B.T.U. per hr.
18	1.77	3.5	43,400
20	2.18	3.5	53,500
22	2.64	4.0	74,000
24	3.14	4.0	88,000
26	3.70	4.5	116,500
28	4.28	4.5	135,000
30	4.91	5.0	172,000
32	5.60	5.0	196,000

*Useful heat taken as 7,000 B.T.U. per lb. of coal burned.

In the present case, we wish to furnish 78,220 thermal units per hour. Reference to Table III shows that a 24-inch diameter grate is adequate.

For hard coal, a chimney flue 8"x12" should be provided.

TYPE OF FURNACE.—While there are many forms of furnaces upon the market, they are in general, divided into two classes, known as *direct* and *indirect* draft. In the first of these the gases pass from the top of the dome or combustion chamber into the smoke pipe by way of passages more or less direct. A well designed furnace of this type is shown in Fig. 1 in which case the gases are made to pass around a radiator by means of suitable reflectors, thus giving up a good share of their heat before entering the chimney. In some of the cheaper forms of this furnace, no radiator is provided and the gases pass directly from the dome into the smoke pipe. The general plan of an indirect furnace is shown in Fig. 2. In this type the gases pass downward to a radiator located near the base, then upward through another flue to the smoke pipe. A

(Continued on page 70)

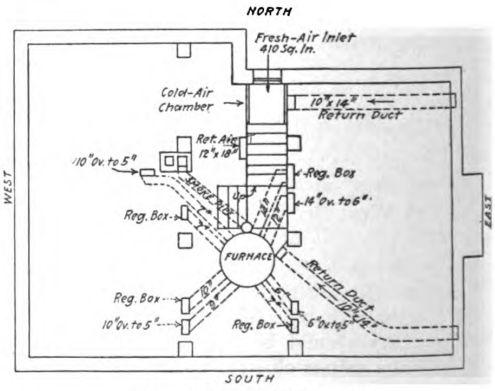

FIG. 3—BASEMENT PLAN

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What You Should Know About Gypsum

A Description of Its Characteristics and Its Uses, and Its Adaptability to Interior Plastering

TO-DAY, as never before, there is a constant search by architects for materials which more nearly approach the ideal and at the same time effect economy in building construction. It is due to this tendency that new types of construction are being developed. Not only are the various elements of the structures being built with materials heretofore but little known and hence little used, but also many well-known materials are being adapted to new uses. While manufacturers are apt from the start to claim success for their product, it is only after the test of time that judgment can competently be passed. Broad experience in building work will often prove of value in judging the merits of new forms of construction.

Among the various materials used in the building industry, perhaps none has in recent years forged to the front more rapidly than gypsum. Due to this rapid development, there has been lack of exact knowledge as to the characteristics of the material and the various uses to which it is best adapted. It will be profitable to survey the field of its usefulness.

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 thirty-six books, book XXXVI dealing with the different kinds of stones and marble, including lime, sand and gypsum. Pliny also minutely describes the removal of a beautiful gypsum plaster frieze from Lacedæmon to adorn a public building in Rome. Going still further back, the Temple of Apollo at Bassæ, built four hundred and seventy years before Christ, affords an excellent example of the use and permanent structural qualities of gypsum. The great pyramids of Egypt contain plaster work of gypsum executed at least four thousand 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 used to a large extent for interior plastering. In proper form gypsum is also used structurally for floors, roofs and outside walls. The United States Government, in its war building operations, used many 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 $CaSO_4 + 2H_2O$. 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 plasters and other 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 determine the possibilities and uses to which the calcined product may be applied in the field of building construction.

Gypsum usually occurs in beds of considerable area from four to thirty feet in thickness. It is quarried or mined in eighteen states and the territory of Alaska. It is also imported from Nova Scotia, New Brunswick and Ontario, Canada, into the United States.

Gypsum Plaster

Gypsum plasters are prepared from calcined gypsum. They may be classed in a general way, 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 proper proportion. It requires but 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 freight 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 per cent by

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weight is calcined gypsum and not less than 1 per cent consists of a non-staining wood fiber. The remainder is composed of hydrated lime, ground clay, asbestos, and, 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 per cent 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 proportions 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 within the scope of this article to enter into the details of other gypsum plasters 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.

Characteristics of Gypsum Plasters

Gypsum plasters possess high tensile and compressive values. The American Society for Testing Materials, Committee C-11 on Gypsum, in specifications for "Calcined Gypsum," and a "Tentative Report on Gypsum Plasters" makes note of these strength properties.

The hardening action of gypsum plaster is one of crystallization. This takes place quickly and uniformly from face to face through the entire mass, and at the same time, due to the water of crystallization combining chemically with the calcined gypsum. As the result of this chemical action the problem of getting rid of dampness and moisture in the building is not a serious one when the proper quantity of water has been used in mixing.

Gypsum plasters set rapidly. This permits the carpenters to follow the plasterers in about 48 hours. Thus the work of erecting trim, casings, base-boards, chair-rails, mouldings and similar interior finish can proceed without delay. The setting properties permit rapid plastering, since plaster coats can at once follow, thus obviating the repeated moving of scaffolding.

Due to this quick setting, the danger of freezing is not as great with gypsum. The U. S. Government in the construction of industrial houses used gypsum plaster, and was particular that it should be used in localities and at periods where freezing temperatures were to be expected, and where, for reasons stated, speed was necessary.

Tests made as to its fire-resisting properties show gypsum to be, from this standpoint, an admirable material. All materials are injured by the action of high temperatures in one way or another; some fuse and melt, others warp, buckle, crack and disintegrate. The changes due to fire which are least injurious to the construction as a whole and the material in question are such as are due to show calcination without appreciable expansion and consequent disruption due to warping and buckling.

The water of crystallization liberated from gypsum rock by physical means (in order to obtain the calcined product from which gypsum plaster is manufactured) is taken back again during the setting of the gypsum plaster in chemical crystalline form.

During the period of a fire, calcination of the exposed gypsum plastered surface again takes place and the recombined water of crystallization is again slowly liberated. So long as this process of calcination of the plastered surface is continuing, and water of hydration is being liberated, steam will be present and for this reason it is not possible under such fire conditions to increase the temperature of the back side of the gypsum plaster coat to a temperature appreciably above 212 degrees Fahr.

Gypsum plaster may be applied upon any plastering lath or base. It is especially adapted to plastering on gypsum blocks and plaster board, and on account of its quick setting and strength properties is extensively used for plastering on metal lath.

From the foregoing it will be seen that in the field of plastering, gypsum forms an admirable material and has a wide and legitimate use.

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Monthly Review of the Lumber Market

THE wave of price cutting has reached the lumber industry, and while various causes for reductions have been advanced by both the producers and dealers, the fact remains that prices have at last begun to tumble. This should not be taken to mean that the bottom has dropped out of the market, but it is apparent in all of the principal producing, distributing and consuming centers of the United States that the much-hoped-for decline has begun.

Due largely to transportation conditions, but also on account of general business conditions, retail lumber dealers have been buying very sparingly for the past sixty days. Hundreds of cars of lumber, ordered prior to the railroad tie-up, are still en route and their time of delivery is yet uncertain. This lumber was bought at the market price at time of purchase, which was considerably above present values. Dealers who were caught in this way naturally are not disposed to place any more orders until they obtain definite assurance of delivery.

While many of the sawmills in the South and on the Pacific Coast have been forced to close down or greatly curtail production on account of the inability to secure cars for shipment, barometers of the various lumber manufacturing associations show that production as a whole has run considerably ahead of shipments and new business for the past thirty days. This is the first time this has been the case since the end of 1919. Lumber, therefore, is beginning to accumulate at the sawmills, but in the larger distributing and consuming markets, retail lumber yard stocks are far below normal and badly broken as to sizes and grades. This is particularly true in the Metropolitan District and New England. Yards in the Middle West, South and West are in better condition to meet the growing demand for building materials.

Building permit records show that building operations throughout the country are on the increase and each month are running ahead of those of a year ago, but the building trade is fully aware of the fact that activity does not begin to keep pace with the normal demand for housing or with the expectation a few months ago of the volume of building that would be under way by this time.

Shortage of money for building projects may have had something to do with the apparent curtailment in operations, but it is generally conceded that "peak" prices had considerably more bearing on the situation. Another factor not generally looked for has been the transportation tie-up, which is slowing down building and every other industry.

This situation has naturally resulted in a marked falling off in the demand for lumber everywhere, and subsequently reductions in values have resulted. The most noticeable decreases in lumber prices have been in the Middle West and at various points in other sections where the railroad embargoes have not been so stringent. In those localities lumber has been "dumped" in considerable quantities and competition among the sales agents has been keen. It has not been necessary in those places for the buyers to bid against each other, as had been their practice during the past six months when the demand far exceeded the available supply.

Of especial interest to the building trades has been the pronounced decrease in the price of hard and soft wood flooring, particularly the latter. Yellow pine and Douglas fir flooring, for instance, is wholesaling $20 to $30 less than it did thirty days ago. Siding, finish, partition, shingles and lath have also shown marked declines. Oak and maple flooring are about $10 cheaper than a few weeks ago, and the decline in other hardwood items indicates a further reduction in flooring prices. Dimension is gradually weakening in price, and, in fact, everything but heavy timbers has decreased very noticeably.

Wise lumbermen are refraining from attempting to predict what the trend of the market will be thirty days hence. As a general rule, however, retail dealers insist that prices must continue to come down until they reach a level more in keeping with the cost of production, and a level where the prospective builder can afford to buy lumber.

When the transportation situation is settled and lumber again begins to move in volume, it is but natural to presume that buying will become more active, but it must be borne in mind that the building season is rapidly passing, and under the circumstances it is not very probable that the demand will greatly exceed production. Under those conditions, therefore, there is little likelihood of a marked stiffening of prices. There is strong indication that by fall the lumber market will be stabilized, a condition which is far preferable to either a rising or declining market, for then the building trades will feel safe in proceeding with their plans for new construction.

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Heating the Low-cost House

(Continued from page 59)

damper is provided to give a direct connection with the chimney, for carrying off the increased amount of gas which is formed when coal is first put on. In a general way, the cheapest and least efficient furnaces are included in the first class described, although this does not mean that there are not efficient and satisfactory indirect furnaces upon the market.

LOCATION OF FURNACE AND FLUES.—In general, a hot-air furnace should be centrally located, both as regards the basement plan and the uptake flues, the object being to keep the horizontal runs of pipe as short as possible. A typical layout for the house in question is shown in Fig. 3, in which the lengths of these pipes, with one exception, are quite evenly balanced, and this is enlarged to offset the effect of its increased length. The longest pipe run from the furnace casing to base of flue is only 8 feet, while all of the others are from 3 to 4 feet. By making the runs short, of ample size, and giving them a decided upward pitch, much of the difficulty experienced in furnace heating will be overcome. In large houses it is frequently recommended that the furnace be located nearer the north-side of the house so that the warm air will be carried *with* the wind pressure toward the more distant rooms having a southerly exposure. While it is best to keep pipes extending toward the north as short as possible, the main point is to keep all pipes down to a minimum length by grouping the flues closely together as in the present case.

The practice of carrying a long horizontal pipe from the furnace so as to deliver the warm air near an outside wall or in a cold corner is not to be recommended in general, as the friction will be greater than if discharged into the room at the nearest point and allowed to find its way across to the outer wall by convection. If the air can be gotten into a room it is usually safe to depend upon diffusion to distribute the heat in those of ordinary size. In special cases it may be necessary to assist this effect somewhat by the use of return ducts as will be described in the next article.

Building Operations in May

A THOROUGHGOING derangement of the country's transportation system, which resulted directly from the strike of the railway employees and indirectly from the depleted equipment of the roads has worked havoc with the construction industries. It has become practically impossible to get materials moved from the factories. Local supplies have become exhausted. Prices are erratic, sometimes even fanciful. The wonder is that construction goes on at all. It wouldn't but for the great urgency of the need.

The amount of contracts let in May show a falling off as compared with those of April of about 25 per cent. This is not to be worried about, however, as there is enough business on hand, and is enough more waiting to be placed to keep the industry going for years to come. The problem is to get the materials. And the manufacturers of building supplies are up against the same problem of transportation in securing their raw products.

It has been stated by the railway officials that they expect the early part of July will see the principal gateways cleared for traffic and that at that time the Interstate Commerce Commission will release the car equipment which has been directed toward the transportation of foodstuffs and coal.

The statistics of contracts let during the month of May have shown a still further reduction of the proportion which goes for the construction of residences, a situation which in view of the housing shortage will be generally deplored. In this connection it is interesting to note that the Metropolitan Life Insurance Company of New York has recently adopted a new policy regarding its building investments. In the past the company dealt only with large projects, but now it proposes to lend its money upon projects where the loan is not in excess of $5000.

Such powerful organizations as this usually point the way. Their methods are the result of an acumen not possessed by the lesser financial institutions of limited horizon. But the smaller bodies are anxious to find the wisdom of their superior's action and to follow suit. This step undoubtedly will be widely imitated. It may take time, but it bodes well for the small contractor.

The United States Geological Survey has published statistics obtained from the building officials of 114 cities of the country which show that building in 1919 exceeded that of 1918 both in quantity and in cost. The number of buildings erected in these cities in 1919 were 309,551, as compared with 173,635 in 1918—an increase of 78 per cent. The cost of this building for 1919 was $1,130,817,591, as compared with $369,252,315 for 1918—an increase of 208 per cent.

(Concluded on page 66)

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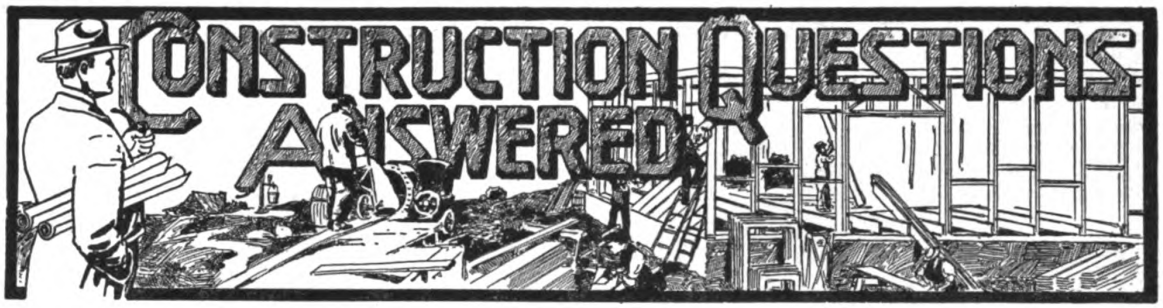


Correcting Leak at Window Head

From C. S. D., Swampscott, Mass.—I am being troubled by a leak which allows water to drip from the inside window casing on to the sill and floor. Construction is indicated by sketch (See Fig. 1). Could the cement header absorb enough moisture to cause this or could it run in between the header and top of frame?

Answer—This trouble of dripping occurring on the inside casing of a window may be caused by several things. If the wall is not furred out on the inside, it is quite possible that sufficient condensation will occur on the inner side and cause the dripping you speak of. This, of course, would be especially noticeable during rainy or cold weather.

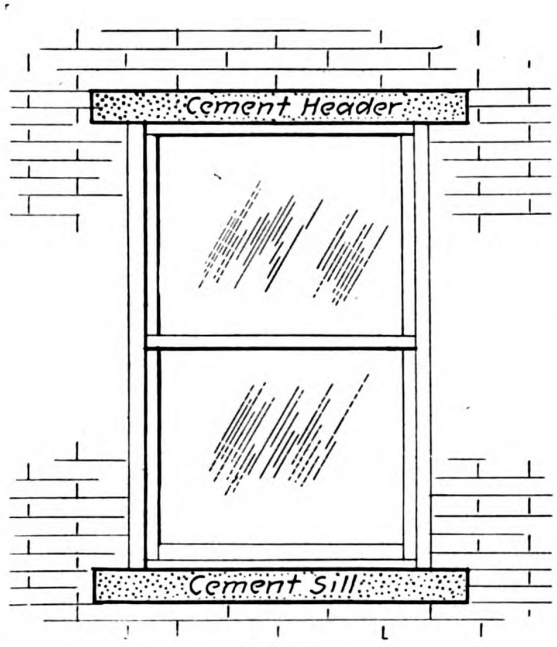
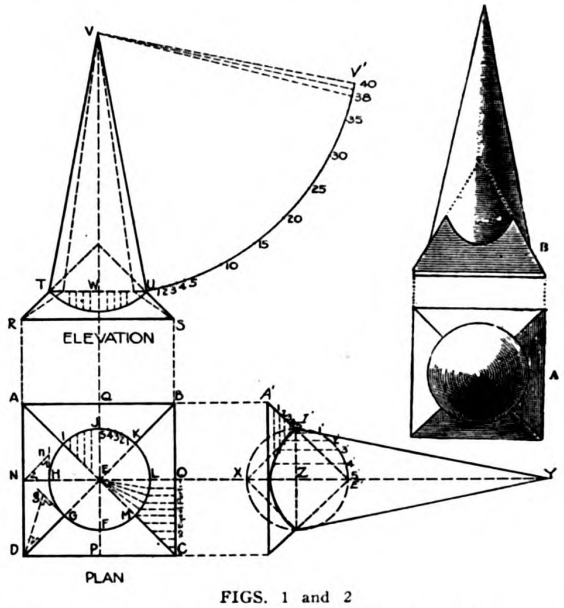


FIG. 1

If, however, the dripping is not due to condensation and occurs as a direct leak through the window construction, it may be that the joints in the blocks above the cement lintel need pointing up, or that the window frame does not fit tightly against the lintel, in which case it should be caulked with oakum or roofer's cement.

More Information on Framing a Conical Roof

Some time ago, a subscriber asked for information as to the method of framing a conical roof, set on top of a hip roof. The particular information desired related to determining the various cuts, lengths of rafters, and the development of plates with method of spacing, etc. It was stated that the vertical axis of the



FIGS. 1 and 2

conical roof must coincide with that of the hips. We give below some useful information on this subject, submitted by one of our subscribers who has worked the problem out in two different ways.

Answer. From O. B. M., New York.—Replying to the query of J. W. on conical roofs, let us assume that the roof he has in mind is similar to that represented in Fig. 1, as he does not state whether the hip lower roof is square, sexagonal or octagonal in plan. However, we will suppose it is square so as to proceed to give him the information desired.

In Fig. 2, lay out the plan in outline as A-B-C-D to

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a quarter-inch scale, this line being equivalent to the outside line of the wall plates. Draw the diagonals or seats of the hip rafters A-C and B-D intersecting at E the axis point on plan. From E as a center and with E-L equal to W-U (see elevation) describe the circle or base of the conical roof G-H-I-J-K-L-M-F, which, it will be noticed, will be divided by the diagonal hips into four quadrants or quarter circles; also draw N-H-E-L-O parallel to D-C, thus subdividing it into eight sections.

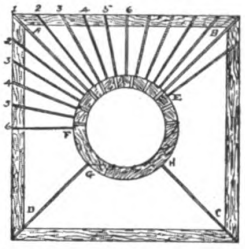
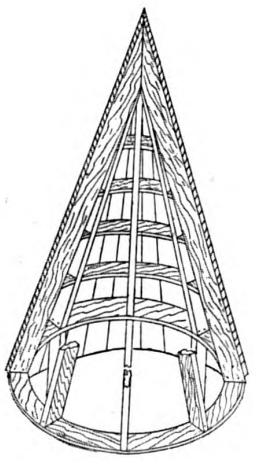


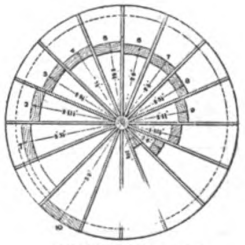
FIG. 3



FIG. 4

With the dividers, space the arc L-M into five equal parts and connect the dividing points with the center E (corresponding to W on elevation). Divide C-O into ten equal parts and draw from these points lines parallel to D-C. It will be found that the five points on the arc L-M will join with the five upper points on C-O and will represent the center lines of the rafters from the straight wall plate on eighth section C-O to the curved plate L-M and each and every rafter on plan C-M-L-O will, although of the same 45 deg. pitch, be of different lengths. From C to M these will be left hand Jack Rafters.





FIGURES 5 and 6

Proceed now to the elevation and draw the top wall plate line of the hip section R-S with its height R-T and S-U. On the axis line W-V scale up a height of twenty feet (five inches) and join T-V and U-V for the conical rafters, the top and bottom bevels of which are shown to the left; also draw and show the dotted lines of hips and carry these dotted lines to the apex of the conical roof which will be the rafters standing over the seats D-G-E and C-M-E on plan below.

To find the development or covering envelope of the cone, with V as center and U-V as radius, sweep the arc 1 to 40 to the right, commencing at U on elevation, then setting the dividers to one of the equal subdivisions of the arc L-M of the plan, lay off 40 such spaces (equal to eight times the length of L-M) which will give the length required to go around base of cone roof J-F, etc., on plan. (Note: The length of the arc U-V to the right of the elevation must equal the circumference of the circle shown on the plan.)

To find the intersection at base proceed to the right and after prolonging the axis line N-H-E-L-O to X-Z-Y to the right of the plan, lay out the full vertical section of the square hipped portion of roof as seen. Divide both the hip A'-I' and quarter circle I'-E' each into five equal parts and from these division points draw dotted lines across and down which will give intersecting points, through with the curve may be traced.

Another, and to my mind a simpler method, is to frame the roof as delineated at Fig. 3. Here the plan is the same as before but there are no hips and no Jack rafters. All radiate to a common center or axis, which as J. W. truly says, must coincide throughout the construction. The rafters will be in four sets duplicated right and left and the conical base or plate will be leve las it must be if all four sets are sawed alike. Fig. 4 represents how the rafters will increase each in length as the carpenter lays them out from 6-F, Fig. 3 to B-E on same figure. The bottom cuts will reverse as they are in sets—rights and lefts from corners—but the top down and under cuts will not vary, but be all alike.

How the conical roof may be framed is clearly shown in Fig. 5. The bottom or main base plate must be sawed in one-eighth or smaller sections in two, three or more thicknesses, with joints fully broken and all solidly bolted or spiked together. The horizontal sweeps as they rise from the base up will be cut in between the rafters or gained or bracketed into them. Each succeeding circle will be less in diameter and of lesser radius than the one following underneath which will be better understood by referring to Fig. 6, where a series of sweeps is laid out for a conical roof and the decreasing radii may be noted. Concerning the development of the vertical tapering boards, it will be found best to introduce a boss or solid apex at the tip of the cone. These are easily nailed, can be spaced out of narrow boards and held at the tip by an inverted conical finial. Bending wood, as would be required in this case, horizontally is an expensive and tedious job and the material unless steamed is hard to bend. Finally it might be said that all of the foregoing will need much careful thought and most accurate carpenter's work.

Building Operations in May

(*Continued from page 64*)

There follows a comparison between the contracts let in May, 1920, against those of the month of April, the same year.

	Contracts let May, 1920	Contracts let April, 1920	Projected work in May, 1920
Minnesota, North and South Dakota	$10,400,000	$11,900,000	$10,000,000
Middle West	78,000,000	94,000,000	111,000,000
Ohio, West Virginia and Western Pennsylvania	44,800,000	61,920,000	56,190,000
Eastern Pennsylvania, Southern New Jersey, District of Columbia, Delaware and Maryland	26,100,000	51,230,000	55,120,000
New York and Northern New Jersey	50,980,000	88,000,000	105,880,000
New England	38,460,000	28,589,000	46,263,000

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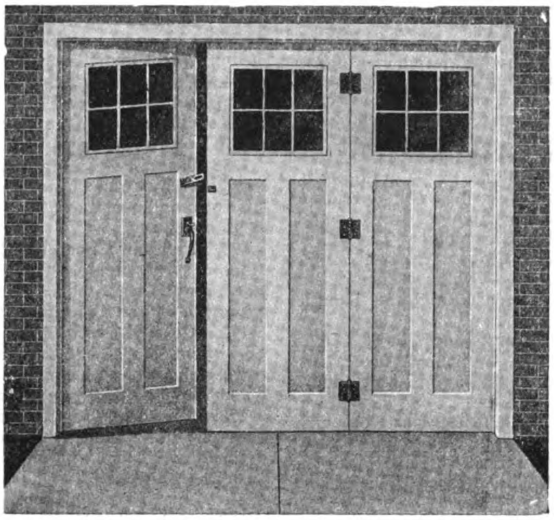
NATIONAL
Nos. 805 and 806
Garage Door Sets



Neatly-fitting easy-working garage doors are assured when National sets, No. 805 or 806, are used.

Doors equipped with National sets afford a smoothly sliding and swinging combination that eliminates all sticking and binding. With National sets, one door is hung so that it will open without disturbing the other two doors.

You will find the National Garage Hardware Booklet interesting and profitable. Write for a copy to-day and mention your dealer's name.

NATIONAL MFG. CO.
STERLING, ILLINOIS

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New Catalogs of Interest to the Trade

These catalogs may be secured direct from the manufacturer. If you prefer, write the date of this issue and the numbers of any catalogs on a postal and mail it to "Building Age," 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.

No. 157-A. The Only Screw Holes in the World. The Stine Screw Holes Company, Waterbury, Conn.—Illustrated literature pointing out the advantages derived from the use of Stine screw holes. A color card showing screw holes in various materials, together with samples and price list, will be furnished on request.

158. Novelty Boilers, Furnaces and Ranges. Abram Cox Stove Company, Philadelphia, Pa.—Catalog No. 73 extensively illustrates and describes the operation and construction of the furnaces, boilers, ranges and heating stoves manufactured by this company.

159. Galvanoid Screen Wire Cloth. American Wire Fabrics Company, Chicago, Ill.—Folder pointing out the merits of this Galvanoid screen wire cloth. Sample enclosed.

160. Vanishing House Doors and R-W Door Hangers. Richards-Wilcox Mfg. Company, Aurora, Ill. —Illustrated folder describing these vanishing doors and their advantages.

161. Alpha Aids. Alpha Portland Cement Company, Easton, Pa.—No. 20 of this house organ contains valuable illustrated articles on method of repairing concrete pavements, comfortable and permanent homes of concrete, etc.

162. Rudy Furnaces. Rudy Furnace Company, Dowagiac, Mich.—Illustrated catalog describing in detail the operation and construction of these furnaces.

163. Speakman Showers and Fixtures. Speakman Company, Wilmington, Del.—Catalog H fully describes and illustrates the showers and other plumbing fixtures manufactured by this company. Prices are given.

164. Contractor's Atlas. Atlas Portland Cement Company, New York City.—The March issue contains some very interesting articles, such as "Re-building Halifax," "Homes Will Help Solve Industrial Unrest," etc.

165. The Maydole Hammers. The David Maydole Hammer Company, Norwich, N. Y.—Illustrated catalogue describing the hammers manufactured by this company. Prices are given.

166. Stanley Especially Designed Garage Hardware. The Stanley Works, New Britain, Conn.—Illustrated booklet describing the various styles of garage hardware.

167. Sampson Wagon Loader and Cellar Excavator. W. H. Anderson Tool & Supply Company, Detroit, Mich.—Sheet illustrating and describing this loader and cellar excavator manufactured by this company.

168. Abram Double Action Long-Handled Tools. Abram Cement Tool Company, Detroit, Mich.—Illustrated bulletin describing the tools which this company manufactures.

169. The Science of House Heating. The Farquhar Company, Cincinnati, Ohio.—Illustrated booklet describing this furnace and its advantages.

170. Expanded Metal Construction. Northwestern Expanded Metal Company, Chicago, Ill.—Illustrated booklet, published monthly, giving photographs where this company's products were used.

171. W. C. K. City. Westinghouse, Church Kerr & Company, Inc., New York City.—Broadside showing many of the various structures designed and constructed by this company under the cost plus a fee method.

172. Eight Garages and Their Stanley Garage Hardware. The Stanley Works, New Britain, Conn.—Illustrated booklet concerning garages and their equipment.

173. Troy Motor Truck Trailers. The Troy Wagon Works Company, Troy, Ohio.—Illustrated catalog describing the construction and uses of the Troy trailers.

174. Contractor's Atlas. The Atlas Portland Cement Company, New York City.—The February issue contains some interesting articles on methods of advertising to secure more business.

175. Sargent Framing Square. Sargent & Company, New Haven, Conn. Catalog describing and illustrating this framing square, which is unique in that it calculates as it measures.

176. Bantam Concrete Mixer. Ransome Concrete Machinery Company, Dunellen, N. J.—Bulletin illustrating and describing in detail the construction and operation of the Bantam concrete mixer.

177. Goodell-Pratt Tools. Goodell-Pratt Company, Greenfield, Mass.—Pocket catalog describing and illustrating the tools for the use of carpenters and builders, which this company manufactures.

178. Vitri-Flux for Concrete and Cement Products. The Granitex Company, New York City.—Literature describing this new integral flux which by its chemical action produces a tougher, denser and stronger concrete. Vitri-Flux also tends to waterproof concrete.

179. Vulcanite Roofing. Vulcanite Roofing Company, Roofing Division of the Beaver Board Companies, Buffalo, N. Y.—Illustrated booklet describing Slab-Tile shingles. Samples are furnished.

180. Paint and Varnish. Devoe & Raynolds, Inc. New York City.—Illustrated booklets showing decorative designs for homes and public institutions.

181. Motor Trucks. Stewart Motor Corporation, Buffalo, N. Y.—Illustrated booklet describing the use of motor trucks for the building trades.

182. Structural Slate. Structural Slate Company, Pen Argyl, Pa.—Booklet illustrating and describing structural slate. Cost data is also included.

183. Ankor Bolts. Ankyra Mfg. Company, Wayne Junction, Philadelphia, Pa.—Booklet illustrating and describing the Ankyra self riveting and self adjusting anchor bolts.

184. The Fire on the Hearth. H. W. Covert Co. New York City.—Booklet under the above title describes and illustrates brick and tile fireplaces.

185. Standard Baltimore Dumbwaiters and Elevators. Standard Electric and Elevator Company, Baltimore, Md.—Folder descriptive of the Standard Baltimore Dumbwaiters and Elevators manufactured by this company. Illustrations show clearly their construction and operation.

186. "Use the Stanley Works Ball Bearing Butts for Permanence." The Stanley Works, New Britain, Conn. —Illustrated catalog describing the various types of ball bearing butts manufactured by this concern.

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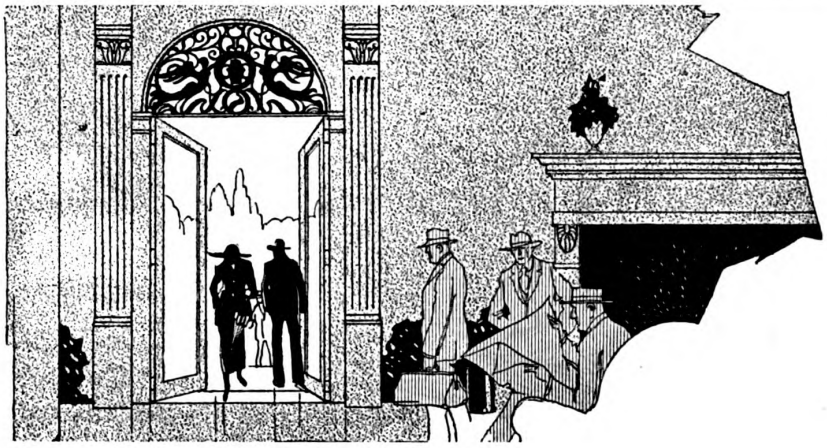


The Silent Servants

IN and out! All day long the perfect door swings to everyone's command. Artistically blended appointments—the beauty of the structure itself would be lost were the doors to balk, squeak or sag.

Architects and Builders realize the importance of hinges in giving life and activity to the building they plan and erect. The McKinney Manufacturing Company makes hinges and butts that demand no compromise.

McKinney Hinges and Butts have filled every hinge need for fifty years. Silently they have served on thousands of doors everywhere. They have established an enviable record—they are the standards in their field.

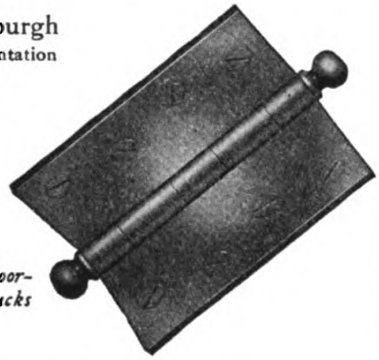
McKinney Hinges and Butts blend artistically with any architectural design. Whether massive door or small casement window, there is a McKinney Hinge to fit—to serve its purpose silently and effectively.

The name McKinney in a specification insures the building permanent hinge service throughout its entire life.

If you do not have the McKinney catalog in your files we will gladly forward you the latest edition. You'll find it always helpful in visualizing the best answer to hinge questions, matching artistic plans and meeting standard hinge needs.

McKINNEY MANUFACTURING CO., Pittsburgh
Western Office, Chicago Export Representation

McKINNEY
Hinges and Butts



Also manufacturers of McKinney garage and farm building door-hardware, furniture hardware and McKinney One-Man Trucks

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If you are bothered by any point of building law, write to our Legal Adviser, A. L. H. Street, LL. B., who is retained for the benefit of subscribers to Building Age, and is at your service.

Collection of Claims for Material

From J. D., Mich.—If Mr. Jones hires Mr. Black to do $100 worth of carpentry on verbal agreement, and pays him for the same. In the meantime Black does not pay for the lumber used on Jones' job. Can the lumber company collect from Jones? If not, how can it collect for the lumber used?

Answer.—If the materials were sold on Black's credit, the lumber dealer can look to Black's personal responsibility. But, since Black may be judgment proof, it becomes important to know what rights can be enforced against Jones. Jones is not personally liable to the dealer unless the material was delivered on a distinct understanding that Jones would pay for it, or unless he has guaranteed payment, or unless Black was his authorized agent in buying the lumber.

Assuming that the bill cannot be collected from Black because he is judgment proof, and that it cannot be collected from Jones, because he never agreed to pay it and it was not incurred by Black as his agent, the lumber dealer's only recourse is under the mechanic's lien law. And whether such a lien can be enforced depends upon whether there has been compliance with the lien statutes.

For the interest of Michigan builders in general we give below the main text of the Michigan lien act, as revised at the recent session of the legislature of that state:

"Every person who shall, in pursuance of any contract * * * between himself as contractor, and the owner, part owner or lessee of any interest in real estate, build, alter, improve, repair, erect, ornament or put in, or who shall furnish any labor or materials in or for building, altering, improving, repairing, erecting, ornamenting or putting in any house, building, machinery, wharf or structure, * * * and every person who shall be (as?) subcontractor, laborer, or material men, perform any labor or furnish materials to such original or principal contractor, or any subcontractor, in carrying forward or completing any such contract, shall have a lien therefor upon such house (etc.) * * * and its appurtenances, and also upon the entire interest of such owner, part owner or lessee in and to the lot or piece of land, not exceeding one-quarter section of land, or if in any incorporated city or village, not exceeding the lot or lots upon or around or in front of which such improvement is made, to the extent of the right, title and interest of such owner, part owner or lessee at the time work was commenced or materials were begun to be furnished by the contractor under the original contract, or by the subcontractor who furnishes or is furnished with any labor or material in the performance or execution of such subcontract, and also the extent of any subsequent acquired interest of any such owner, part owner or lessee, and in case of the construction of a number of buildings * * * under one contract * * * for the same owner * * * such lien for such material or labor so furnished, shall attach to all of said buildings * * * the same as hereinbefore provided in case of a single building * * *; Provided, That any person, firm or corporation furnishing materials or performing labor of any kind * * * shall within thirty days after furnishing the first of such material or performing the first of such labor *to any contractor or subcontractor,* serve on the owner, part owner or lessee * * * a notice * * * of the nature of the materials furnished, or labor performed," etc.

The law contains form of notice that may be used, and the further provisions:

"The owner, part owner or lessee shall not be liable to the subcontractor, material men or laborers, for any greater amount than he contracted to pay the original contractor, and shall be entitled to recoup any damages which he may sustain by reason of any failure or omission in the performance of such contract, but the risk of all payments made to an original contractor after he shall have received the notice above mentioned, or before the contractor shall have furnished him with a statement as hereinbefore provided, shall be upon the owner, part owner or lessee until the expiration of sixty days, within which claims or lien may be filed as hereinafter provided, and no payment made to any contractor before the expiration of said sixty days shall defeat any lien of any subcontractor, material man or laborer, unless such payment has been distributed among the subcontractors, material men or laborers, or if distributed in part only, then to the extent of such distributions."

It follows that if the lumber dealer has not com-

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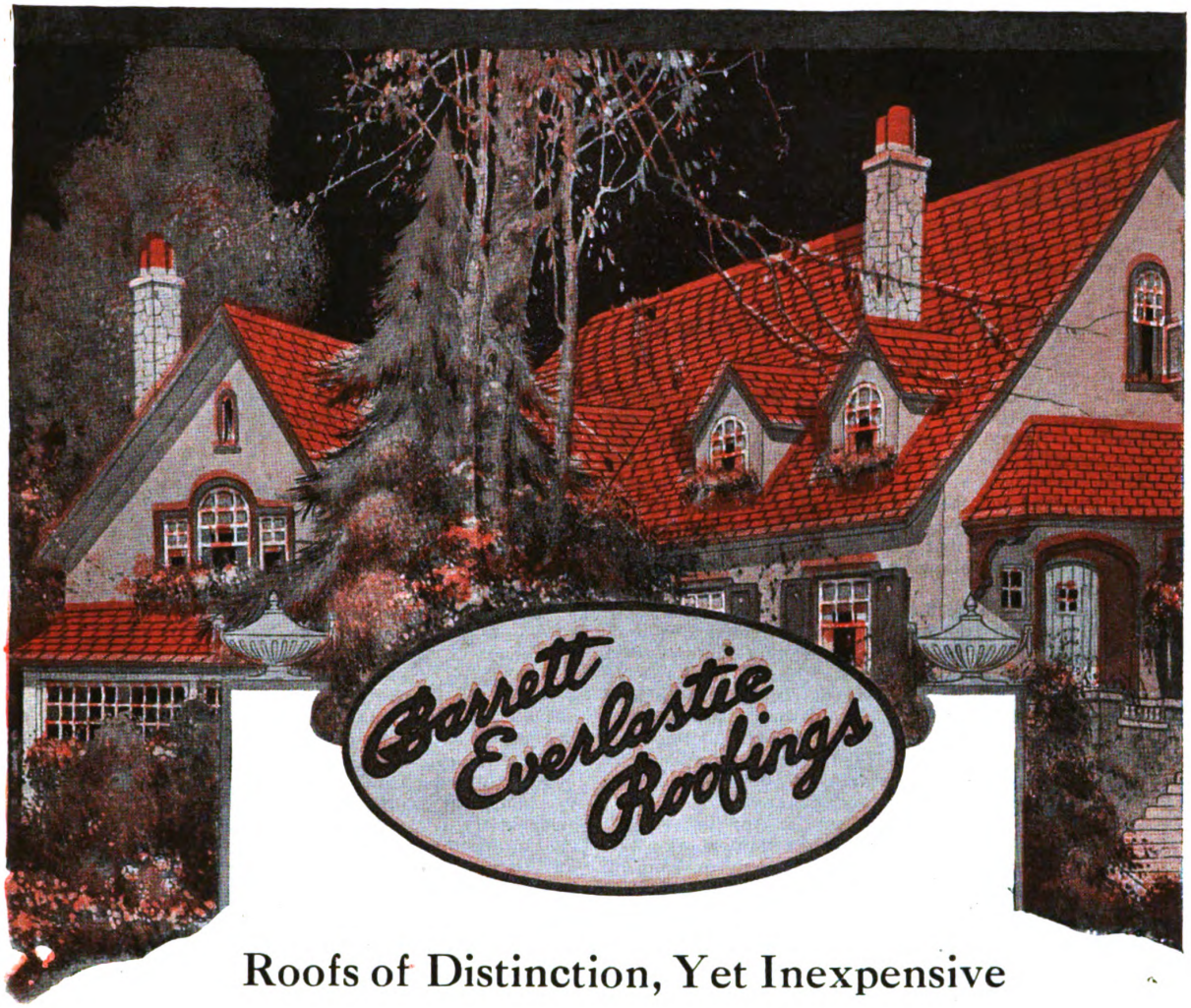

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BETTER and handsomer roofs for the owner—easier and quicker work for the contractor—money and trouble saved for everybody concerned.

These are the advantages of Barrett Everlastic Roofings—proved by thousands of users all over the country, and backed by The Barrett Company's 60 years of leadership in the roofing business.

Everlastic Roofings come in four different styles. They are suitable for *every type* of steep-roofed building.

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Illustrated booklets, describing the four styles of Everlastic Roofings, free on request

Everlastic Multi-Shingles. The newest thing in roofing—*four shingles in one.* Tough and durable. Made of high-grade waterproofing materials and surfaced with crushed slate in art-shades of red or green. When laid they look exactly like individual shingles and make a roof worthy of the finest buildings. Weather and fire-resisting to a high degree. Need no painting.

Everlastic Single Shingles. Same material and art-finish (red or green) as the Multi-Shingles, but made in individual shingles; 8x12¾ inches. A roof of Everlastic Single Shingles is more beautiful than an ordinary shingle roof and costs less per year of service.

Everlastic Slate-Surfaced Roofing. The most beautiful and enduring roll roofing made. Surfaced with crushed slate in art-shades of red or green. Very durable; requires no painting. Nails and cement in each roll.

Everlastic "Rubber" Roofing. This is one of our most popular roofings. Thousands upon thousands of buildings all over the country are protected from wind and weather by Everlastic "Rubber" Roofing. It is tough, pliable, elastic, durable and very low in price. It is easy to lay; no skilled labor required. Nails and cement included in each roll.

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plied with the provisions of the above mentioned law, he cannot enforce a lien against Jones' property. It is also necessary that the lumber have been sold and delivered to Jones or Black for use in improving the property against which lien is sought. If the materials were sold to be kept by Black in a general stock, and without contemplation at the time of delivery to him that they would be used on any particular building a lien could not be enforced.

Contract Employing Architect Interpreted

The case of Davis vs. O'Kain, 216 Southwestern Reporter, 354, lately passed upon by the Kentucky Court of Appeals, involved plaintiff's right to recover compensation for architect's services in preparing plans for a building that was never constructed. Plaintiff was awarded judgment in the trial court in Louisville for $2,000, but this was reversed on appeal to the Court of Appeals; that court holding that recovery was limited by the following clause in the contract of employment:

"It is further agreed that in the event the said party of the first part [the owner] fails to erect the building within two years from the date of this contract, said party of the second part [the architect] shall receive the sum of $250 for *preliminary services* rendered in connection with this contract, and should this building be erected within five years from the date of this contract, the party of the second part shall under the terms of this contract be architect thereof and prepare the plans and specifications therefor."

Disposing of the case, the Court of Appeals says:

"The contract cannot possibly be construed, as plaintiff seeks to construe it, into covering only preliminary drawings and payment therefor, since it in the plainest terms possible provides for completed plans and payment for the same. The preliminary services for which he was to receive $250 in the event the building was not constructed in two years necessarily means all services enumerated in the contract to be performed previous to the awarding of a contract [to the builder].

"Since it is admitted the contract was never awarded, and that the building was not constructed in two years, or at all, it follows plaintiff, by the very terms of his admitted written contract, was limited to $250 for all services he performed thereunder, and he performed no other services whatever. That his services may have been worth much more than he agreed to accept for same is, of course, irrelevant."

Architects Win Suit for Compensation

In the recent case of O'Dell & Halpin vs. Straith, 175 Northwestern Reporter, 441, the Michigan Supreme Court affirmed judgment for $2,500 in favor of plaintiffs, as compensation for their services in preparing plans and specifications and receiving bids for a building which defendant finally determined not to construct.

The agreement was verbal, and defendant sought to show at the trial a conversation had with a former member of plaintiff's firm concerning the terms of the contract. But the trial judge is held by the Supreme Court to have properly ruled this evidence out as not being binding upon the plaintiffs.

Plaintiffs sued to recover $6,000, and the jury brought in a verdict for $2,500. Defendant sought a new trial on the ground that the jury acted arbitrarily in fixing this amount; that the verdict should have been for $6,000 or nothing, because the expert testimony offered by plaintiffs showed that the services were worth $6,000. But the Supreme Court overruled this ground of appeal, saying:

"It is true that the plaintiffs sued to recover the sum of $6,000, and offered testimony tending to show that their services were worth that sum. It appeared, however, during the trial of the case, that the plaintiffs had rendered a bill to the defendant for $3,000, and we cannot say that the jury acted unreasonably and improperly in cutting the plaintiff's claim down to $2,500. We think it is a matter of which the defendant cannot complain—that the judgment was too small. There is nothing here to indicate that the jury did any 'splitting of differences.'"

When Does a Contract Have a Consideration?

One of the fundamental requirements of a valid contract is a consideration. A bare promise by one person to do something for another without a consideration moving to the promissor may be morally binding, but it will not be legally obligatory.

It is not necessary, however, that the consideration be cash. As illustrating this point, we cite the decision of the Minnesota Supreme Court in the recent case of W. K. Morrison Co. vs. Slonzynski, 175 Northwestern Reporter, 992.

One Ahl had a building contract. He sublet painting to plaintiff at a price of $100. The subcontract was made in the fall and contemplated doing of the painting during the winter months when work in general was slack. After part of the painting had been done, it was stopped, through no fault of plaintiff's, by suspension of the carpenters' work. In April, Ahl, the contractor, asked plaintiff to resume the painting. But plaintiff insisted that he could not complete the work during the busy season at the price given on the understanding that the painting would be done during the winter. Thereupon, Ahl agreed to pay $25 more and plaintiff proceeded to completion of the subcontract work. Payment not being made, plaintiff instituted mechanic's lien proceedings. Defendant, the owner of the building, resisted these proceedings, on the ground that there was not sufficient consideration. But the Supreme Court decided against her, saying:

"The only proposition urged on the appeal is that there was no consideration for the modified contract; hence the recovery should have been limited to $100. But it seems to us that * * * a legal consideration was shown. Through no fault of plaintiff there was a cessation of the work on the building, so that he could not finish his part within the time contemplated when he took the job. Because of this default—it is immaterial whether it was defendant's or Ahl's—plaintiff was forced to file a lien to protect his rights in case construction was not resumed, and he had to do the work during the busy season, instead of during the slack, as was in the minds of the parties when the original agreement was made. We think these matters furnish a sufficient consideration for a modification of the original contract. Defendant was not a party to the contract [subcontract]; Ahl does not offer any objection to the validity of the modification; and it is difficult to see wherein defendant is injured or damaged, for plaintiff's work was reasonably worth $125."

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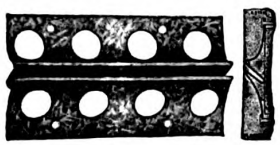

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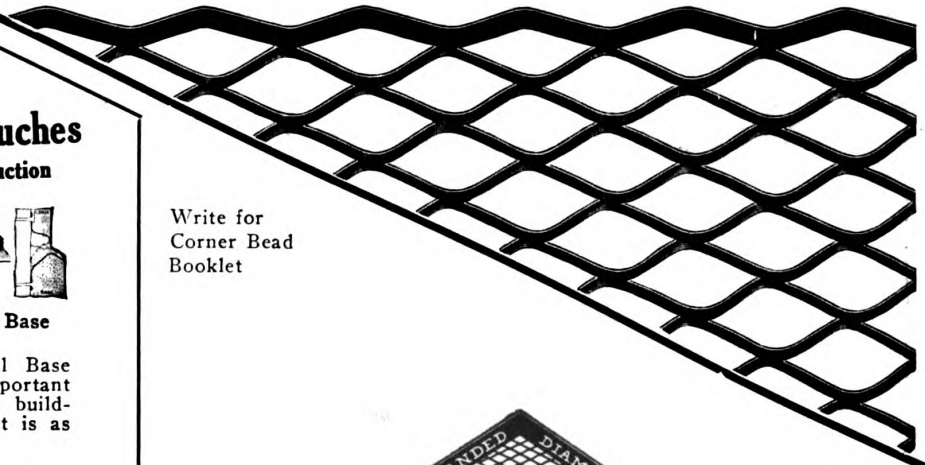
"Milcor" Metal Picture Moulds are also a great improvement over former wooden devices and in strict harmony with modern fire-proofing, non-warping construction.



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The Sign of High Grade Metal Lath

MILWAUKEE CORRUGATING CO.

MILWAUKEE, WIS.

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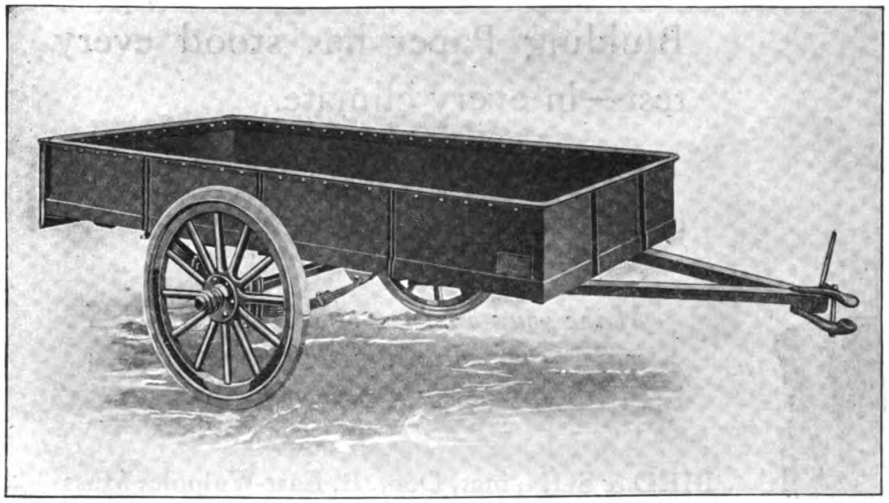

Capacity—2,000 pounds. Body—8 feet long, 46 inches wide, 12 inches high. Body and under frame built of open hearth steel. Axles—1½ inch square bed, special high carbon steel. Springs—Semi-elliptic, oil tempered and double heat treated. Bearings—Roller. Wheels—1½ inch spoke, artillery type, second growth hickory. Tires—32-2, solid rubber. Weight—534 lbs. Other models with gates at front; also extension tongue which permits carrying lumber, poles, ladders, etc., 30 feet long.

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Use Neponset Black Waterproof Building Paper back of stucco, underneath clapboards, beneath roofing and between floors. The houses you build will be free from moisture and draughts even on the coldest or rainiest days of the year.

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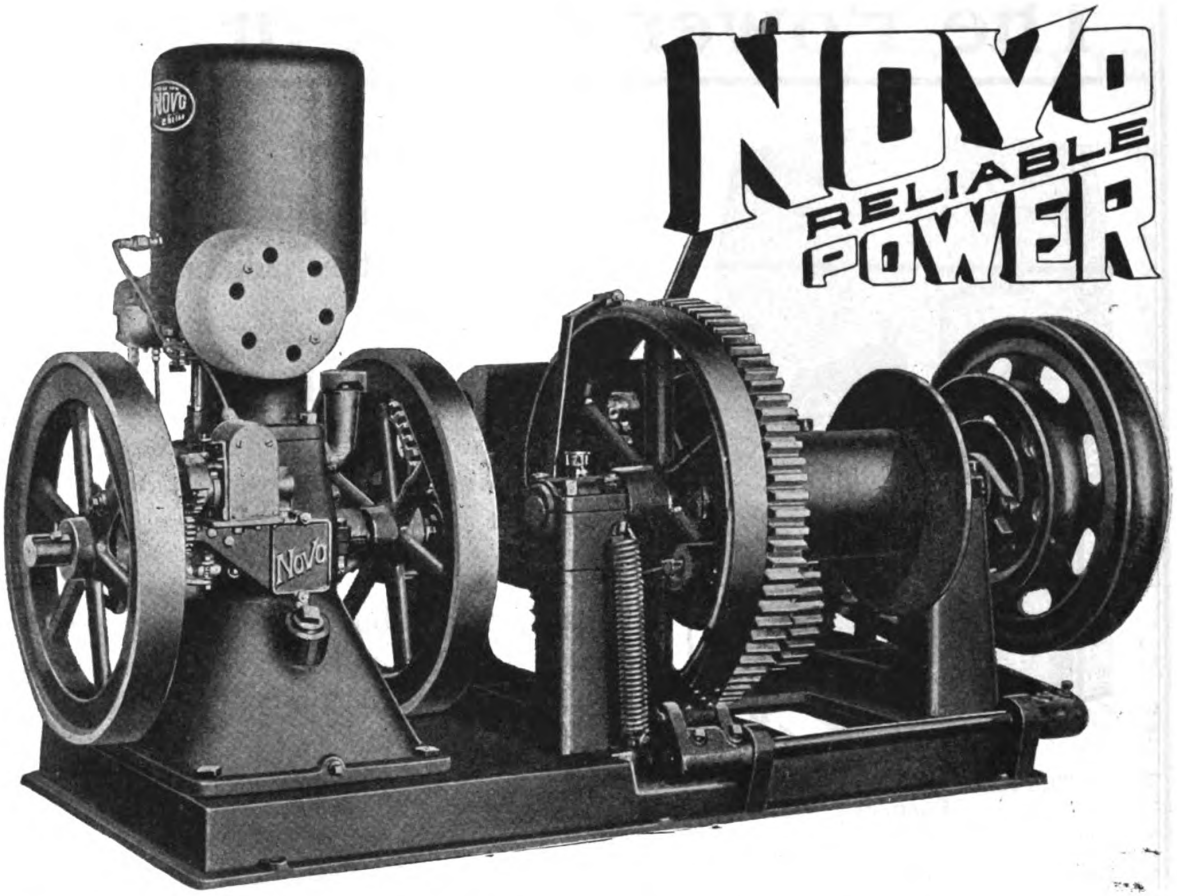

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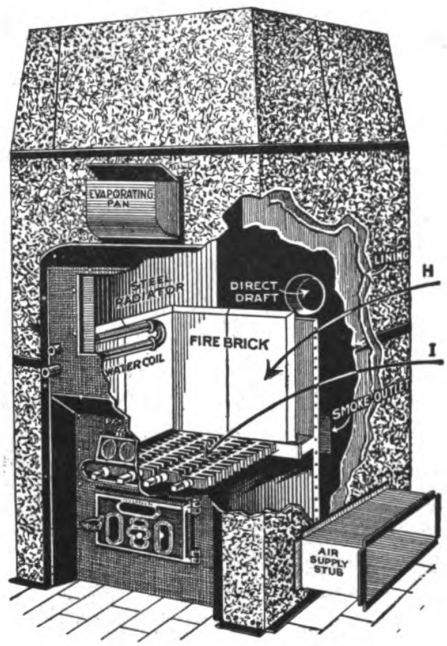
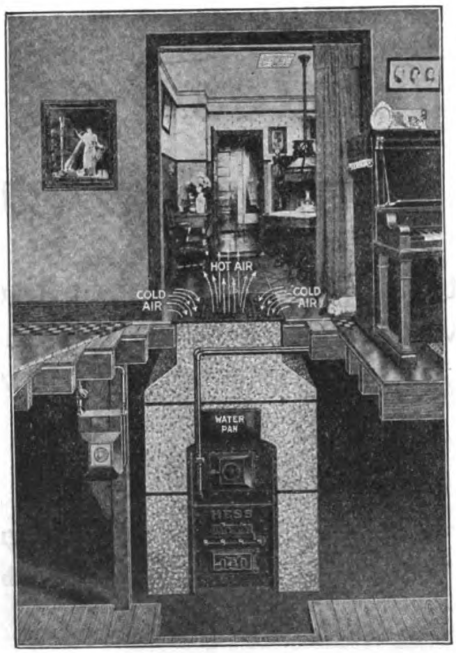
The Power of a Furnace



The Hess Welded Steel Pipe Furnace



The Hess Welded Steel Pipeless Furnace

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The Hess Furnace

is square, not round: because the square form contains more square feet of radiating surface than the round form. Same with the fire box.

The HESS fire box, locomotive type, is adapted to any and every kind of fuel. There are no dead corners—but perfect combustion delivers all the heat your fuel contains.

When you compare other furnaces with the HESS, learn the respective areas of the grates and fire surfaces—and then you will understand, partly, why HESS WELDED STEEL FURNACES (pipe or pipeless) give complete satisfaction everywhere.

Our hand book on furnace heating is instructive and interesting. It's free for the asking. Get one and learn how to provide comfort in your home for all time.

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Judged by strength Upson Board should sell for twice as much



The above picture (from an actual photo) shows five men resting their full weight on a single panel of Upson Board

The Mullen Tester, proves that Upson Board stands a pressure of nearly 400 lbs. per square in. Other boards break at 220 to 240 lbs.

BY actual test Upson Board is nearly *twice as strong* as ordinary wall board.

Thus—if its price were to be measured by its *greater* strength, you should pay twice as much for it.

Also because of its superior strength and its greater *stiffness* and *hardness*—

—Upson Board *holds* to the nails where soft, weak boards pull away. It does not buckle around nail holes.

—It *eliminates* the waste of "fluffed" boards in cutting, fitting and applying.

—It looks, feels and *works* like lumber—sawing and cutting more easily than the average board.

—It can be more rapidly and more *permanently* applied. Carpenters say that they can handle one-third more Upson Board in a day than they can of other boards.

—It lies *flat* on the wall when properly applied, minimizing troubles some boards create.

Discriminating contractors and carpenters insist on applying genuine *blue*-center Upson Board because they can get *better* results with it. They know that it costs less to apply than cheap, inferior boards.

While it may cost a trifle more at initial purchase, when applied and painted it is the *cheapest* board on the market because it saves $5 to $15 in the cost of decoration. "The *little* difference in price does not measure the *big* difference in quality."

Why Upson Board is stronger and better

Upson PROCESSED Board is stronger because it is *made* better. Any board is *only* as good as the material put into it!

Only long, strong wood fibre is used in the manufacture of Upson Board.

These fibres are scientifically processed under the original Upson method to give the strength, life and durability that a *good* wall board should have.

The panels are compressed under great pressure to make a solid *woodlike* panel.

Because of the better fibres and the scientific method of combining and processing the fibres into finished panels, any stock panel of Upson Board will test nearly twice as stiff and strong and hard as other wall boards.

If you have never used Upson Board, try it on a single job! You will quickly see the difference.

You will *know* why the permanent satisfaction Upson Board gives should add profits and prestige to your business.

Samples for *you* to test and instructive literature gladly sent on request.

THE UPSON COMPANY, *Fibre Board Authorities.*
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UPSON PROCESSED BOARD

THE DEPENDABLE BOARD WITH THE FAMOUS BLUE CENTER

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DUPLEX TRUCKS
BUILT FOR BUSINESS

Careless Truck Buying Makes Transportation Cost Too Much!

The Truck is a Piece of Business Machinery. It Should Represent the Most Economical Method for Doing its Particular Job. Buy Your Truck on That Basis—And it Will be a Good Investment

RISING costs and the shrinking value of the dollar to a large extent can be offset by *intelligent buying.*

A steadily increasing number of business men are *getting* the facts and then *buying* their trucks on the basis of the facts.

There are many good trucks on the market. But value in a truck, very much like character in a man, isn't always completely revealed by what the eye can see.

Back of every Duplex Truck are *Fundamental Principles*—of design and of construction—factors that result in the *remarkable degree of service value in Duplex trucks for the man who buys.*

There is Nothing Somebody Else Can Do to Save a Man From Paying the Price of His Own Limitation or His Own Carelessness

Look in the used car columns of your local paper. Note the number and makes of trucks offered for sale and *think about* all the reasons.

In one day in three cities 324 different used trucks were listed for sale—and not one Duplex among them.

Are these trucks for sale because they were not bought right?

There is something significant here when you stop to analyze it.

Why is this tendency to standardize on Duplex so noticeable of late years?

The answer is very likely that trucks are *more and more being bought on the business basis of service delivered and what the service costs over a period of years.*

This is a Time for Intelligent Buying

A truck is just as much a piece of business equipment as any other piece of machinery. Its value is in *what it does and how cheaply it does it.*

Transportation is a necessary part of every business.

A truck gives a business man transportation facilities—at a high or a low price. *It depends on the fitness of the truck for its job.*

Now take a man who buys a truck for his business without getting all the facts first. Later he discovers that his truck is not as economical as it should be He sells it at a sacrifice and gets another—and so on. Finally he buys the truck he should have selected the first time.

What is the result?

He pays too much for his transportation. His costs for trucking are not right.

The Duplex Users of Today Are Probably the Most Intelligent Buyers and Users of Trucks in America

Think of this—ninety per cent of the Duplex dealers have been distributing Duplex Trucks ever since this company was first organized.

What does this signify? It shows for one thing that their customers have found the Duplex Truck to be a successful truck for them.

The great significance of all this is that *Duplex users stay Duplex users.* Many of them had tried out five or six different makes of trucks before they got their first Duplex.

The whole history of this business shows that when a man buys his first Duplex it is only a little while until *he standardizes* on Duplex.

Get the Facts for Yourself

We have hundreds of letters from users in our offices that show some very remarkable facts. They are not edited. The letters stand just as they were written.

If you are a truck user and want to read these letters write us and we will send them to you for your private perusal. For ethical reasons we do not care to publish them.

What Do You Think?

Duplex 4-Wheel Drive

Many companies in the heavy duty fields say that the Duplex 4-Wheel Drive is the only successful truck they ever owned.

If your kind of work has proved too much for the ordinary truck—you will find that the Duplex dealer near you can give you some really interesting *facts.*

Many owners still seem to be using the *wrong kind* of trucks. Get the Duplex facts.

DUPLEX BUILT FOR BUSINESS

The Duplex Limited

Thoughtful men have entire confidence in the Duplex Limited—feeling that this *high speed* Duplex is a safe investment because of the fact that it *is* a Duplex.

Medium capacity—Pneumatic Tired—Two Wheel Drive—Full Electrical Equipment—here is a Speed Truck that *lasts.* Strong, rugged, mechanically and constructively *right*—it handles as easily and smoothly as a passenger car—and at a minimum of upkeep.

Duplex Truck Company
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One of the Oldest and Most Successful Truck Companies in America

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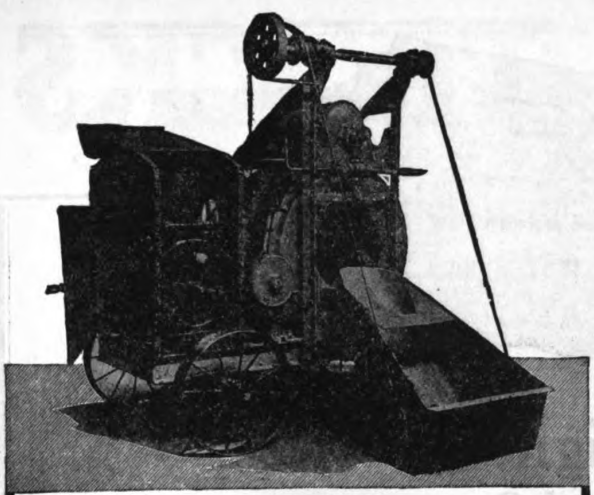

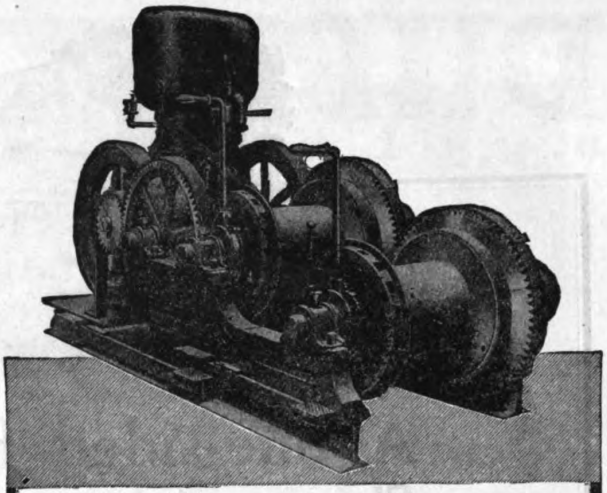

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FASTER DISCHARGING—
7 to 15 second discharge thru patented action—every bucket discharges—easy to clean.

BROKEN GEARS AND LOOSE CHAINS ELIMINATED—Steel roller pinion drive runs smoother—quieter and saves power—tooth replaced in 4 minutes without taking pinion off shaft.

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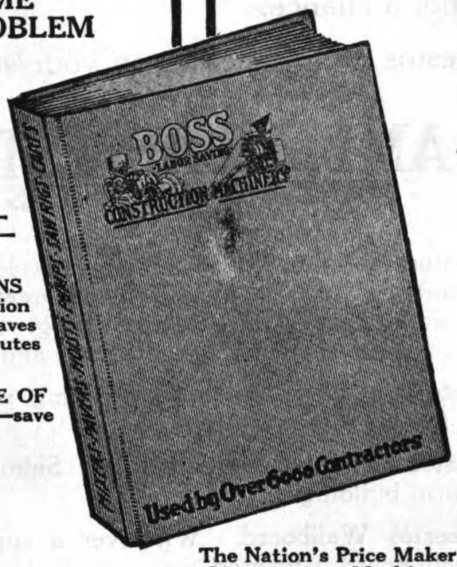

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HOISTS

COMMANDS LARGEST SALES OF ANY GASOLINE HOIST

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1920 FEATURES

S. K. F. BALL BEARING THRUSTS
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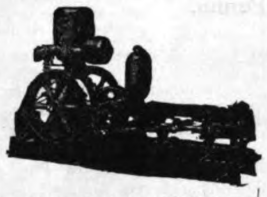
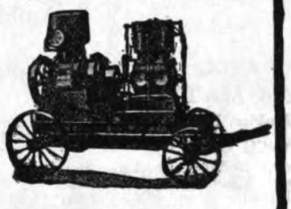
One and Two-Bag Pavers—High Drum.



Force—Trench or Diaphragm Pumps—Gas, Steam or Electric.



Portable Air Compressors.



Portable Saw Rigs. All Attachments.

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A one-sided fight

Flame vs. Asbestos and Concrete

A halt is called to Flame's long record of tragic victories when Asbestos and Concrete step into the ring.

Immediately it becomes a one-sided fight in which Flame has not a chance.

Get Asbestos and Concrete on your side by using

AMBLER ASBESTOS
BUILDING PRODUCTS

Ambler Asbestos Shingles. Made in three styles, four permanent colors. Newport grey, natural slate, red and green. Lie snug to the roof, forming water-tight and fire-tight covering. Also 1/4 inch mixed color shingles in seven shades of reds, browns and greys.

Ambler Asbestos Building Lumber. For siding, partitions, fire doors and wherever fire resistance is essential.

Ambler Asbestos Corrugated Roofing and Siding. For industrial, railroad and farm buildings.

Ambler Linabestos Wallboard. Wherever a superior flame-proof, fire-resisting wall-board is wanted.

Send for samples and literature showing reproductions of installations.

Asbestos Shingle, Slate & Sheathing Co.

Ambler, Penna.

Factors
KEASBEY & MATTISON CO.
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BRANCH OFFICES:
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Manufacturers of: Ambler Linabestos Wallboard, Ambler Asbestos Building Lumber, Ambler Asbestos Shingles, Ambler Asbestos Corrugated Roofing and Siding. 85% Magnesia and Asbestos Pipe and Boiler Covering, Asbestos Textiles.

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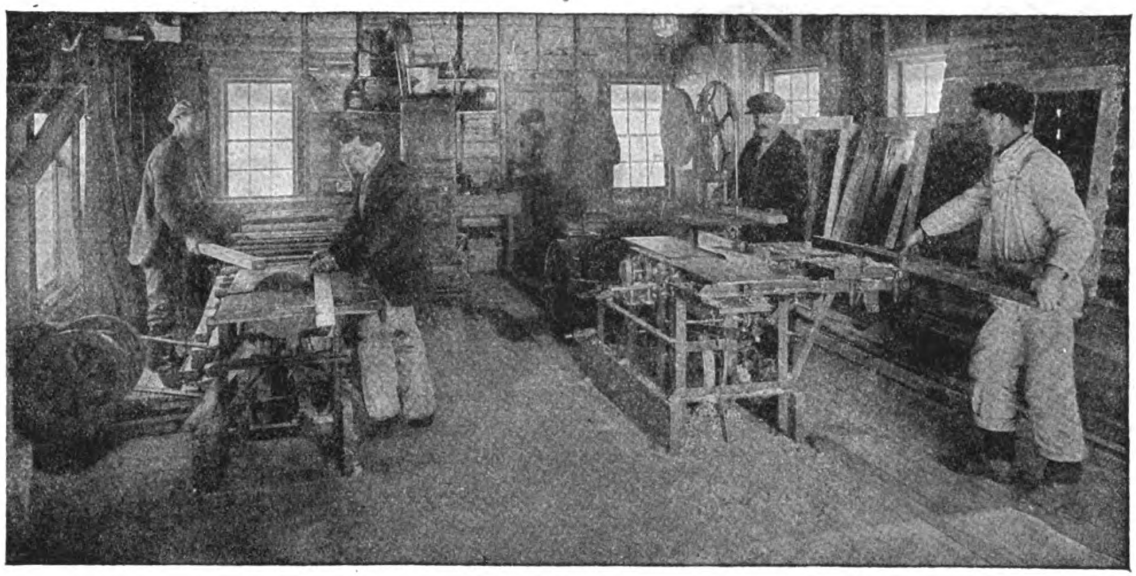


Workshop of Billerica Garden Suburb, North Billerica, Mass. Left, Swing Cutoff Saw. Right, the "Pride of the Shop."

Save Lumber, Labor, Time and Money!

Costs in the near future must come down. Unless you are prepared to meet the demand for greater economy, business may pass you by. Parks Machines will enable you to underbid on both cost and time and make a greater profit. You don't have to wait for special stock from the planing mill; you can use up any odd size lumber that you have on hand. Users everywhere report that they save the time of from two to four men and turn out a better job.

Parks Machines are sturdily built of angle steel; vibration is reduced to a minimum—no "waves" to be planed out.

February 18, 1920.

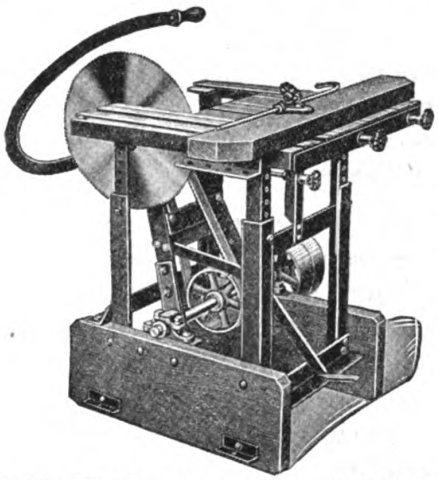
The Parks Ball Bearing Machine Co., Cincinnati, Ohio.

Dear Sirs:

Am sending you under separate cover a picture of one of your machines which we have had in operation for some time preparing material for our Garden Suburb Homes. The machine has been seen in operation by visitors to the Suburbs from a large number of the states, some as far away as the Pacific slope, and all seemed favorably impressed with the machine.

Yours truly, C. H. WILLIAMS,
Billerica Garden Suburb, Inc., North Billerica, Mass.

P. S.: Kindly send another catalog.



The machine at the left is our "Alert" Swing Cutoff Saw. Set up for instant use, it has proven of great value and convenience, especially in working long material of large dimension. When special cut is desired, with one man to lay it in position, you can get a clean square cut, as the swinging frame is short and rigid. It will be used often when a regular saw bench with adjustments for saw and guides would not. Cuts a one-inch board 20 inches wide or a three-inch plank 15 inches wide. With one twelve-inch cutoff saw and one three-inch belt. Shipping weight, 185 lbs. Price, $50.

Write today for catalog and learn what a Parks can do for you. Ten day free trial—ten year guarantee.

The Parks Ball Bearing Machine Co.
Station A
CINCINNATI, OHIO

Chicago Offices and Show Room: 615 Machinery Hall

WOODWORKING PARKS MACHINES

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Builders realize that the field for the use of Metal Lath has barely been touched. Its protective offices are imperatively needed to make **frame structures safer.** That it is the best base for stucco has been incontestably proven by Government tests and years of experience. **And for interior plastering** purposes there is no comparison between the quality of the work done over KNO-BURN and that done over other plastering bases.

KNO-BURN is the easiest of all types of Metal Lath to erect and plaster. The small diamond shaped meshes reinforce the mortar in every direction, **preventing cracks.** There are no excretions from the metal to stain the plaster. Its use for either interior or exterior work is an assurance of permanently satisfactory work.

Samples of KNO-BURN and book "FIRE-PROOF CONSTRUCTION" gladly sent.



NORTH WESTERN EXPANDED METAL CO.

904 Old Colony Bldg. :: Chicago, Ill.



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Use the Red-Lead in Paste Form



Four builders out of five use Red-Lead paint to protect steel skeletons, sheet-iron roofs, tanks, fire-escapes, ventilators, stacks, gutters—every kind of metal construction.

When you use Red-Lead, see that it's Dutch Boy, the Red-Lead in paste form. This pure Red-Lead contains linseed oil—you simply add more linseed oil, to give it paint consistency.

Dutch Boy Red-Lead covers evenly and smoothly, affording uniform, complete protection against rust. It "brushes out" so easily that your labor cost is materially reduced. Will not harden in the keg.

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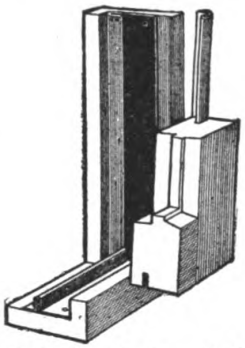
PREVENT LEAKS AROUND DOORS AND WINDOWS



Section Showing Removal of Sash and "Flexible" Strip at the same time.

Modern building practice recognizes that calking and weather strips are essential equipment for all types of buildings. Their merits are particularly well known where Diamond Metal Weather Strips and Calking Compound are specified. They do away with storm sash and absolutely close all openings around doors and windows, keeping out wind, dirt, storm and noise, but allowing for proper ventilation.

$5000 per year clear profits, or more, can be made in handling Diamond Metal Weather Strips and Calking Compound.

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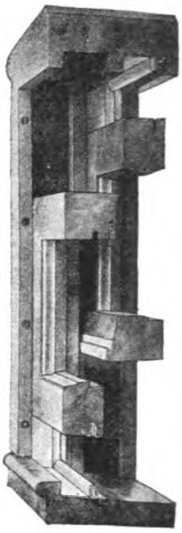

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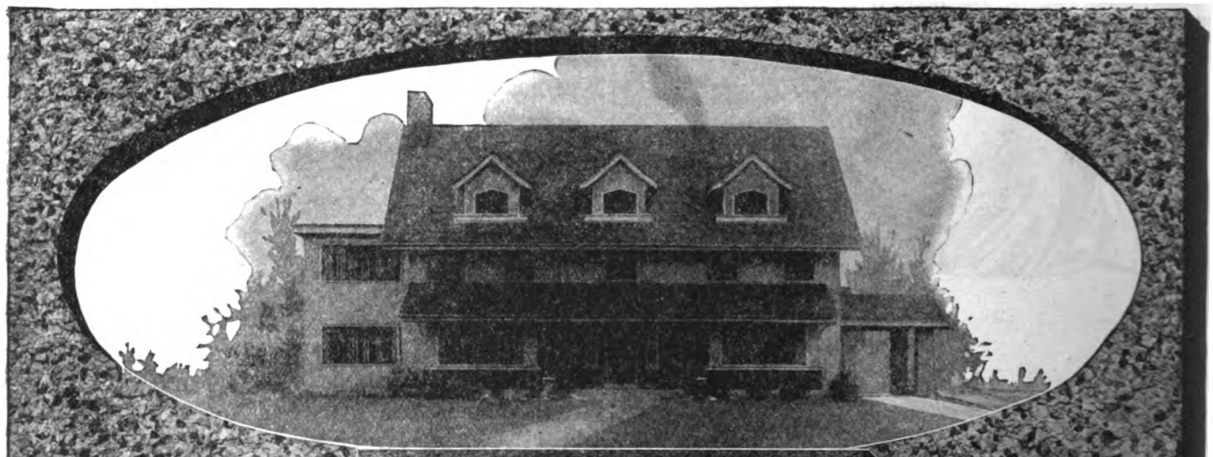
THE DIAMOND METAL WEATHER STRIP CO.
COLUMBUS OHIO



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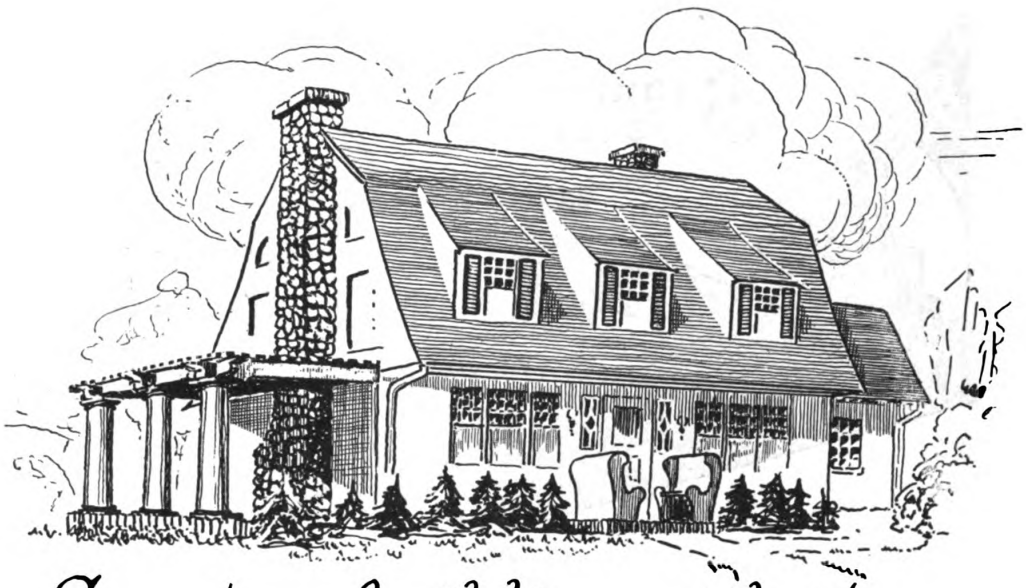

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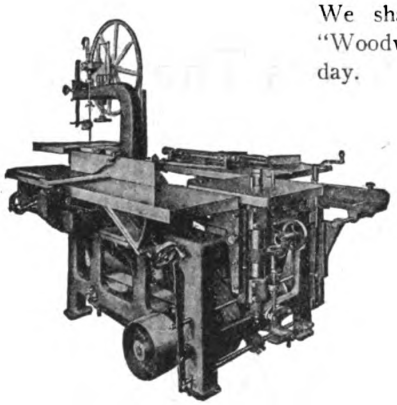
We shall be glad to send you our booklet "Woodworking Machinery." Write for it today.



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Sidney Ohio

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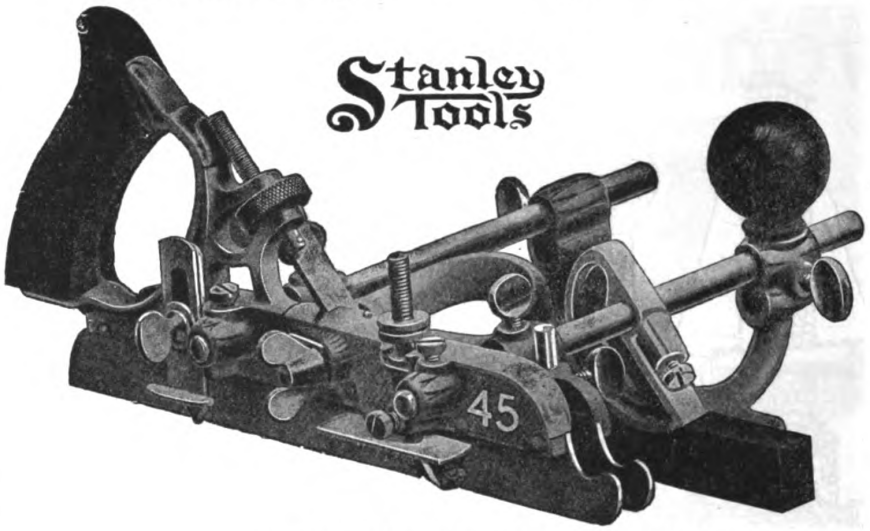
Stanley "Forty-Five" Plane



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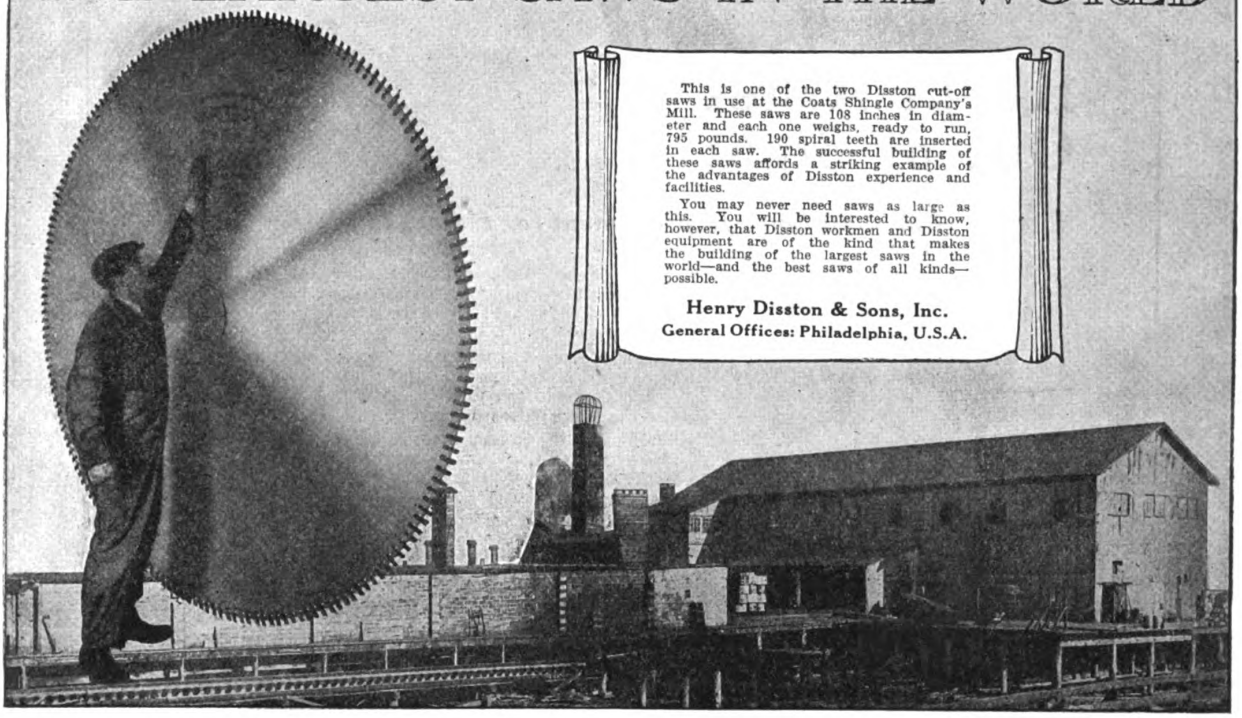
THE LARGEST SAWS IN THE WORLD



This is one of the two Disston cut-off saws in use at the Coats Shingle Company's Mill. These saws are 108 inches in diameter and each one weighs, ready to run, 795 pounds. 190 spiral teeth are inserted in each saw. The successful building of these saws affords a striking example of the advantages of Disston experience and facilities.

You may never need saws as large as this. You will be interested to know, however, that Disston workmen and Disston equipment are of the kind that makes the building of the largest saws in the world—and the best saws of all kinds—possible.

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General Offices: Philadelphia, U.S.A.

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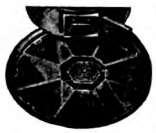
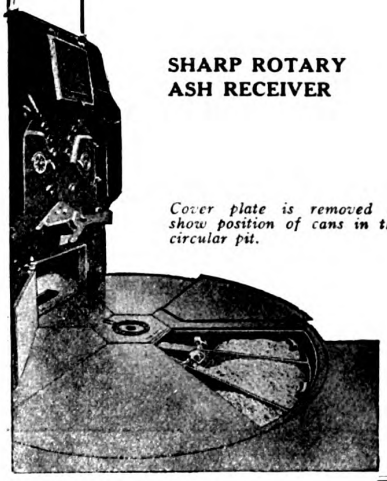
Keeps Ashes Out of Sight



Cover plates removed to show interior view.

A modern home Improvement for Home Builders



SHARP ROTARY ASH RECEIVER

Cover plate is removed to show position of cans in the circular pit.

Here is a device builders are installing to make better homes from the standpoint of cleanliness, reduced furnace work and a cellar that's of more use than a furnace and ash room.

The Sharp Rotary Ash Receiver, installed beneath the cellar surface, keeps ashes out of sight, eliminates unsightly ash cans, and prevents ash dust from settling on the furnishings in the rest of the home.

By adding it to the conveniences of homes, an example is set in improvements that sells homes on the merits of their modern conveniences. The Sharp Rotary Ash Receiver is a necessity home owners are seeking to have.

Send for catalog which gives complete information about the Sharp Rotary Ash Receiver.

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Dept. "L."

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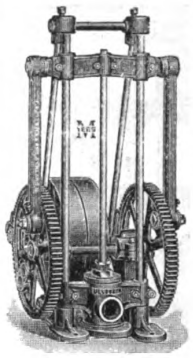

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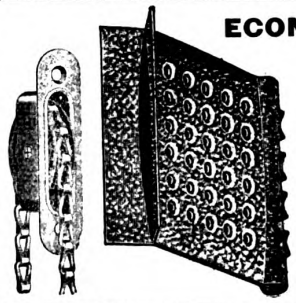

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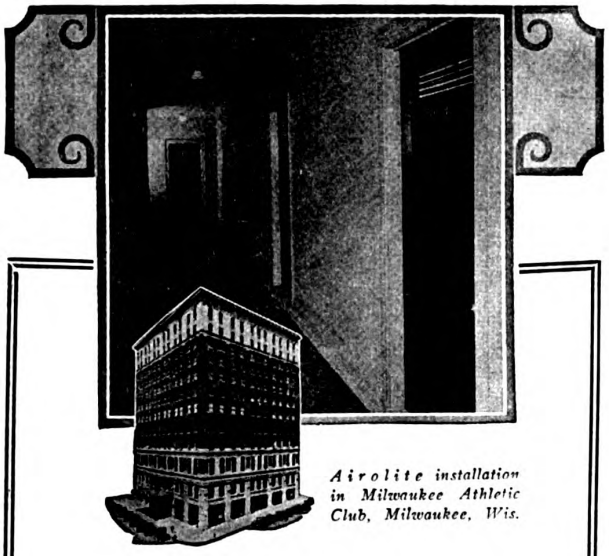

Airolite installation in Milwaukee Athletic Club, Milwaukee, Wis.

How One of America's Finest Athletic Clubs Solved Its Ventilation Problem

Clubhouses and hotels can get a "tip" on modern ventilation from the Milwaukee Athletic Club. There is not a bedroom transom in the entire building, yet every room is cool and airy.

Airolite is the answer. This scientifically correct ventilator has been placed in the upper panel of each bedroom door. It furnishes fresh air without draft, insures privacy, and eliminates the unsightly transom —at much less cost.

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The Caskey-Dupree Mfg. Co.

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A Calculating Square

With a Sargent Framing Square the carpenter merely measures his Hip, Valley, Jack or common rafters and his square does the rest. It calculates lengths and cuts as he measures. No figuring on his part. No possibility of error. A lot of time is saved.

Sargent Framing Squares are made of selected steel and carefully inspected for accuracy of markings. Owing to the great variety of these markings they are adapted for almost any purpose a carpenter might require.

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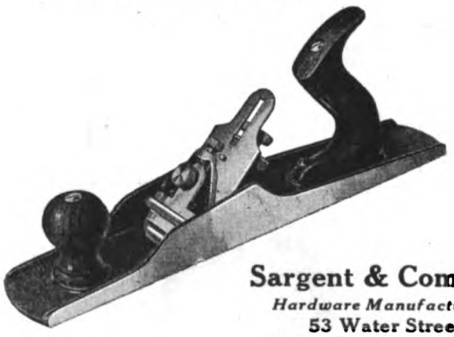
If you want a fast, true-cutting plane, just get a Sargent Auto-Set Bench Plane. This is the only plane on the market from which the blade can be taken, whetted, and replaced without any readjustment. Made in various sizes. Booklet on request.



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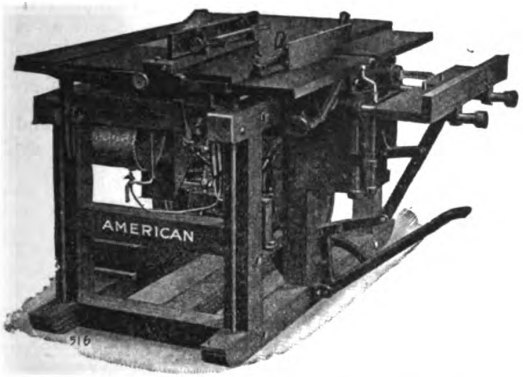
"AMERICAN" CONTRACTORS' VARIETY WOODWORKER



"American" Variety Woodworker—Furnished with Built-in Gasoline Engine, Self-Contained Electric Motor, or for Belt Drive

Compare this outfit, item by item, with any other woodworker you know. Send for the Bulletin and read the specifications. And measuring it all by the service-giving standard, you'll decide that the "American" carries more real value than you can get elsewhere for the price. Think of having 18 machines combined in one self-contained unit, with practically all the functions of a woodworking plant. Figure the economies such an outfit could work—even in a plant with larger machines. An "American" is a thoroughly good woodworker investment. Write for the Bulletin and judge for yourself.

The "American" line is fully described in Catalog 20—saw mills, edgers, bolters, trimmers, planers, matchers, moulders, shingle mills, lath mills, excelsior machines, woodworkers, saw benches, bandsaws, rip and cut-off saws, wood lathes, etc.

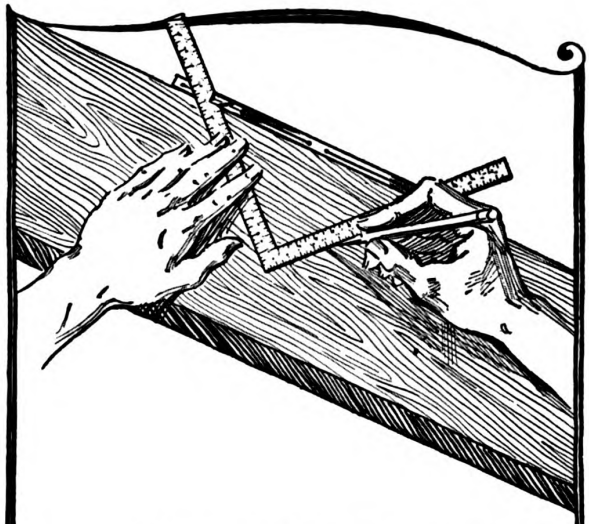
American Saw Mill Machinery Co.

HACKETTSTOWN, N. J.
62 Main St.

NEW YORK CITY
1362 Hudson Terminal

Woodworkers
Rip and Cut-off Saws

Saw Benches
Hoists



Starrett Tools

Tools that make your work easier and more accurate. That's the kind that are marked with the name of Starrett. For forty years we've been striving to make tools just a little better than they were ever made before.

The Starrett Stair Gage is one of the most useful tools in a carpenter's kit. Used in connection with your steel square, you will find it mighty handy for cutting in stairs, rafters, braces, etc.

There are 2,100 fine tools listed in our Catalog No. 21 "P". Write for a free copy.

THE L. S. STARRETT CO.

The World's Greatest Toolmakers
Mfrs. of Hack Saws Unexcelled
ATHOL, MASS.



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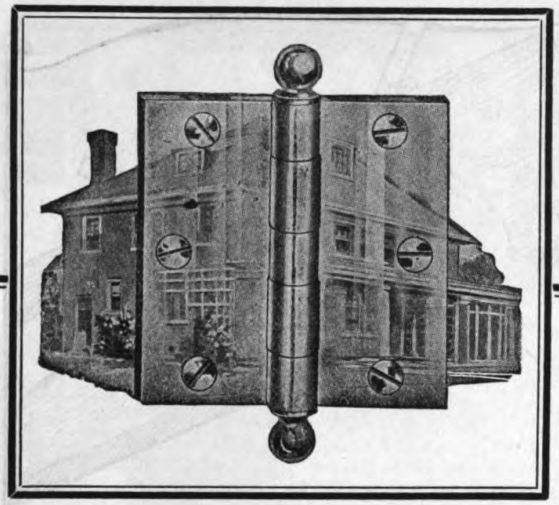


Your
ATTENTION!!

is called to the hinges on the door. To some people door hinges may seem rather small and unimportant—nevertheless, their mission in helping to make or mar the appearance of the rooms in a modern home is worthy of serious thought. The

GRIFFIN
"The Door Butt of America"

is designed along lines that insure both beauty to the home and *service* whenever the doors are opened and closed.

The Griffin operates freely and easily, it is amply strong for heavy doors and it is such a pleasing fixture that architects and home builders are glad to specify and use it.

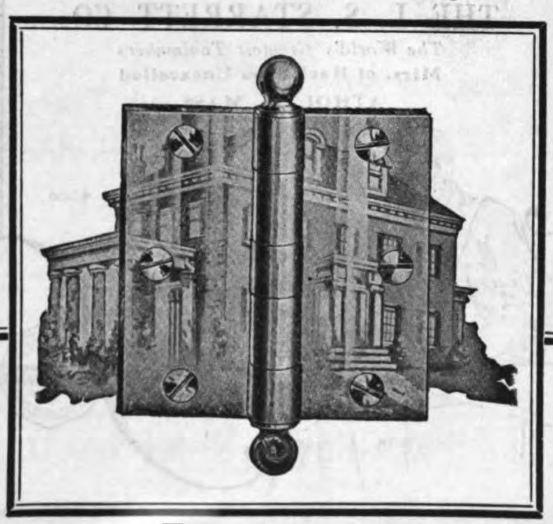
Being finished in the various Griffin hardware finishes, it is in wide demand for the better class of houses and office buildings.

Send for illustrated catalog and circulars.

The Griffin Manufacturing Company
ERIE, PENNA.

45 Warren Street
New York

229 West Randolph Street
Chicago



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—a big difference—in wall boards. The only wall board with the strength-giving, insulating wood core is

Compo Board
PATENTED TRADE MARK

The wood core makes Compo Board the most valuable of all wall boards to use for ceilings, walls and partitions, yet it is the most economical in the long run. The wood core gives it added strength, stiffness and durability. Will not warp, buckle or shrink nor absorb moisture. Handles and saws like lumber. Always stays smooth, regardless of the decorative scheme. Is far superior to lath and plaster. Possesses great fire-resisting and insulating value.

Insist on the wall board with wood core and you will get the genuine "Compo Board." Sample and interesting booklet FREE.

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5778 Lyndale Avenue No.
At 44th
MINNEAPOLIS MINNESOTA

Compo Board
None Genuine without the WOOD CORE

M&F C
Fiberlic

Fiberlic Wall Board

The *material* from which it is made, the fact that the pulp is *chemically cleansed* and that the *fibre lengths* give the finished product that *natural reinforcement* that is lacking in ground wood boards, is in itself a guarantee of the superiority of Fiberlic for *strong, permanent, economical* and *sanitary construction.*

MacAndrews & Forbes Company
200 Fifth Avenue, New York City
Factory: Camden, N. J.

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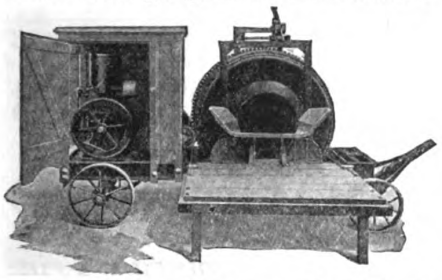
"THE STANDARD"

Low Charging Concrete Mixers



Increase Production—Cut Costs

Speed and thorough mixing are the most important points to be considered when you are in the market for a concrete mixer. The faster you can place thoroughly mixed concrete, the more money you will make on the job.
"The Standard" Concrete Mixer is adapted to every sort of a building project.
In addition to Concrete Mixers, "The Standard" line includes Hoists, Pumps, Air Compressors, Wheelbarrows, Engines, Block Machines—everything needed by the contractor.

Ask for Catalog No. 48 and specify the particular items in which you are interested.

The Standard Scale & Supply Co.

Pittsburgh	New York	Chicago
1631 Liberty Ave.	145 Chambers St.	163-171 N. May St.
Philadelphia	Cleveland	Baltimore
523 Arch St.	1547 Columbus Rd.	400 N. Gay St.

STOVER Fire Place Fixtures



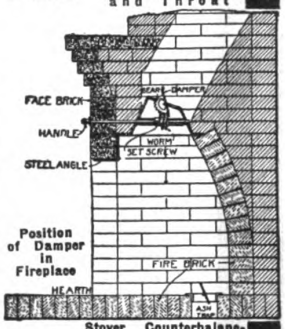
Stover Dampers Increase Heating Efficiency

The success of operating a fireplace depends upon ability to regulate draft. The Stover Improved Dome Damper shown here, is not only most popular, but the most efficient style of damper made.

Stover Improved Dome Damper and Throat

Lightest Touch of the Lever Opens or Closes This Damper

Cover hinged in center, operated by worm gear. Has long rod—just right height to go between rows of brick—quickly adjusted by loosening set-screw in worm. No machine-work or cutting necessary. Polished brass knob has wide flange covering opening in wall. Extra high dome forms smooth throat which help draft and makes it easy for contractor to lay brick where ordinarily most difficult.



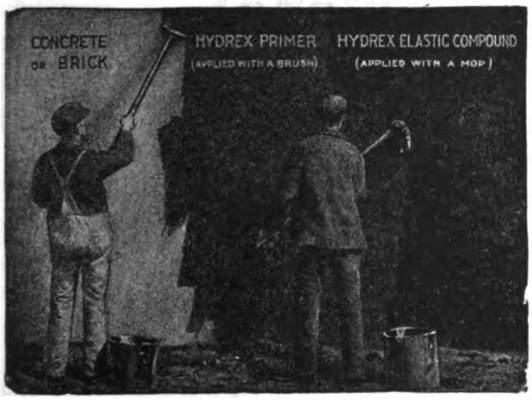
Stover Andirons, Fire Baskets, Fire Sets, etc., furnished in Special Bronze and Plated finishes—very attractive, cost but little more than black. Also made in solid brass, brush finish. Their varied surfaces, soft color tones and rhythm of lines lend themselves to decoration with uncommon results.

Write for Free Booklet, Prices, terms, etc.

Stover Counterbalancing Ash Trap Door

Stover Mfg. & Eng. Co. *Dept. 747* **Freeport, Ill.**

Also Builders and Shelf Hardware and Hardware Specialties



The enormous covering capacity of HYDREX DAMPPROOFING PAINT

One gallon of Hydrex Dampproofing Paint will cover from 100 to 125 square feet of stone, concrete or brick surface.

Hydrex Dampproofing Paint is a heavy bodied, black paint applied cold with a brush. It consists of a pure mineral base, with a solvent which is very volatile and exceedingly penetrating. It is much heavier bodied than the average dampproofing paint, and forms a thick, durable protective coating. It is a quick dryer, drying in less than half an hour.

Samples sent upon request.

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Chicago Philadelphia



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A Complete Set of Tools in One

A Truly Remarkable Tool

for smooth, round, oval or square boring, scroll and twist work. Takes but little practice to put this tool to many varied uses such as core boxes, fine and delicate patterns, veneers, screen work, scalloping fancy twist columns, newels, ribbon molding and mortising. Just the thing for cabinet makers, carpenters and woodworkers. Write for dealers' proposition.

The PROGRESSIVE MFG. CO.

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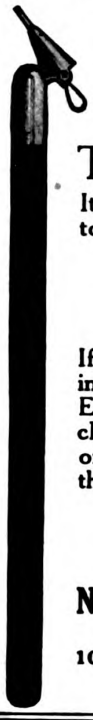
PERFECTION Lettering and Drawing Pen



THE most simple and most efficient lettering pen for freehand lettering. It writes with a steady, smooth, velvety touch.

It's Different! Try It!

If you want comfort, speed and efficiency in lettering, try the PERFECTION. Eliminates that constant refilling and cleaning. The PERFECTION is the only lettering pen that actually solves the lettering problem.

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For

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SAVES TIME AT EVERY TURN

Here you have— an easy working ratchet, right hand, left hand. (and rigid), a comfortable handle and withal a strong and serviceable driver.



Made in 8 lengths of blade, from 2 inch for small screws, up to 12 inch suitable for all kinds of high power house carpentering.

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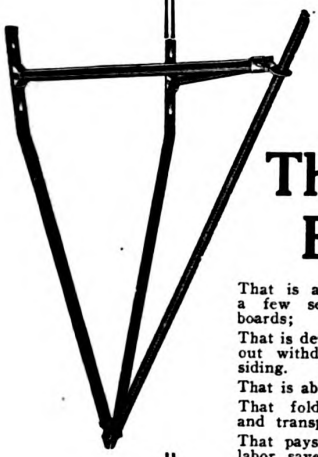


This is the Bracket

That is attached by four nails in a few seconds without removing boards;

That is detached in a twinkling without withdrawing nails or defacing siding.

That is absolutely safe when in use;

That folds compactly for storage and transportation.

That pays a dividend in time and labor saved on every job.

THE

"RELIABLE" Scaffold BRACKET

Made only by

ELITE MANUFACTURING CO.

ASHLAND, OHIO

Order from your supply house or write us direct if unable to secure locally.



THE COMING BATTLE

When this old world has finally adjusted itself to post-war conditions and the market swings from the buyers to the sellers, as it has already done in many lines, we will then be in the greatest commercial battle—the battle for the world's trade.

To the Victor Belongs the Spoils

It behooves us now to lay our plans for this battle so that we will not feel so keenly the thrust of foreign competition. Every operation must be speeded up and cost cut to the minimum for the cream of the trade will come to those who can produce most efficiently and economically—to the Victor belongs the spoils.

adopt the WALLACE IDEA at every bench

—And Speed Production

The Wallace Bench Machines are designed so that the workman may do from 75% to 80% of his cabinet, pattern and fitting work right at the bench—the workman's entire attention can be concentrated on the work at his bench without those disturbing interruptions incident to old methods—he will do more and better work wih less physical effort, thus cutting costs and speeding production.

Your inquiry will bring an illustrated book explaining the Wallace Idea and how to use these machines.

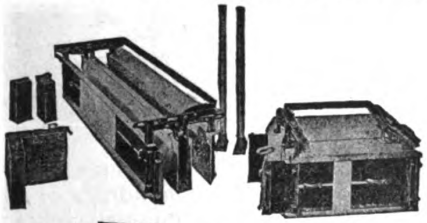
The Wallace 4" Bench Planer
The Wallace 6" Bench Jointer
The Wallace Universal Bench Saw
The Wallace Plain Bench Saw
The Wallace 14" Band Saw

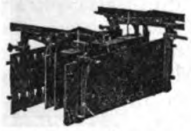
J. D. WALLACE CO., 1419 Jackson Blvd., Chicago

Van Guilder Outfit

for building reinforced concrete

Double Monolithic Walls





Our Patent Angle Iron Corner Guides make absolutely plumb and true corners; they are a wonderful time saver.

The window frames are set in place and cemented tight, with air space brought up to frame by the sliding plates on sides of machines—no solid wall anywhere to carry dampness through.

Our wonderful New Window Machine gets into all the small places and short angles, and follows complex architectural designs. Our special exclusive features are time and money savers, and are worth the cost of our entire system.

BUILD ANYTHING

from cottage to mansion; chicken house to full dairy plant including Double Wall Silos that will not freeze; garages, factories, theaters; triple wall store houses and cold storage plants. Concrete construction at the cost of wooden buildings and even less.

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Paints, Varnishes, Stains, Fillers, Colors

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Murphy In-A-Dor Beds are being used the country over in Bungalows, large and small Residences, Apartments, Hotels, Hospitals, Dormitories, Public Buildings (in rest rooms).

Let our technical department help solve your problem. This service is free.

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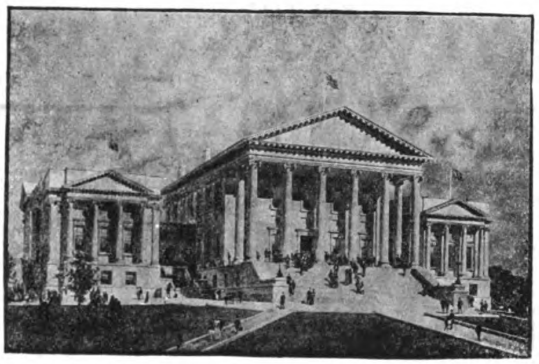

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Its extreme lightness (about one-eighth that of slate), durability and moderate cost commend it to those wishing something out of the ordinary in roofing.

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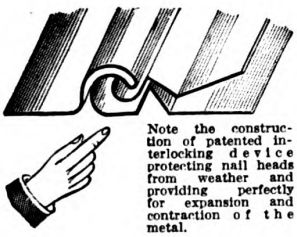

Note the construction of patented interlocking device protecting nail heads from weather and providing perfectly for expansion and contraction of the metal.

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1



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Last year the Allmetal agency was worth $5000 and up to many builders. It will be worth more this year. If you can represent us successfully write quickly for details.

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The first essential in a well planned home

ECONOMY

Combination Boiler and Gas Water Heater with Positive Thermo Valve Control

A reasonably priced piece of equipment which renders instant and continuous hot water service on the storage principle, with a marked saving in consumption of gas. Specify for the bungalow, residence, two-flat building, three-story detached apartment, club and play-ground showers, factory lavatories, restaurants, etc.

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RED GREEN, PURPLE, BLACK
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The booklet illustrated contains interesting facts for the man about to have a new roof put on or an old roof repaired. It is also a splendid thing for the roofer to give to his roofing prospects. Copy on request.

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Specify the furnace that cuts fuel bills 35%—that burns any kind of fuel—that doesn't get out of order—that doesn't give trouble.

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Waterproofs, Strengthens and Hardens Concrete

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171 Madison Ave. New York City



PULLMAN Sash Balances are constructed on the Unit System. There are three units K, L and M, adaptable to any style of sash in any kind of a building. Anyone can install the Pullman Unit Sash Balances with ease and rapidity.

Economy—Using Pullman Sash Balances saves money on every window over the old-fashioned cords and weights—besides making a better construction.

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PULLMAN MFG. CO.
8 Industrial Street Rochester, N. Y.

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"CREO-DIPT" Stained Shingles

Bungalow at Williamsport, Pa. Arch. Chas. Barton Keen, Philadelphia

Picturesque and Practical

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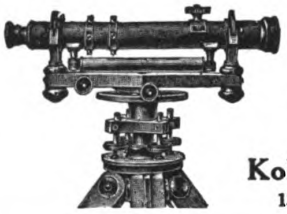

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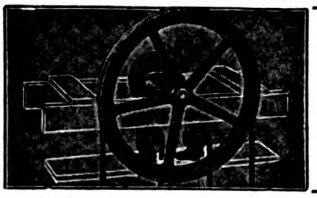

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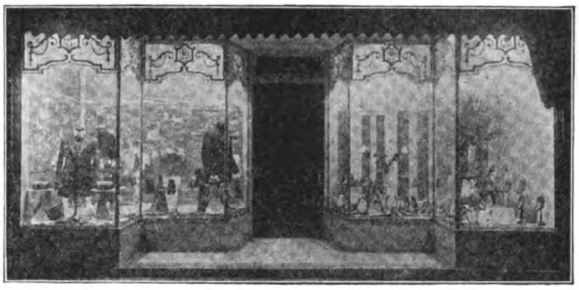

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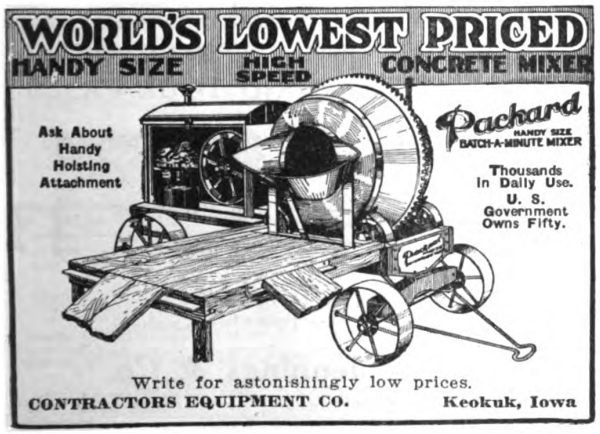

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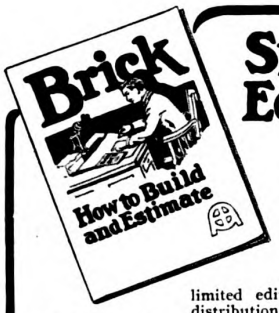

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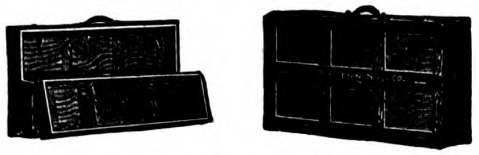

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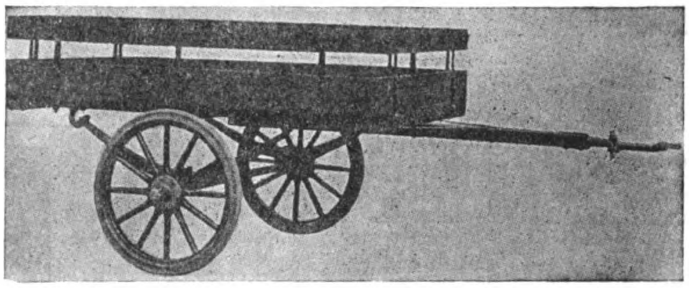

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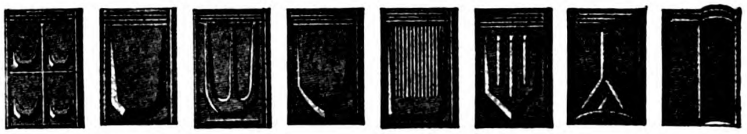

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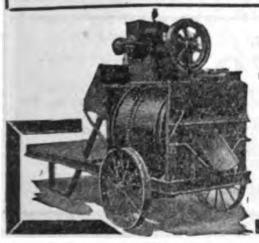

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CORRECTION

Architects Tooker & Marsh, New York City, should have been given credit for the house at the right of the "Creo-Dipt" Stained Shingle Co., Inc., advertisement in our June issue. The other house in the illustration is by Architect Robert Seyfarth, Chicago.

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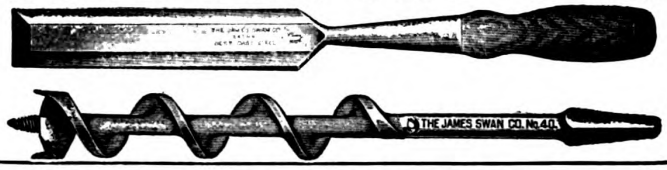

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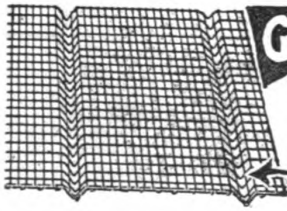

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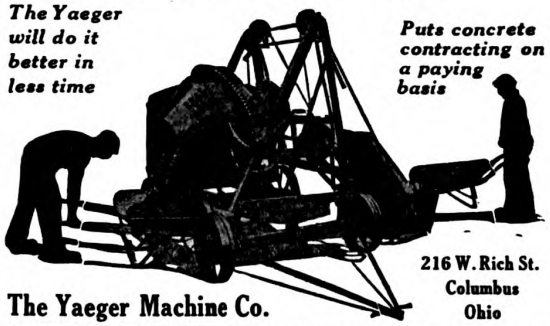

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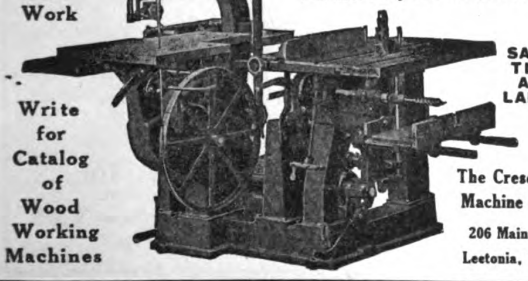

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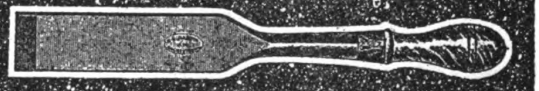

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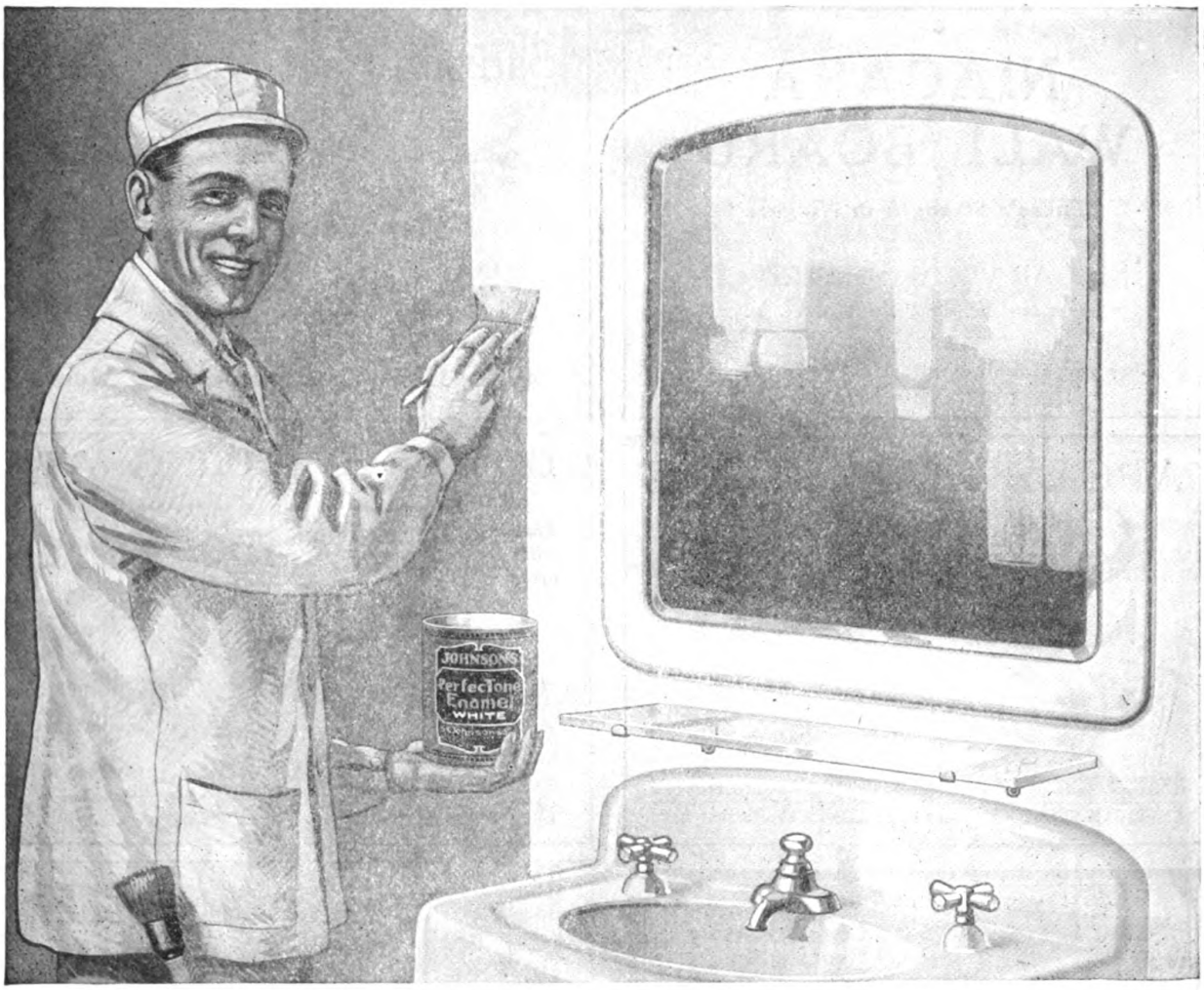

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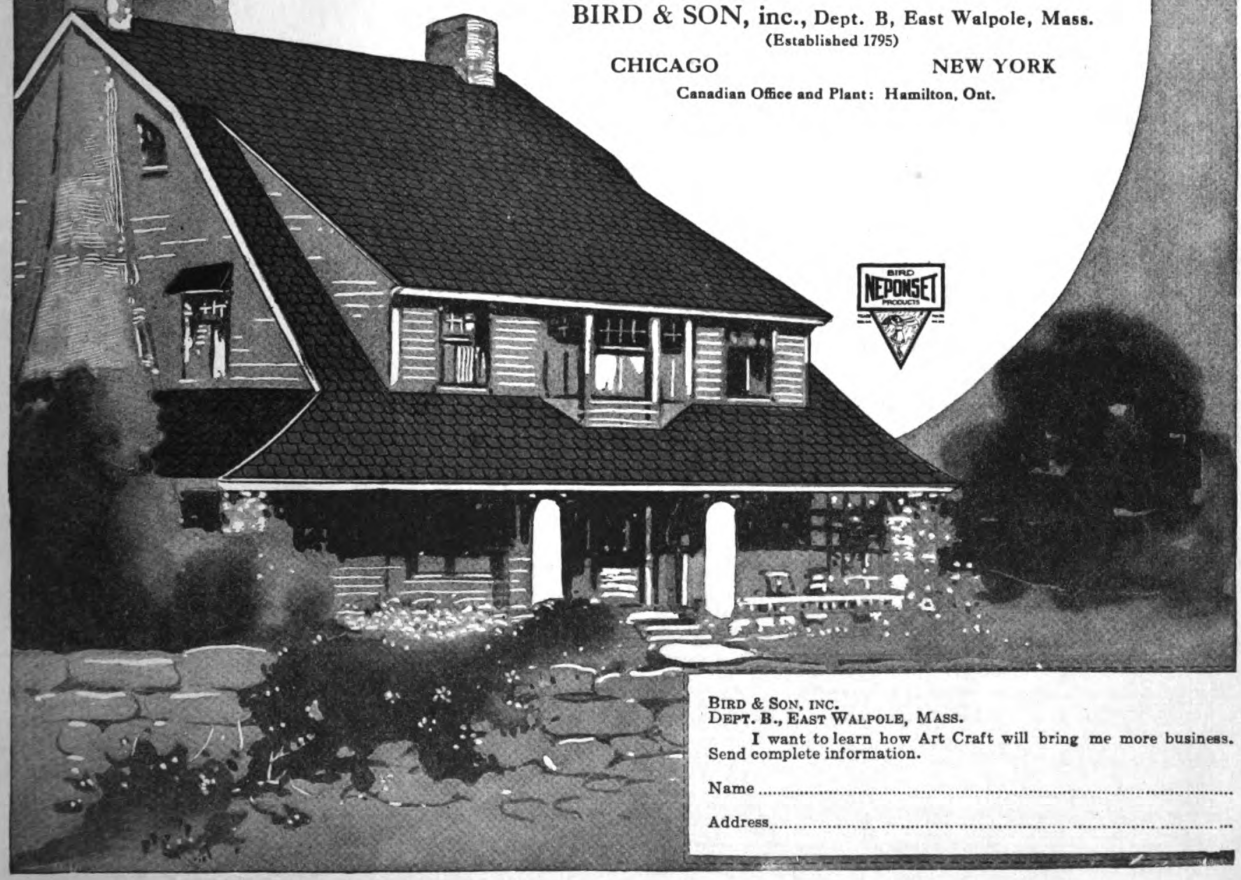

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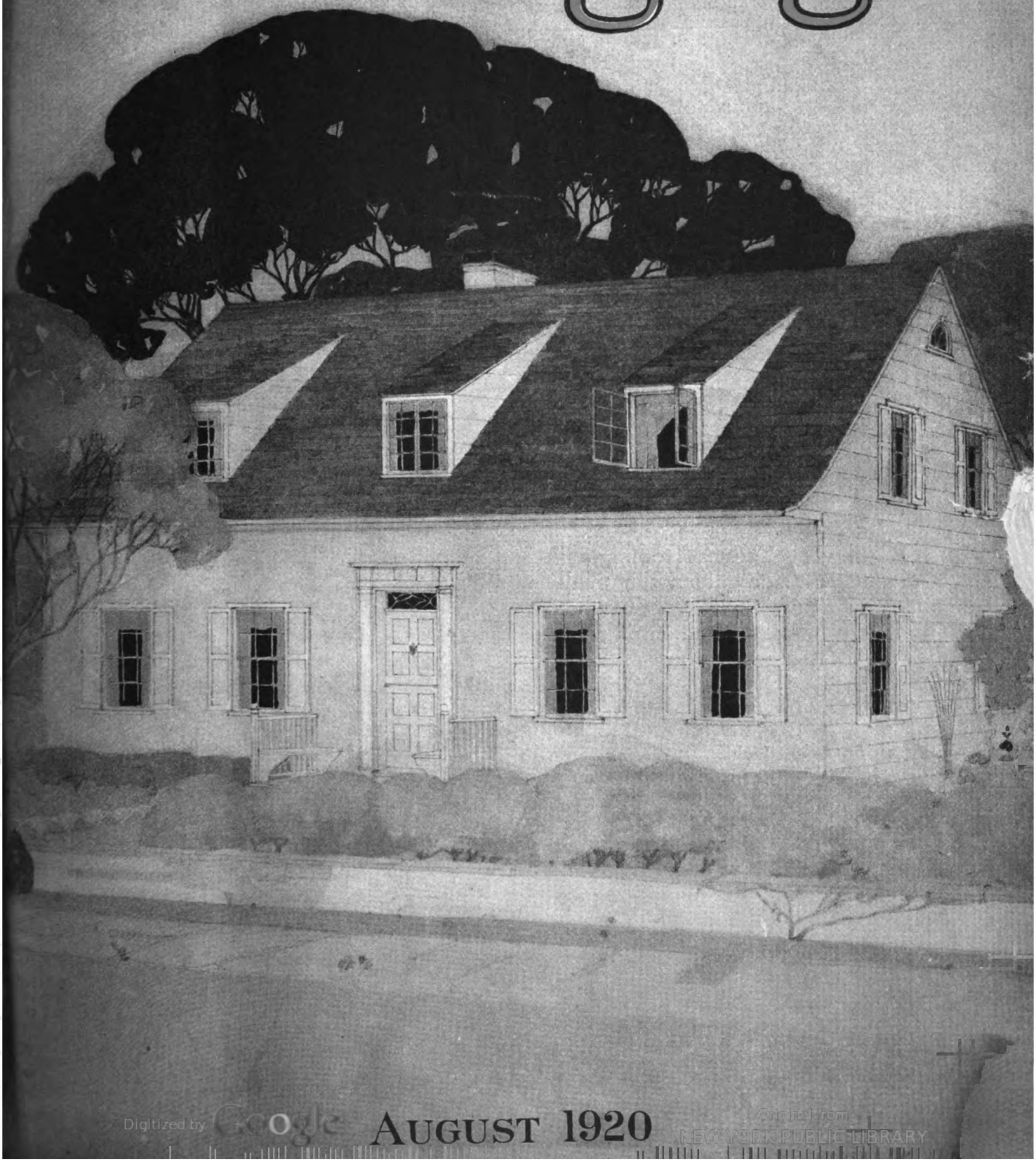

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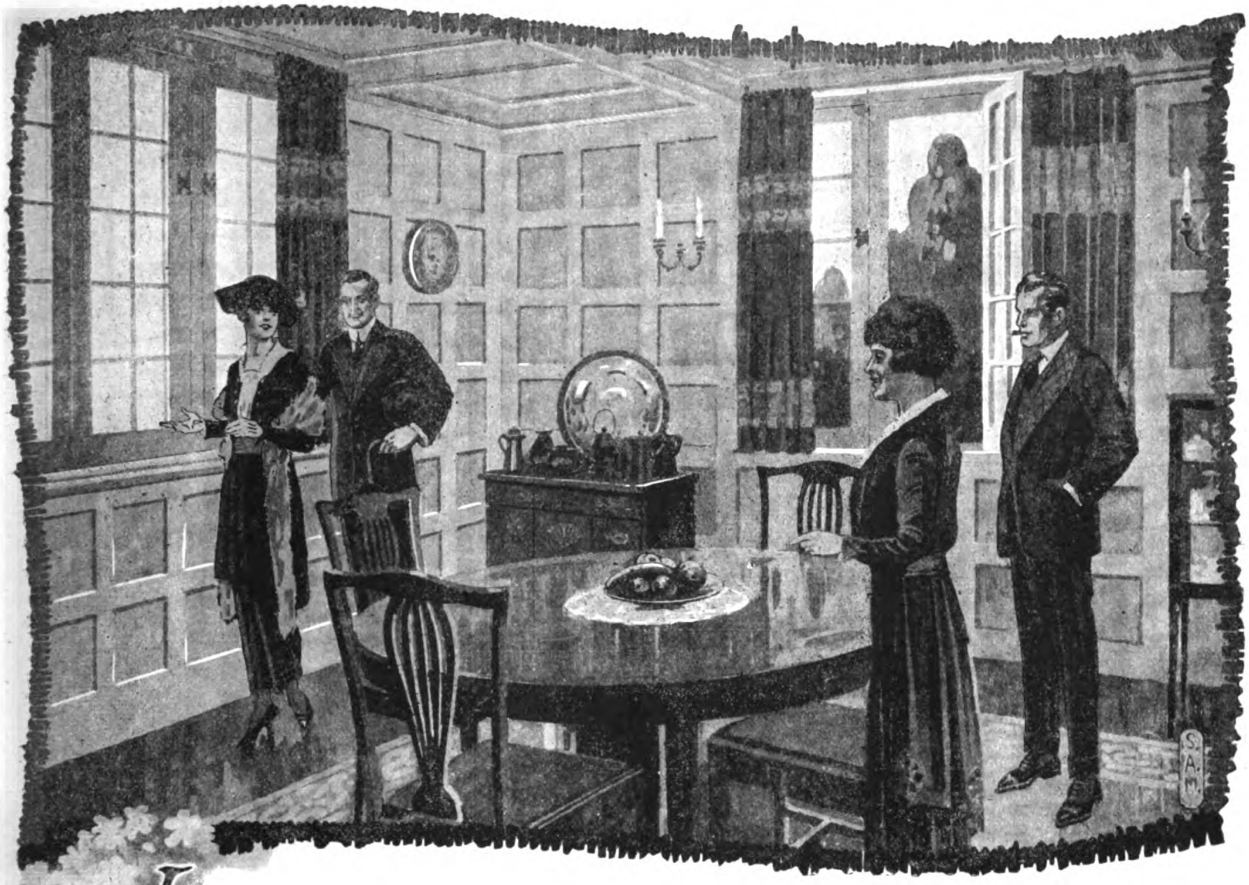

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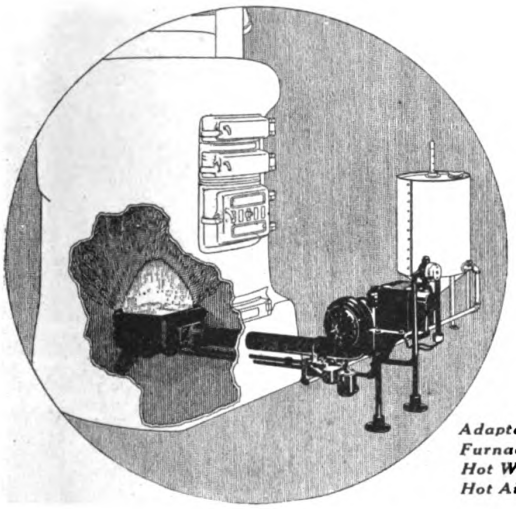

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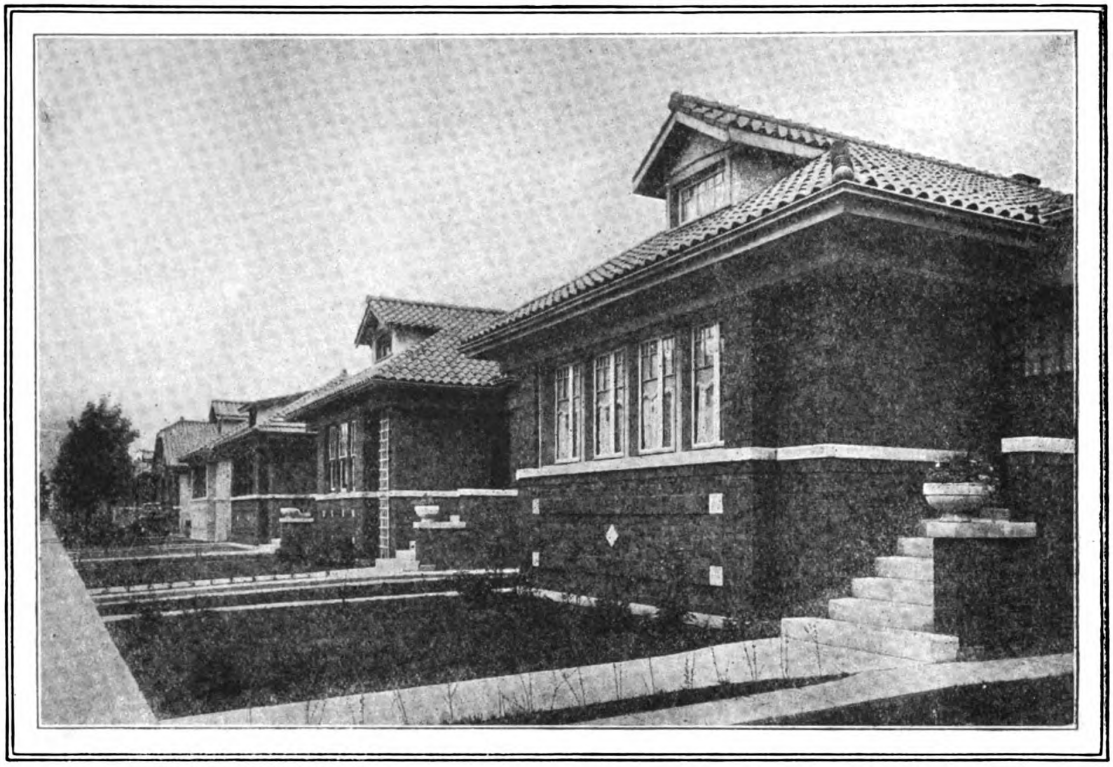

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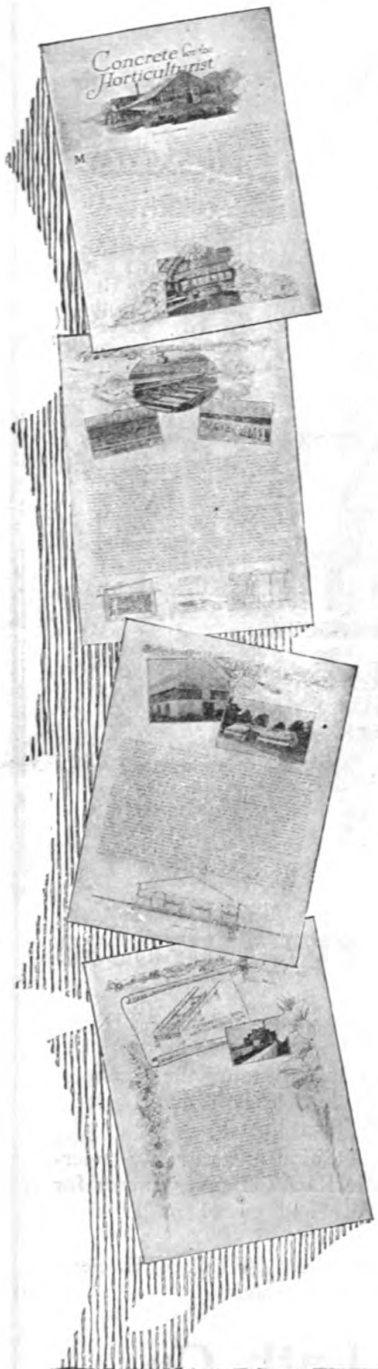

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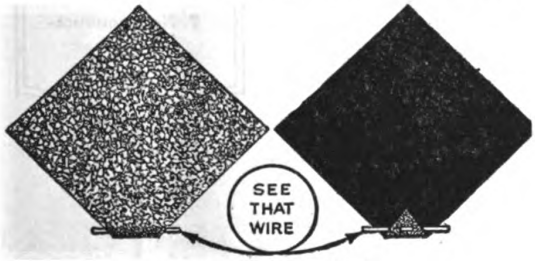

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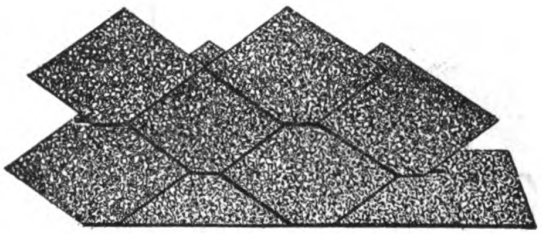

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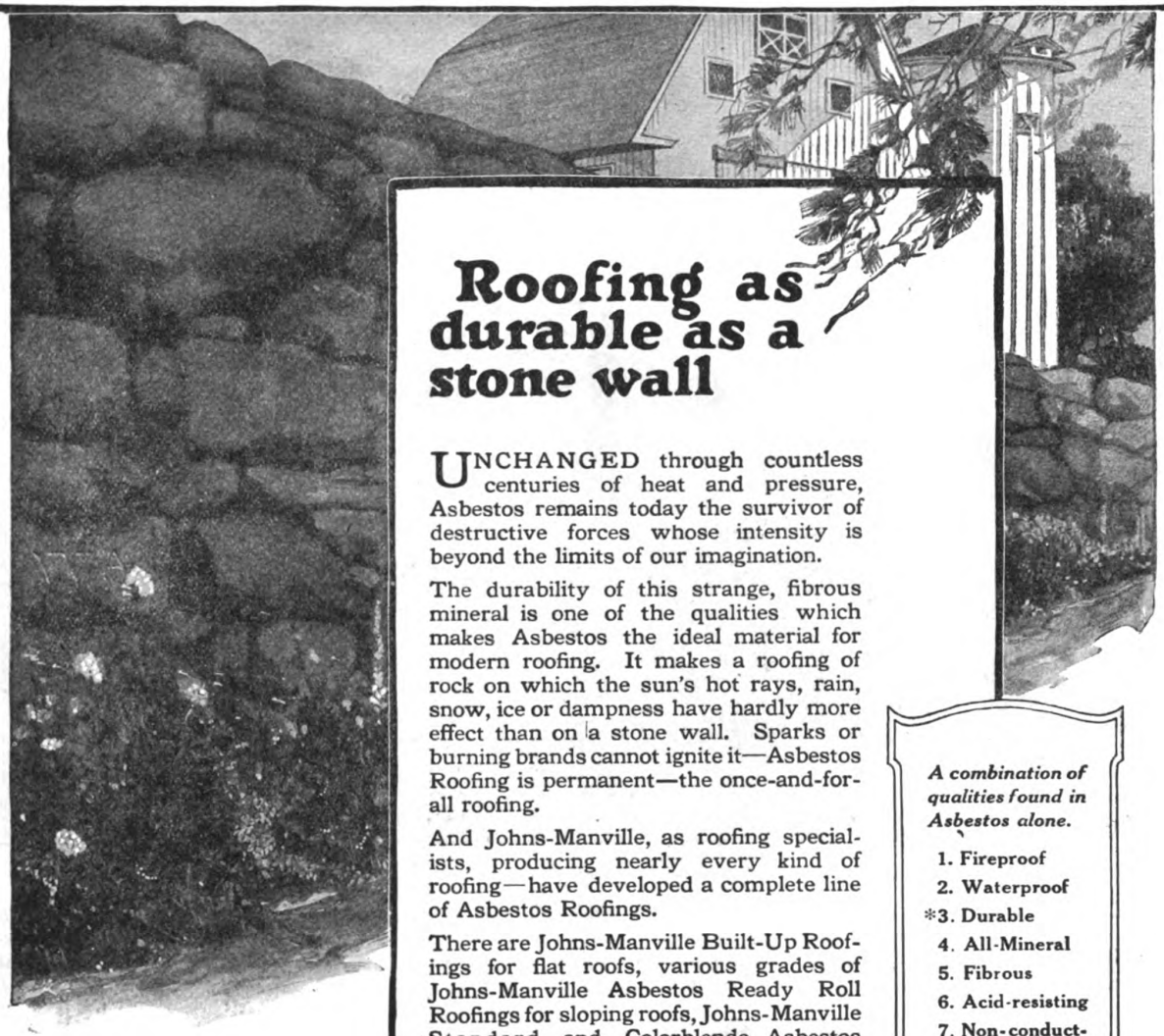

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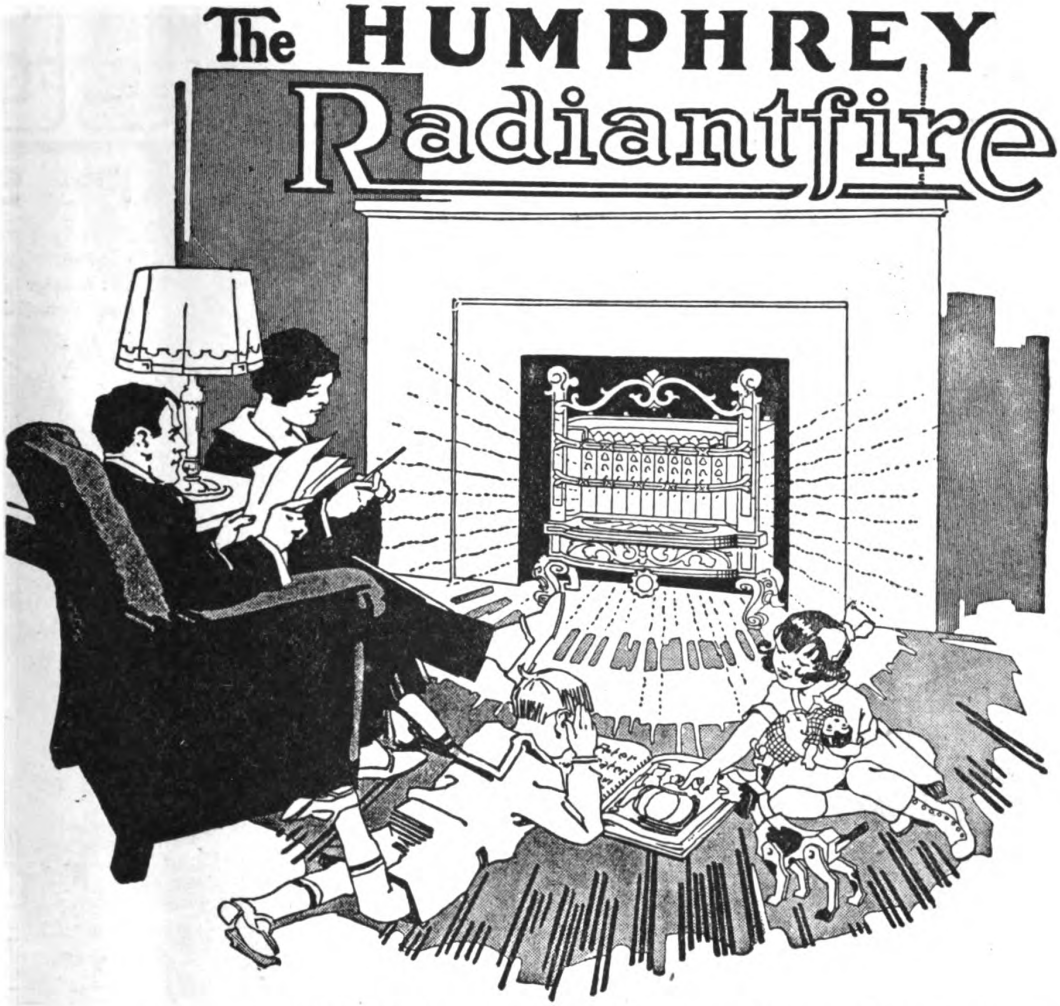

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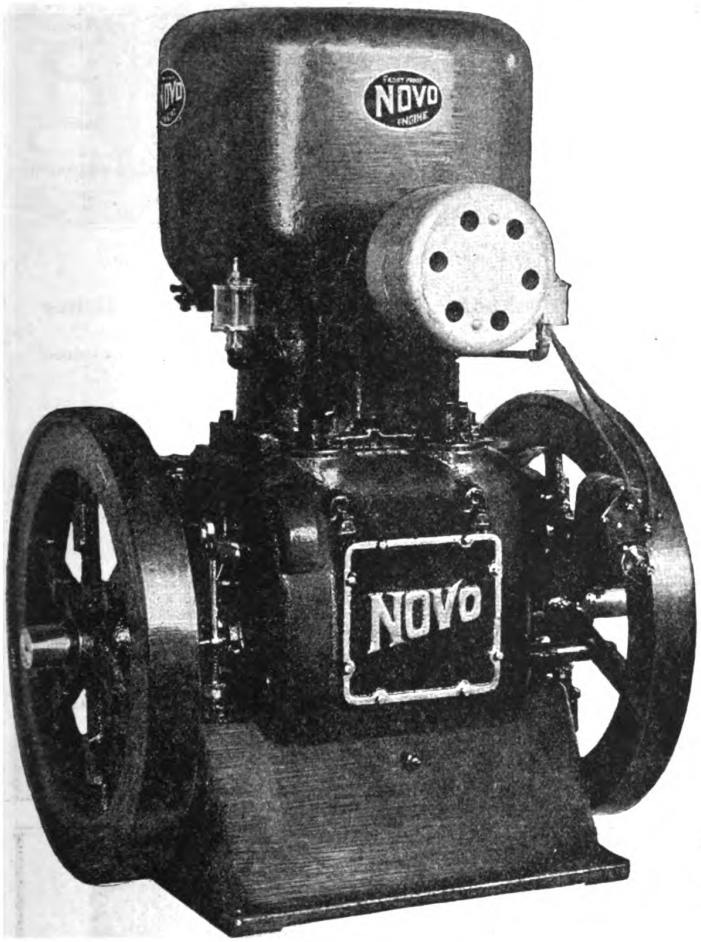

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Farm house of George Ade, the author, at Brook, Indiana, shingles, siding and timbers stained with Cabot's Creosote Stains

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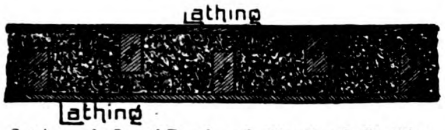

Section of Sound-Proof and Fire-Proof Partition. Can be used for outside walls also.

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BUILDING AGE

NEW YORK, AUGUST, 1920



A Home Building Project at Fairfield, Iowa

Illustrating how one town has worked out a solution of its housing problems

By Ivor Mattson

HOUSING is now our most acute problem. Not only are big cities suffering for lack of dwellings, but small towns are in equally desperate straits. The big home building projects have of course commanded the most attention, but the small city will find unsuspected advantages in organized home building. Such has been the experience of Fairfield, Iowa, a county seat town of 7,000 population, with seven factories, a wholesale paint and glass house, and a brick and tile works. Last year these industries began to realize that the lack of housing was holding back their expansion even more than slow railroad service or scarcity of building material.



One of the cottage types

These few non-competitive manufacturers and other public-spirited men who are all "Hello Bill" to one another had no difficulty getting together and agreeing on their common problems. The fact is, it came about so simply and quietly that many local residents are still unaware that anything unusual is going on, although in reality the first twenty-four houses are rapidly being prepared for occupancy. The business men organized The Fairfield Building Company early this spring with a capitalization of $200,000.00, $100,000.00 of which has already been paid in; the balance to be raised in installments as needed to finance the purchase of additional equipment. The first $100,000.00 was paid in five "calls" of $20,000.00 each.

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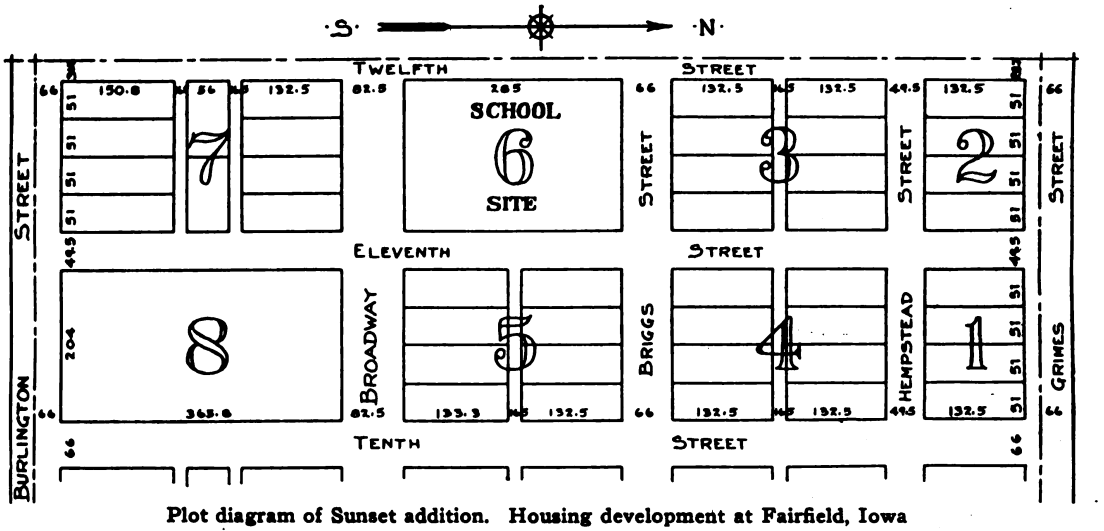
The following is a list of the largest stockholders: The Louden Machinery Company, The Iowa Malleable Iron Company, The Dexter Washing Machine Company, The Fairfield Glove & Mitten Company, Thoma & Son, Inc.

The officers are: R. B. Louden, president The Louden Machinery Company, president; Fred L. Hunt, manager The Fairfield Glove & Mitten Company, vice-president; Wm. L. Long, secretary; W. H. Bangs, vice-president and manager First National Bank, treasurer.

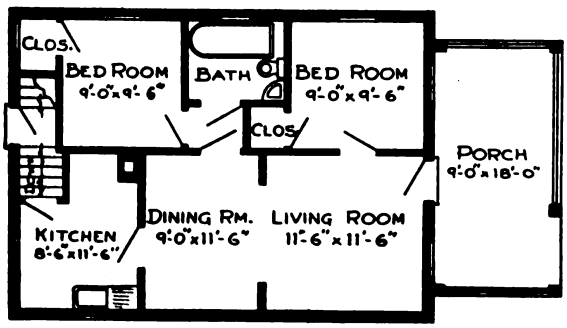
This list of principal stockholders and officers is of interest in that it shows the simplicity of the organization—a compact committee meeting transacts the business.

An old flour mill that had been idle for several years—a "white elephant" to the owner was bought by The Building Company at a bargain, to be transformed into a planing mill. As soon as deliveries can be made, the planing mill will have the following equipment: Band saws, jointers, planers, stickers, clamps, tenoners, boring machines, shapers, grinders, swing saws, accommodation rip and cut out saws.

Mr. Edward Angstead, the manager, buys mill run lumber in carload lots. This lumber is sorted upon arrival and every bit of millwork produced in the mill. The mill has not been in operation long enough yet to have any definite figures available as to the saving brought about, but these savings are great enough to enable the mill to show a very satisfactory return on the investment.



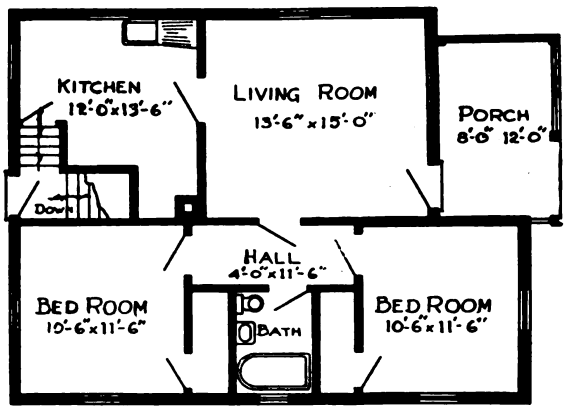
Plot diagram of Sunset addition. Housing development at Fairfield, Iowa



Typical ground floor plan, type A

The Building Company was fortunate in having the paint and glass wholesale house of Thoma & Son, Inc., in the city to get both glass and paint promptly as well as expert service in the selection of colors so as to give the whole sub-division a pleasing color scheme.

The news has gotten out that there is a home building project on here, and the result is that



Typical ground floor plan, type B

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there is plenty of labor to keep things moving on schedule. Labor is attracted by large and permanent undertakings, and the following incident hints at the reason.

This was a very wet spring, and the sewer, cellar and masonry work fell far behind schedule, but all the carpenters were kept busy. Repair jobs at some of the factories and out over the town gave them employment until the foundations were ready. Mr. Angstead has general plans for other work for his men for the winter so as to hold his labor force together. Several factories are planning extensions, and it is quite likely that this building organization will be utilized on several of them. Be it understood, however, these other services are performed only when they do not interfere with the main business of home building. A month or so ago Fairfield experienced a nail famine. The Building Company had secured a large stock of nails and out of this stock supplied other building enterprises in town enough nails to bridge them over until they could secure their regular supply. A lumber yard that was being rebuilt found it impossible to get a suitable furnace in town, and even the local dealers couldn't get deliveries. The Building Company has forty furnaces on hand and when the lumber yard needs it, The Building Company can supply a furnace at a reasonable price. These are small "by-product" services that stack up big in a small city, and the writer wouldn't be at all surprised if The Home Building Company in the smaller cities will come to be looked upon as being as much a necessity as water, sewer and light service.



View showing progress of development

The first building site was an eleven-acre tract, very conveniently located, but the topography was such that no real estate dealer had ventured to subdivide it. The Building Company secured this tract for about two-thirds of what a more level piece of ground similarly situated would have commanded. By building a whole group of houses as a single job, and putting full basements under all of them, the dirt moving was so handled that this sub-division will be very attractive, and well drained, whereas, on more level ground, there would have been an expensive job of carting away the surplus dirt. The big thing, however, to be emphasized in this connection is that this particular piece of ground would never have made an attractive home site with each property owner following his own notions. City planning is automatic where a real Home Building Company holds sway.

In most of the home building projects we have seen discussed, there has usually been some one design used throughout. With us, we have striven to get away from the sameness in *appearance*. This has been achieved by standardizing *unit parts* of construction. For instance, four standardized roof shapes have been used on these cottages over identical floor plans. These roofs have been covered with two different colors of prepared shingles, and cedar shingles. They are further varied by the use of eight different styles of porches. Walls are painted in seven different colors. Foundations are in brick, concrete blocks, and stuccoed tile. Walls are made with wide drop siding, alternate wide and narrow drop siding, and with shingles. Bathrooms,



Two types of cottages, A and B

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plumbing, and arrangement are standardized. So also are doors, windows and furnaces. This is the kind of standardization that makes real savings, but does not offend. A number of people have wanted to contract for houses, but The Building Company in its main building project is not ready for this kind of work. It is a rare thing for a man to contract for a certain house, but that he, or his wife particularly, will pester the contractor with all kinds of questions and changes. Little wonder that the $5,000 house finally costs $10,000.00! If homes shall be within the reach of most of us, we shall have to buy the finished article just as we buy our automobiles and breakfast foods. A Home Building Company, amply financed, and competently managed, can operate on a manufacturing basis where a number of small contractors couldn't remain in business unless they catered to the owners-to-be.

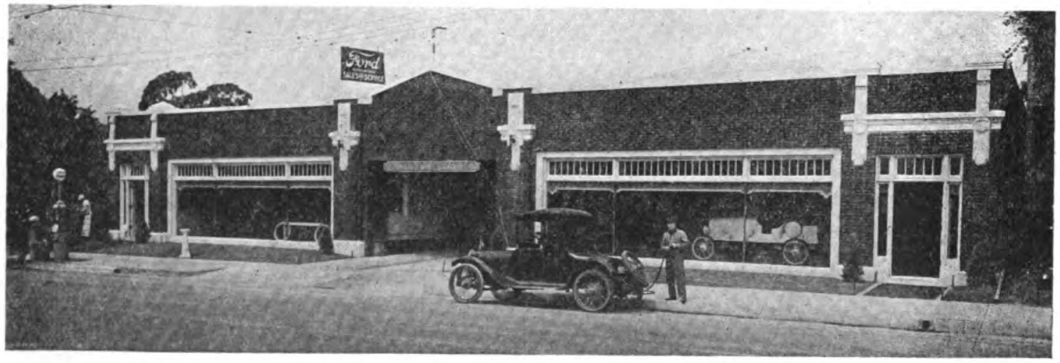
Now a word about financing. The Building Company aims at as rapid a turnover as possible. The building proceeds on schedule, but not until the house is finished is it for sale. If the buyer needs terms, the local Building and Loan Association will lend two-thirds of the selling price, which, together with a minimum of 12½ per cent. cash is paid over to The Building Company. The balance of 20 5-6 per cent. is carried back on a second mortgage by The Building Company at the local current rate of interest. The indebtedness to The Building Company is paid off in monthly installments over the same length of time as the Building and Loan. From this it will be seen that finance and operation are separated, and the financing is practically done out of the savings of local people. In this connection, it is interesting to note that all of Fairfield's industries have been developed out of the savings of the business—no outside capital has been brought in. And so what could be more natural than to finance the Home Building locally. Saving isn't a painful "going without" when you can promenade in the evening with the wife and kiddies and "point with pride" to the new homes and factory extensions that your savings are helping to bring into existence.

A Public Garage at Santa Barbara, Cal.

Store, display room, garage and repair shop all under one roof

Designed by Roland F. Sauter, Architect

DESPITE high prices, difficulty in obtaining materials, and many other handicaps, the construction of one type of building has persisted since building in general was restricted several years ago. This is the public garage. Since the owner of a motor vehicle needs many facilities in addition to simply car storage, the public garage has been expanded until today it provides the autoist with practically everything he may require in connection with his machine. Be it gasoline,



A public garage of exceptional merit of design, lighting and efficient planning

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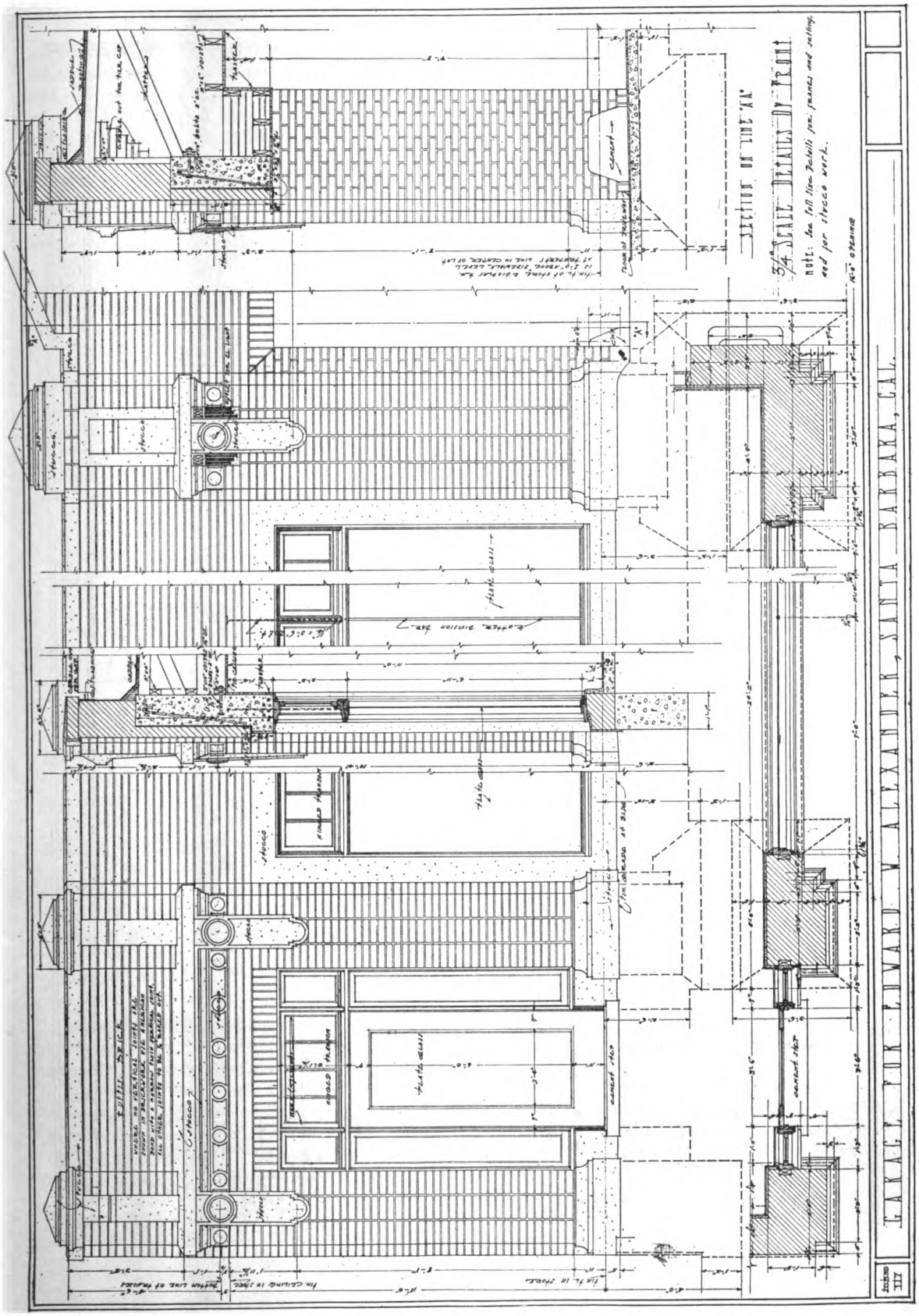

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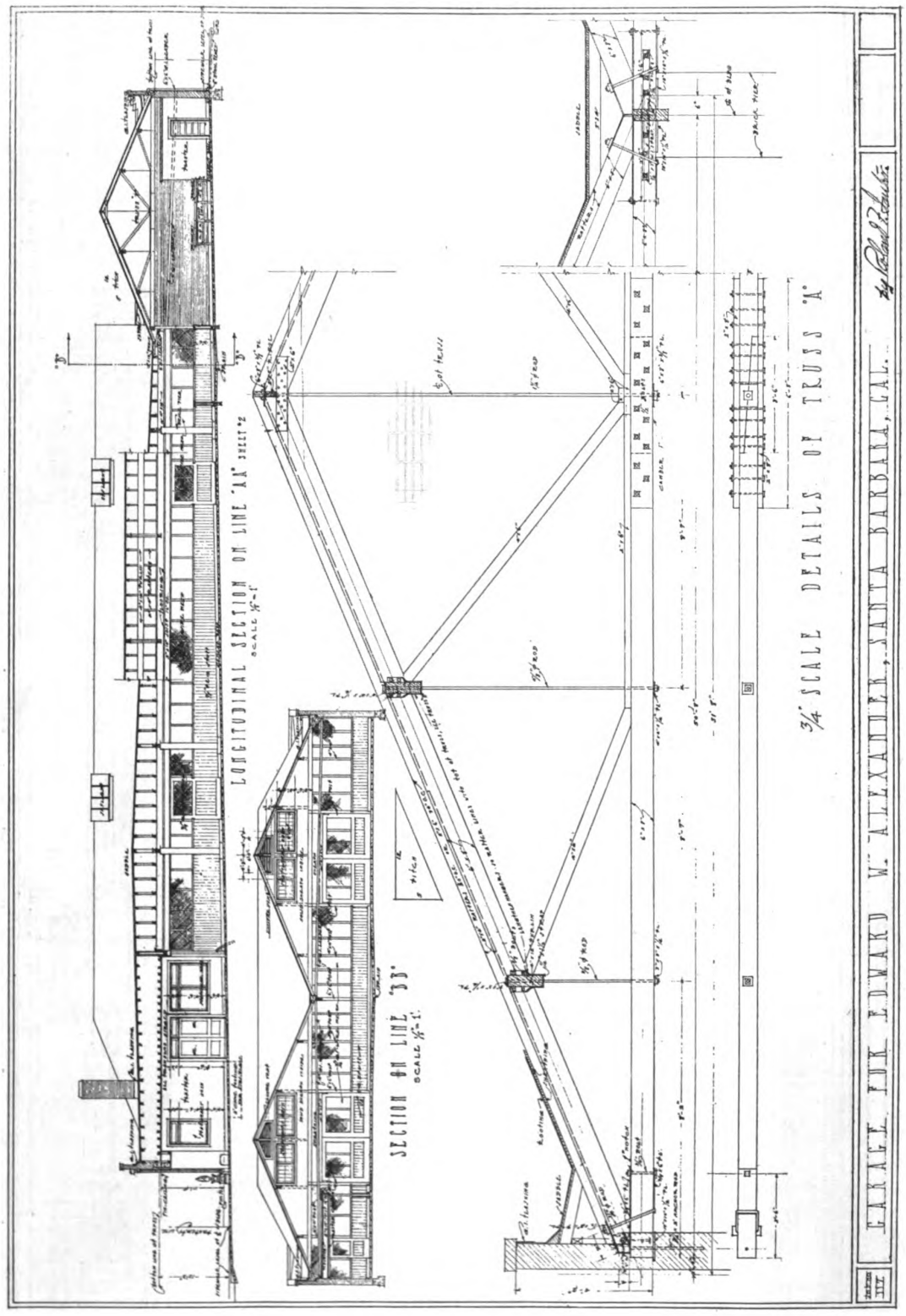

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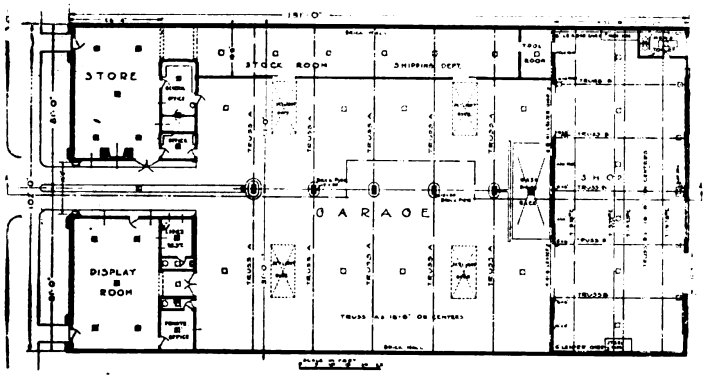
extra tires, spare parts, repairs or what not, the up-to-date garage can supply his needs, and even if these go so far as to require a new automobile, he need seek no further than the place he stores his car, and his needs can be filled. The garage of any proportions, erected to store cars only, is neglecting a great business opportunity. The architect or builder called upon to design such a structure should point out to his client the potential possibilities for trade extension that lie in this class of building.

During recent years the public garage has been built along more attractive lines, and erected on the most prominent business thoroughfares. Thus it may render service not only to those who regularly store their cars therein, but also to all who pass and need service or accessories.



Ground floor plan

Rather than have a front wall broken only by an entrance door and a few windows, this portion of the structure should be reserved for an auto sales room and a store for accessories—tires, spare parts, etc. If the garage owner does not desire to operate such stores, he can readily rent them at most attractive prices. The sale of gasoline forms a most profitable business, and arrangements should be made for ample storage capacity. Two 550-gallon tanks will usually prove adequate for the large garage. The care of cars stored, such as washing, etc., also adds to the profits.

Then there is the repair shop. What machine is today so perfectly manufactured, and so carefully operated, as not to require repairs at somewhat frequent intervals? Practically none. Therefore, a repair shop, operated in connection with the public garage will prove of real service to the motor car owner as well as increasing the income on the garage owner's investment. This service may be operated in conjunction with the garage, or the space provided for this purpose rented to a separate party. The former arrangement is usually the most satisfactory. Adequate light, both natural and artificial, should be provided for this section of the building.

The space reserved for the storage of cars—that is, the garage proper—should be as free from columns as possible. Therefore, long span trusses are coming into quite general use.

In the building erected at Santa Barbara, Cal., and here illustrated, all of the features just described have been incorporated, and a structure presenting a most attractive and well balanced exterior has been worked out by Mr. Roland F. Sauter, the architect.

The brick walls with white stucco trim give just the right degree of ornamentation and contrast.

The store at the left (see photograph) is devoted to the sale of automobile accessories, and that at the right to a Ford Sales Agency. The large plate glass show windows, constructed without wide sash or other vertical members, and extending almost to the sidewalk level, give opportunity for excellent display.

The building is one story high, 102 ft. wide by 191 ft. deep. The space devoted to the storage of cars is approximately 84 ft. by 100 ft. The roof is supported by trusses having a 50 ft. span, supported by the side walls and a row of brick piers at the center.

A stock room and shipping department is partitioned off from the garage along one side. At the rear is located the repair shop, which is approximately 50 ft. by 100 ft., inside dimensions, with a 12 ft. by 9 in. wide door opening in the rear wall.

Offices and a ladies' rest room are provided at the rear of the stores.

Details of the brick work of the front wall and of the trusses are shown in the accompanying drawings.

The very persistence with which public garages have been erected proves that they form a profitable investment. Where the ground value is not exceptionally high, the one story garage will prove considerably better than a taxpayer. Careful design is essential, and the mistake should not be made that a garage is simply a four wall and roof proposition.

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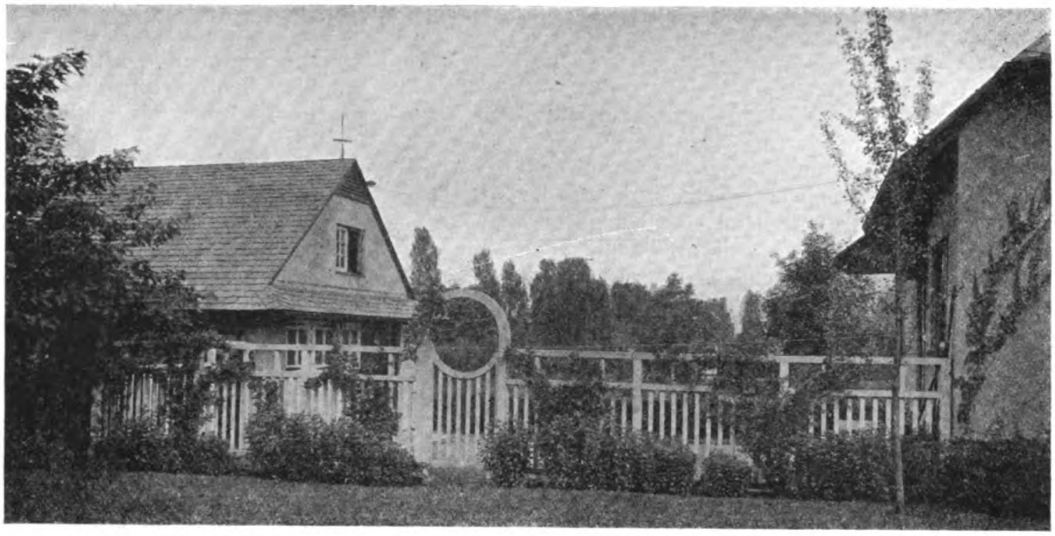

Fig. 1

Fences—Their Design and Construction

With illustrations of various types best suited to the suburban house

THE politician, or statesman—if you insist on the higher appellation, who excused his absence from his legislative duties on the plea that he had to go home and mend his fences, was simply stating and in simple form a reason which he knew his hearers could readily understand.

Fences first had their origin as boundary marks, plainly to show the limitations of certain prescribed areas. They also were in a sense stockades to repel the marauding and depredacious activities of war-like neighbors. Later, they became necessary in order to form enclosures to keep cattle from straying too long distances. The evolution of the fence, its progress in form and type is as marked and as interesting as is our architectural development. The materials employed are to-day as varied as are those used in building construction.

When the pioneers made their houses in a new country and broke the virgin soil, they cleared the land of stones by placing them in large heaps and later along the lines of their land. Here the stone fence first had its origin. In other sections where stone was not so common, the low and ineffective lines of stone were increased in height by rails split from the logs of small trees, and thus the "snake fence" came into form. Then, where the stone lay far beneath the surface and was not turned up by the point of the plow, the cedars and other logs from the clearing were cut into posts and there was evolved the "post and rail" fence. From this latter type there have grown the many different sorts of fences. To-day a fence constructed of wood and designed along good lines may very well, and often does become one of the most attractive features out of doors.

AS we have learned to use screens indoors to serve some utilitarian purpose, to hide some objectionable feature, to form a protective barrier against drafts; in like manner have we learned so artistically to use wood in the building of fences. These attractive barriers screen the groups of purely utilitarian buildings, hedge about the bleaching yard, form artistic and convenient trellises over which to run

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vines and climbing plants. The artistic possibilities that are to be found in fences need not be described here. Every reader will know that it is necessary but to combine good design with correct forms of construction to create a detail that will not only increase the general good effect, but will also secure a certain enhancement of value of the entire property, much greater than the initial expense.

Such fences are among the most attractive features of rural communities. They have figured in song and story for ages, and their associations are as intimate as those that cluster around "the old oaken bucket that hung in the well." In fact, these fences are closely associated with the old well-heads as the trysting places where the daughters of the family were wont to meet their bashful swains.

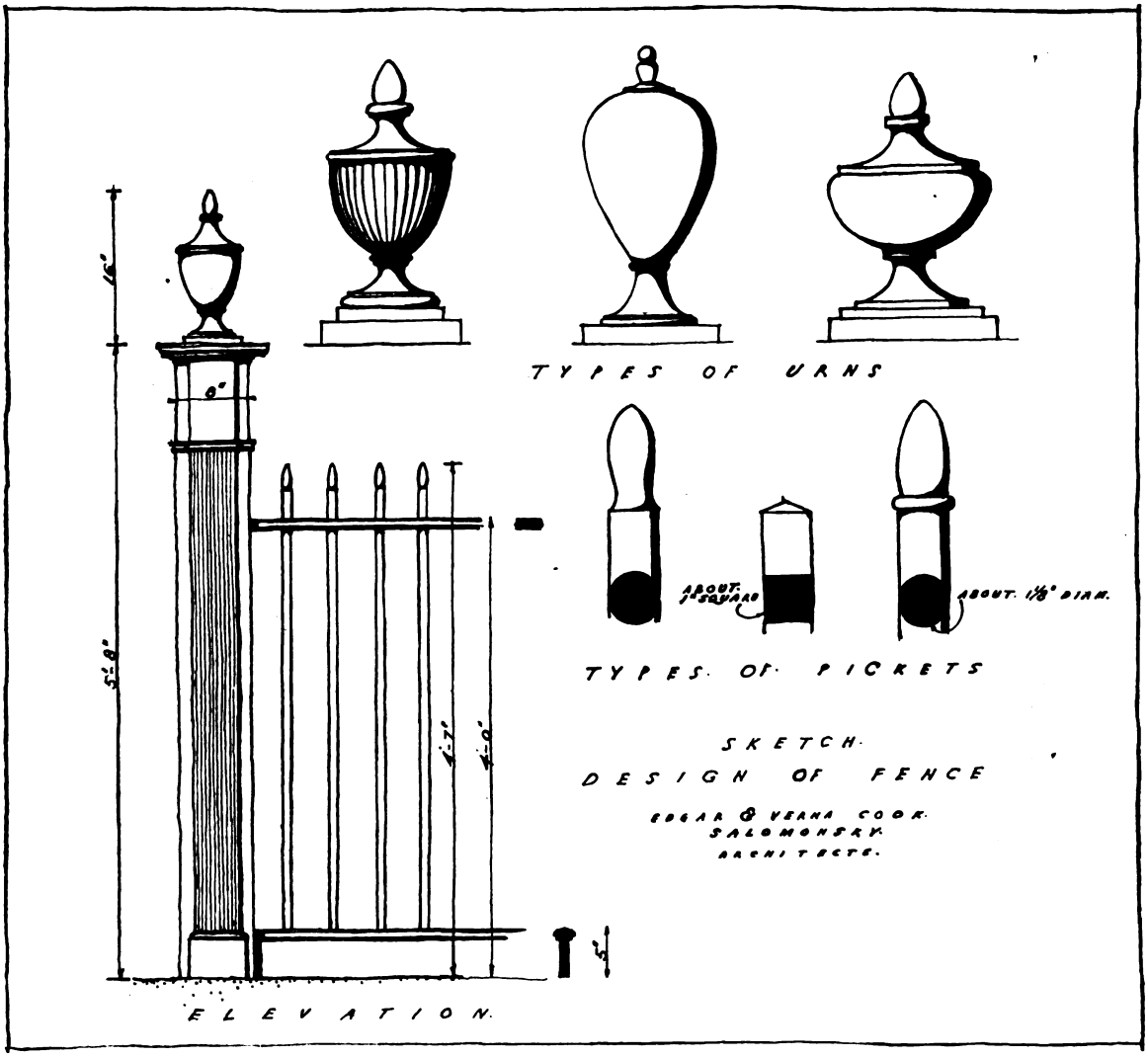

Fig. 6

While we may use, with good effect, any one of a score of materials to construct a fence: brick, stone, concrete, wire—it is undoubtedly true that the cheapest, most artistic and often the most durable fences are those constructed of wood. Wooden fences, properly designed, guarded by a protective coating, and painted harmoniously to blend with the landscape have never been excelled.

The gate on its sagging hinges has ever been regarded as marking the place where young folk spent many hours.

To construct a fence or any fenced enclosure without due regard to the general design of the house is to commit an artistic error. Better to be out of harmony with your neighbor's fence than out of harmony with the house. While one might suggest to

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an overthoughtful observer that you were not on good terms with your neighbor, the other would certainly suggest that you were lacking in a due regard for the correct consideration of the artistic proprieties.

THE carefully selected series of illustrations accompanying this article show the possibilities of modern fence construction. They graphically set forth just what may be accomplished to serve a utilitarian purpose in an economical and efficient manner.

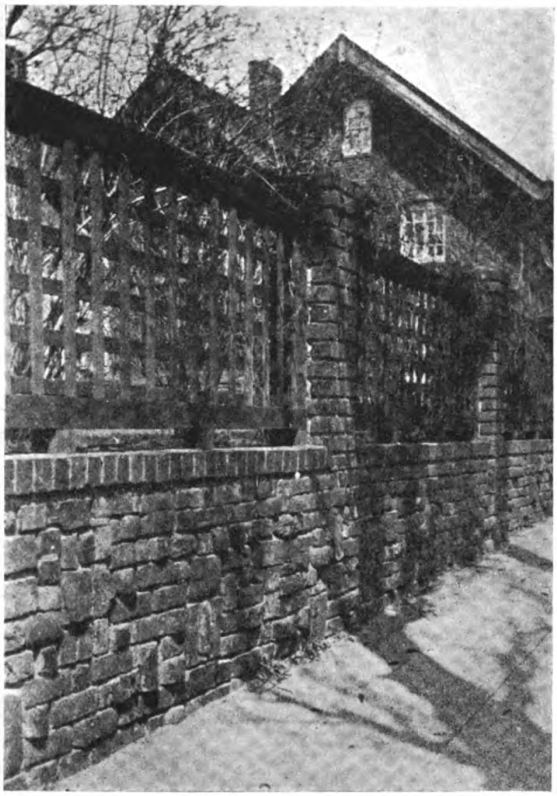

Fig. 7

Figure 1 illustrates an artistically designed wooden fence or screen designed to connect an open space between the house and the garage. It serves to show that good proportion is the very essence of all correct design, and further that construction need not be elaborate to be thoroughly artistic. Built of wood and cut in simplest form, it serves the utilitarian purpose for which it is intended, but is also a decided improvement to the property. The only expensive feature of this fence is the arched gateway, and this in the hands of the skilled carpenter will be but a small detail.

Figure 2 shows a wooden fence with an originally designed pergola. Good taste has made this fence one of wide spacing as to its pickets. The fence serves its purpose as a barrier, and at the same time does not obscure the view of the well-designed group of farm buildings in the background.

Figure 3. This wooden screen suggests a Japanese influence in its design and is apparently in harmony with other features not shown in the picture. It is well to proceed with caution when attempting a fence so out of the usual in type. Fences should always harmonize with their surroundings and particularly should they conform to the architectural style of the house, the dominating feature. Fences may become too exclusive, particularly those which run along the street lines of property. They may be so constructed as to shut off a view of the house from the road and at the same time equally block the view from the house. This exclusive feature in suburban communities is to be strongly opposed. There is a general air of good breeding and a sense of dignity in village streets where no sidewalk line fences exist. Well-kept lawns combined with good features of planting proclaim the proper communal atmosphere. The fence in such instances is best when confined to "party lines" or

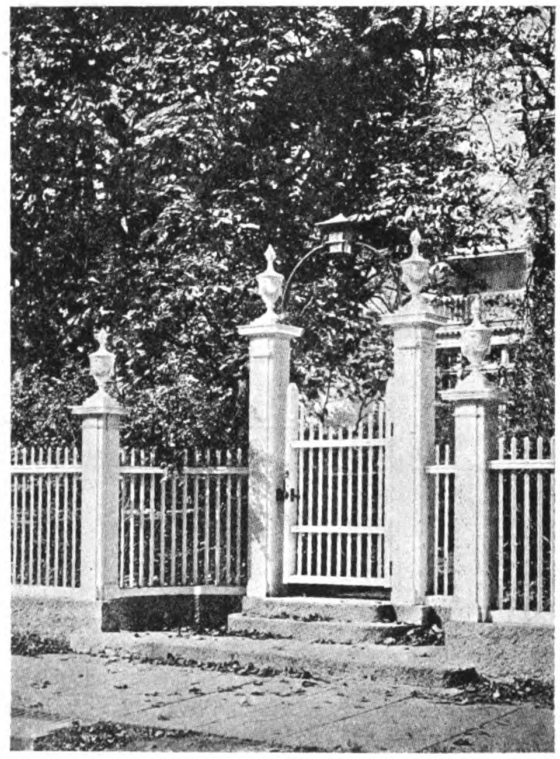

Fig. 9

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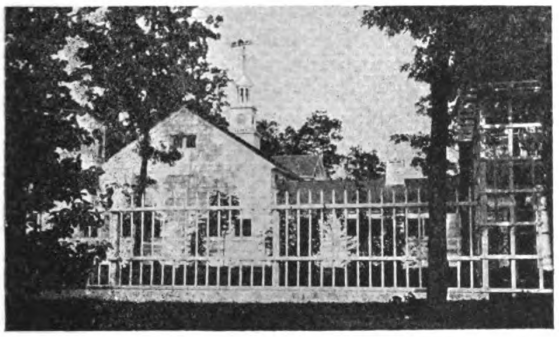

Fig. 2

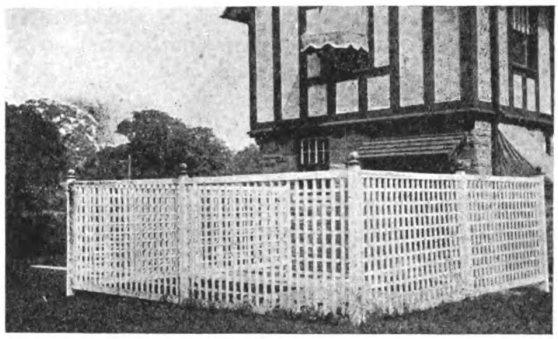

Fig. 4

The gate shown in Fig. 8 below could be used in completing the fence shown in Fig. 2 above

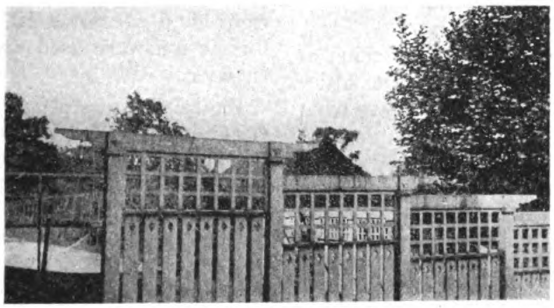

Fig. 3

The fence enclosure shown in Fig. 4 is a further example of the possibilities of the use of lattice in screening enclosures

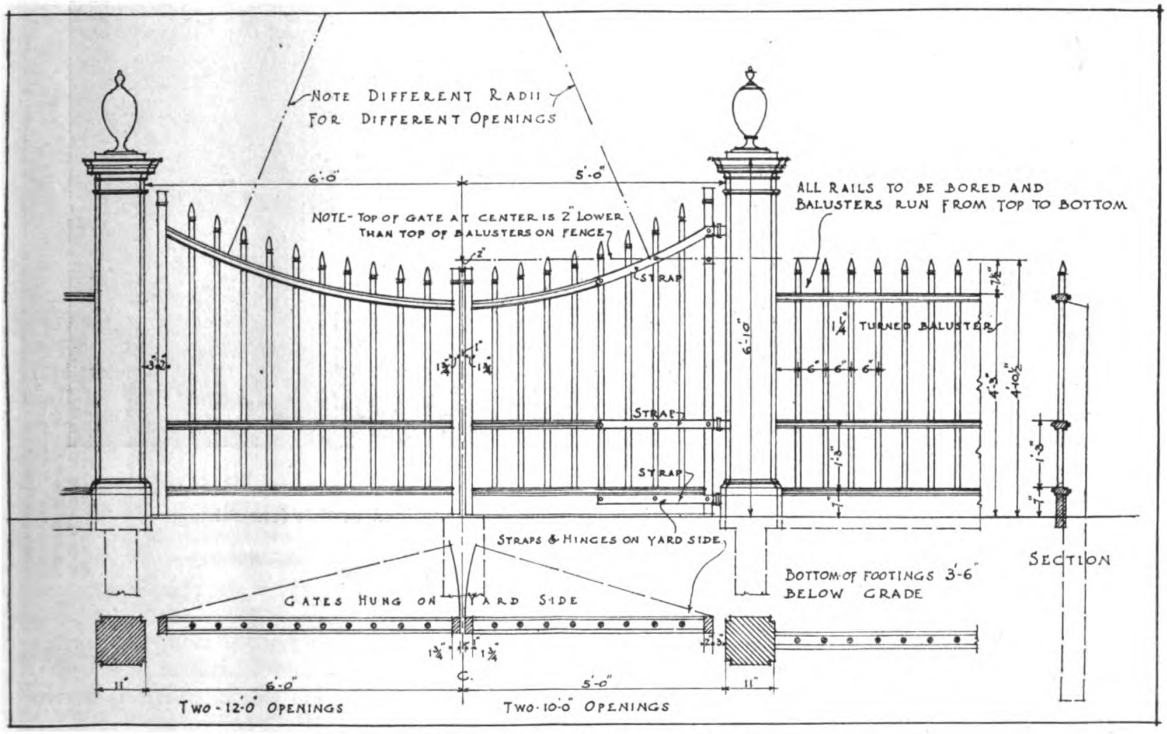

Fig. 8. Alfred Hopkins, Architect

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such purposes as screens which may be found necessary. But the reader may in memory recall many streets in quiet and old New England towns where white picket fences were a feature of the general effect. All of which is true, as these fences were a part of the houses embowered in trees that stood behind them. These houses were practically all of a certain type or period and the fences supplemented them. Also the houses stood much nearer to the roadside than modern houses in suburban towns. And such modern houses are seldom if ever of the same architectural style, but often so widely different as to be inharmonious in relation. The wide and deep lawns of the modern suburban house are only marred when the view is broken by a fence, no matter how well constructed and designed.

FIGURE 4 shows a type of enclosed bleaching or laundry yard. It partakes more of the lattice than the fence type, but it is a suggestion as to what may be economically accomplished to screen a necessary domestic utility.

Figure 5. A fence built of two materials and located on a side street. The well-laid brick base and gate posts follow in design the style of house and materials used. The pergola in the garden further accents the decorative use of wood about the suburban house, while the white painted fence and pergola complete a well-designed enclosure.

Figure 6 is an architect's sketch design for a fence. Three different types of urns are shown and as many pickets.

Figure 7 shows a fence surmounting a brick wall, with brick posts at long intervals.

Figure 8 presents working drawings of a fence, actually constructed. This is a comprehensive plan for a well-designed fence. It will be noticed that the leaves of the gateway are of different dimensions, the left-hand gate being for a 12 ft. and the right-hand one for a 10 ft. opening. Four gates of this design were used, two being 10 ft. and two 12 ft. wide.

Figure 9 shows a gate of more formal character. It is a most correct design after the Georgian or English colonial style and provides a most dignified entrance to the approach of a very finely designed New England house.

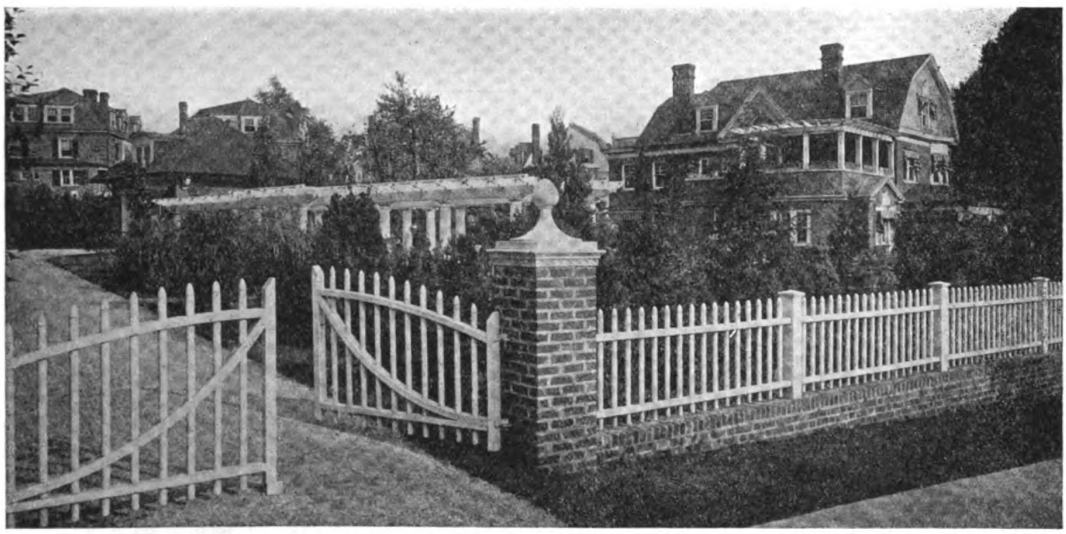

Fig. 5

A harmonious combination of wood and brick has been attained in this fence design

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A Group of Farm Buildings at Lantryville, Ill.

Designed by F. W. Puckey and A. D. Jenkins, Architects

NO question relating to our building activities is today of larger importance than that of the development of farm buildings. The large exodus from the farms to the cities, the discontent with farm life, is largely traceable to the poor design and construction of farm building groups.

If we are ever successfully to start a "back to the farm" movement, we can only do so when we have made the home life on the farm as attractive as possible, and created conditions where comparisons as to the social elements of farm life are not, as now, so greatly against the farm. We shall need more groups as carefully designed and as skillfully planned as that at Lantryville, Ill., herewith illustrated. There is a certain pride in the home life of such surroundings, and the comparison with the cramped quarters of even the suburban dweller is largely in favor of such well-thought-out conditions as are here shown.

The scarcity of farm labor is today acute, and one of the prime causes is the unattractive and bleak surroundings of farm life. At present farm labor is of the most nomadic type. In fact it is perhaps the most restless element in any branch of labor. The manufacturer who suffers from an excessive overturn knows nothing of the perplexities that affect the agricultural industry, the third largest in the country.

The architectural coherency of the group at Lantryville is much to be commended, not only because the design has been so carefully worked out so as to present an attractive whole, but also because the choice of materials and the method of their handling show that even a utilitarian group when thoughtfully designed may thoroughly serve the purpose of its erection, and at the same time become a very dignified and justly admired work of the builder's craft.

The well textured cement base of the barn and farm house is in splendid keeping with the simply expressed half timbered superstructure. The graceful lines of the gambrel roofs are examples of correct proportion. Note the simplicity of the entire design, and then learn how the accurate proportioning of solids to voids creates an architectural effect, absolutely simple, absolutely good, and to which no amount of added ornament could give a further expression of refinement.



An attractive farm building group of good design

The frankly expressed use of hollow tile in the construction of the silo is further evidence that the designer of this group knew how to handle his materials, and the carrying out in the circular roof of this silo of the gambrel roof effect is something that the critical observer will highly commend.

There has always been an incongruity of extremes in earlier farm-building groups. In one case the house has been so pretentious as to dwarf

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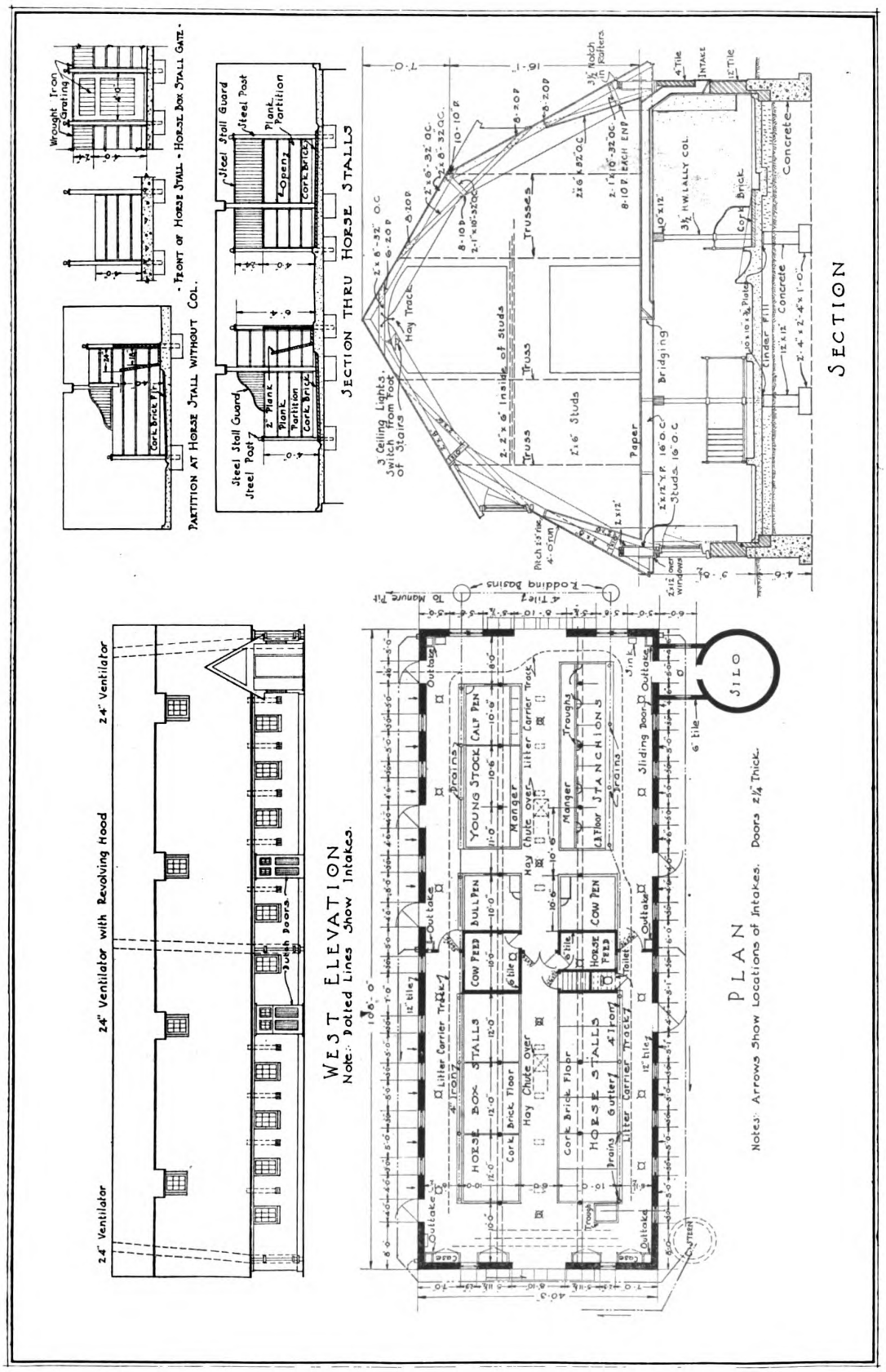

Plan, elevation and section of barn, Lantryville, Ill.
F. W. Puckey and A. D. Jenkins, Architects

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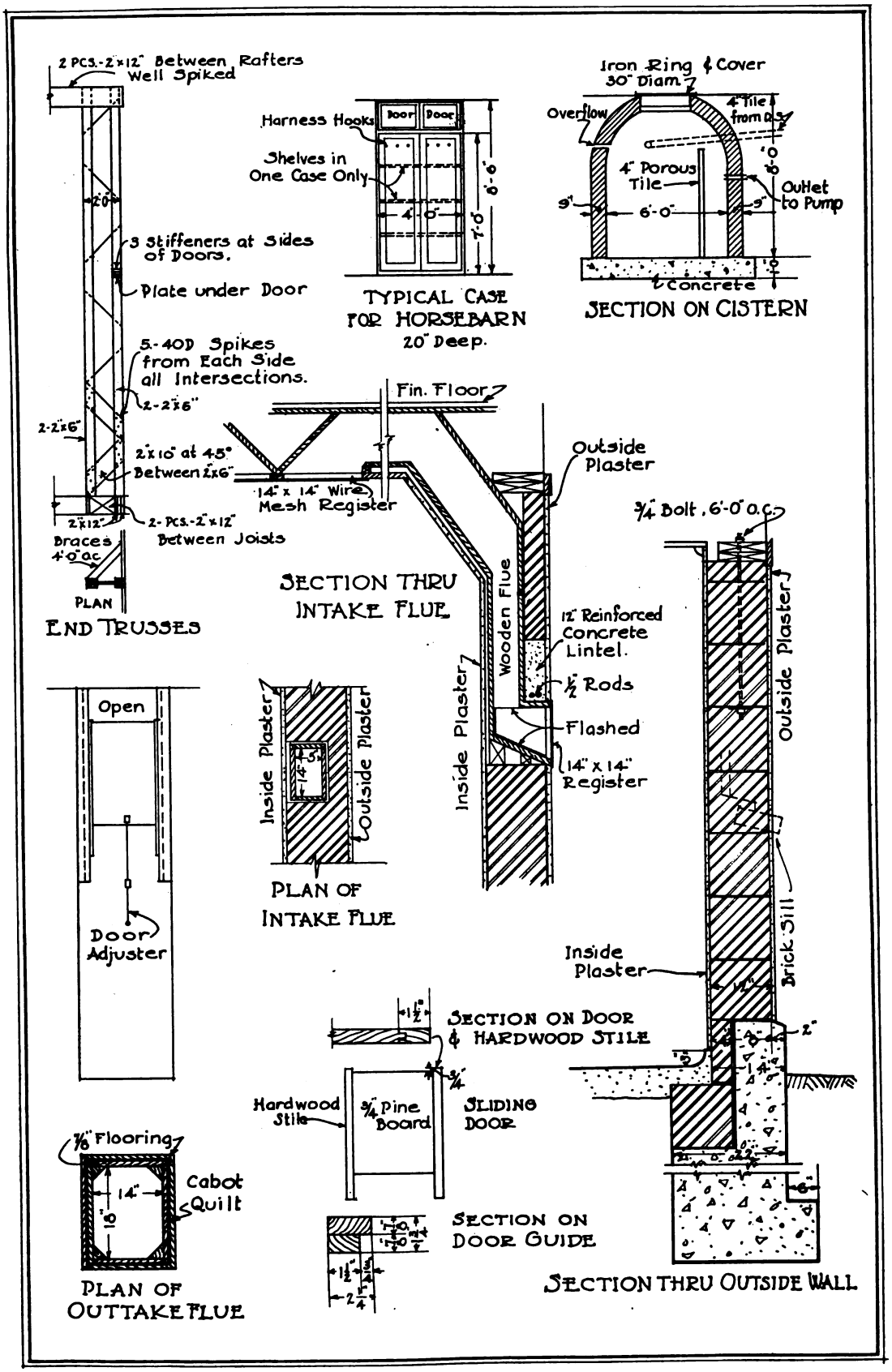

Construction details for barn, Lantryville, Ill.

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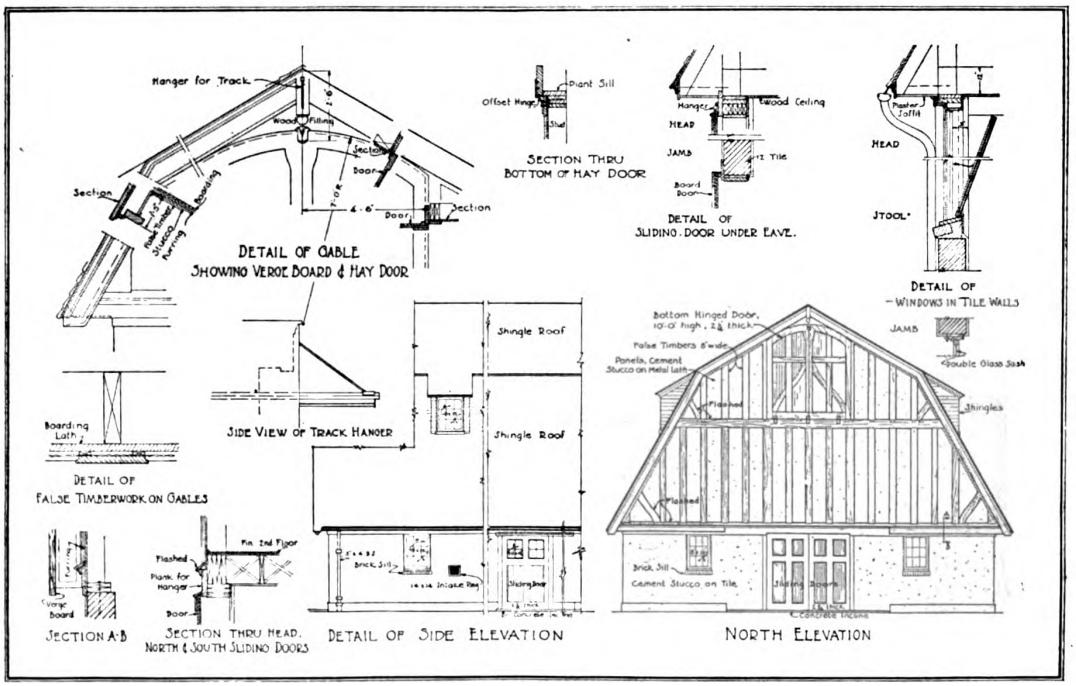
Detail of the barn and silo with working drawings

F. W. Puckey
and
A. D. Jenkins
Architects

A group of farm buildings at Lantryville. Ill.



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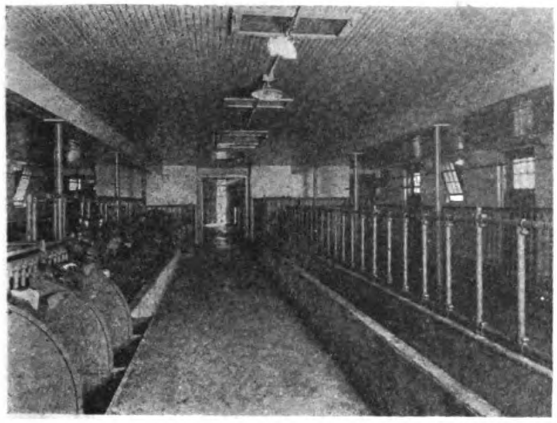
to insignificance the dependent buildings; in others the barn and stables have received all the care and the passerby receives the impression that this certain farmer regards his crop and stock as of more importance than his family. Here we have a certain well balanced dignity throughout.



Interior of cow barn

It is interesting to note the introduction of the well designed ornamental fences and lattices, built to serve as screens for unsightly places, and to link up the buildings of the group. This creates an impression of compactness, of unity and robs the group of that feeling of detachment that is, as a rule, the feature of lonesomeness that pervades the average farm group.

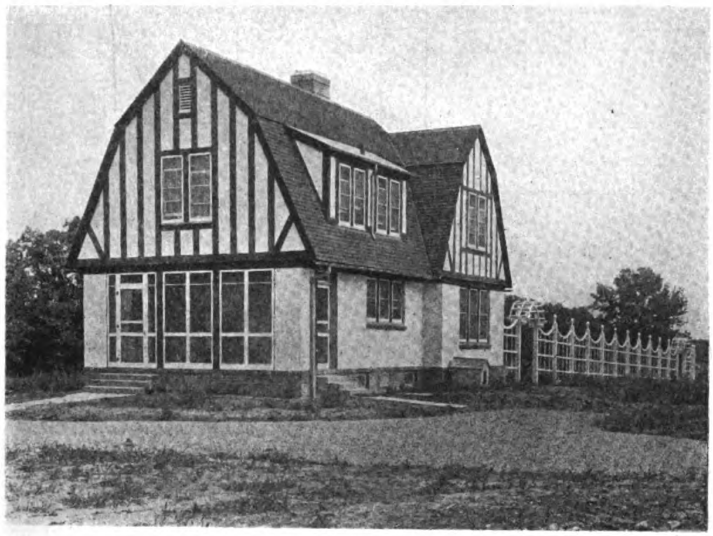
The reader will, we are sure, be particularly interested in the well designed plan of the barn herewith presented as well as the details of construction. The construction is of the most stable character, and there is a suggestion of permanency that really means economy in the annual upkeep. This barn in colder climates affords a shelter for stock that warrants the first relatively high cost of construction. This sort of thing always pays for itself in the end.

In planning this barn, the architect has carefully considered every question of efficiency of operation. The careful placing of the feed bins economizes effort, as does the placing of the chutes from the hay lofts overhead.

A litter-carrier, built on an overhead trolley system provides for the prompt and efficient cleaning of the interior, while also affording a quick means of conveying the contents of the silo to the various troughs.

The floors have been laid on well tamped cinder fill, surfaced in the horse stalls with a non-porous cork brick and in other places with cement.

The fixtures are all of the most approved sanitary type, easily kept clean and the lighting, both artificial and natural, is completely arranged.



The farm house

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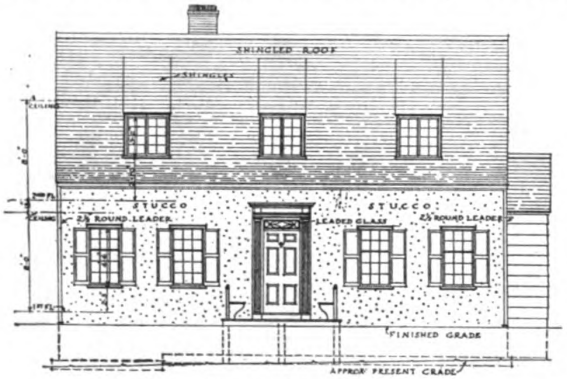
A House at Fieldston, N. Y., Designed for an Artist

Edgar and Verna Cook Salomonsky, Architects

THE Dutch Colonial style in the last few years has formed the basis of design for quite a few small houses. In the residence of Mr. Richard F. Bach of the Metropolitan Museum of Art and the well-known art connoisseur, however, the main consideration was to design a residence which would be absolutely true to the type of the charming old Dutch Colonial houses such as are often met with on Long Island. This has resulted in a house which is quaint and artistic on its exterior and which is exceedingly compact and livable.

The most striking feature of the front is the entrance with its hospitable benches flanking either side and the doorway with its delicately wrought



Front elevation

mouldings and leaded glass transom, both peculiar to this style.

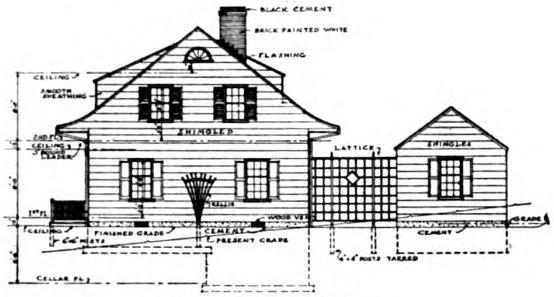
A perspective drawing of this excellent example of domestic architecture forms the cover design of this issue.

The roof is of shingles laid four and one-half inches to the weather and allowed to weather naturally. The side walls are also of shingles, random widths, laid ten inches to the weather and painted white. The front is of stucco as is so often found in the old prototypes and gives an added zest in the way of variety of materials.

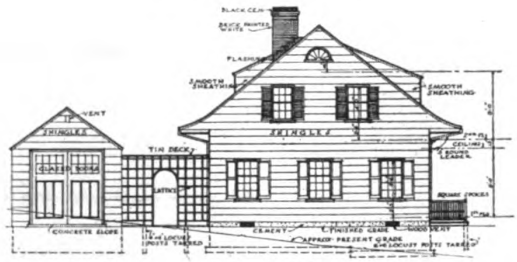
A point to be noticed is the manner in which the chimney is treated. The caps are slightly corbelled and the top is of black cement, giving a decided accent to this feature.

The garage is separated from the house by the kitchen and drying yard, on one side of which is a lattice and on the other side a covered passageway which forms a connecting link.

On the first floor there is a living room and a study adjoining, a good sized dining room, kitchen and pantry, which is very accessible from the



RIGHT · SIDE · ELEVATION ·



Left side elevation

kitchen, as the usual connecting doorway is omitted and a large opening is placed in its stead.

The second floor has an owner's room, child's room, guest's room and bath and as is usually the case in this type of house there is an abundance of closet space near the eaves.

The interior details are designed with a view to their historic precedents and, in general, the more beautiful examples have been studied and adapted as is the case of the stairway with its delicately turned balusters and twisted mahogany newel post. The treads are stained birch and the risers of pine painted white.

The house is located at Fieldston, Riverdale-on-Hudson, New York City.

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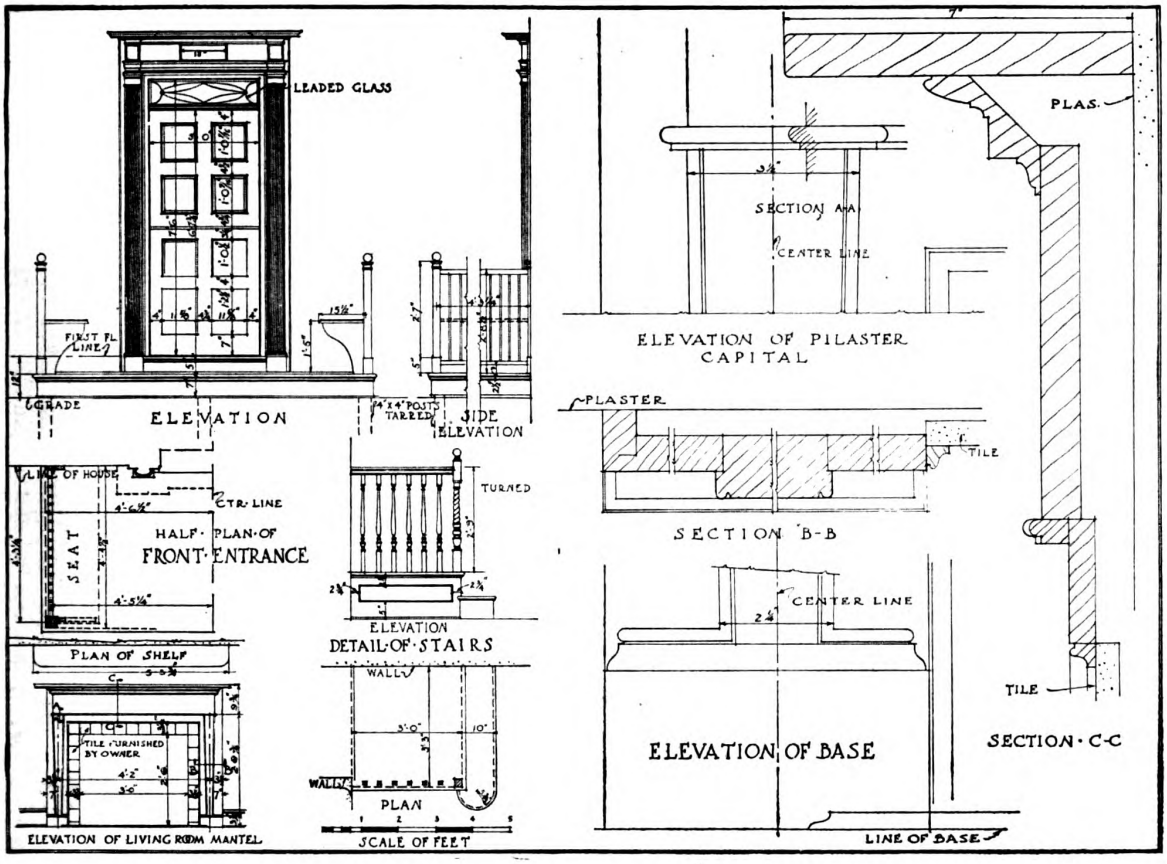

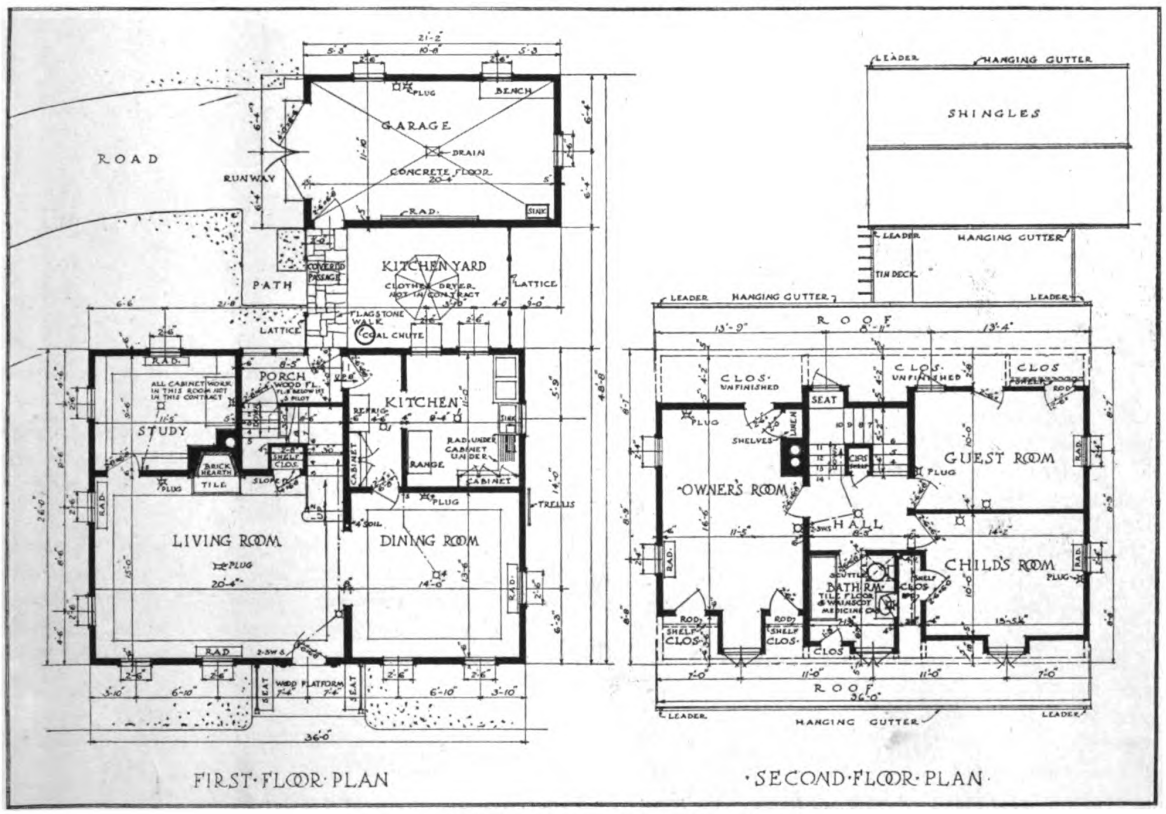

House of Richard F. Bach, Fieldston, N. Y.
Edgar and Verna Cook Salomonsky, Architects

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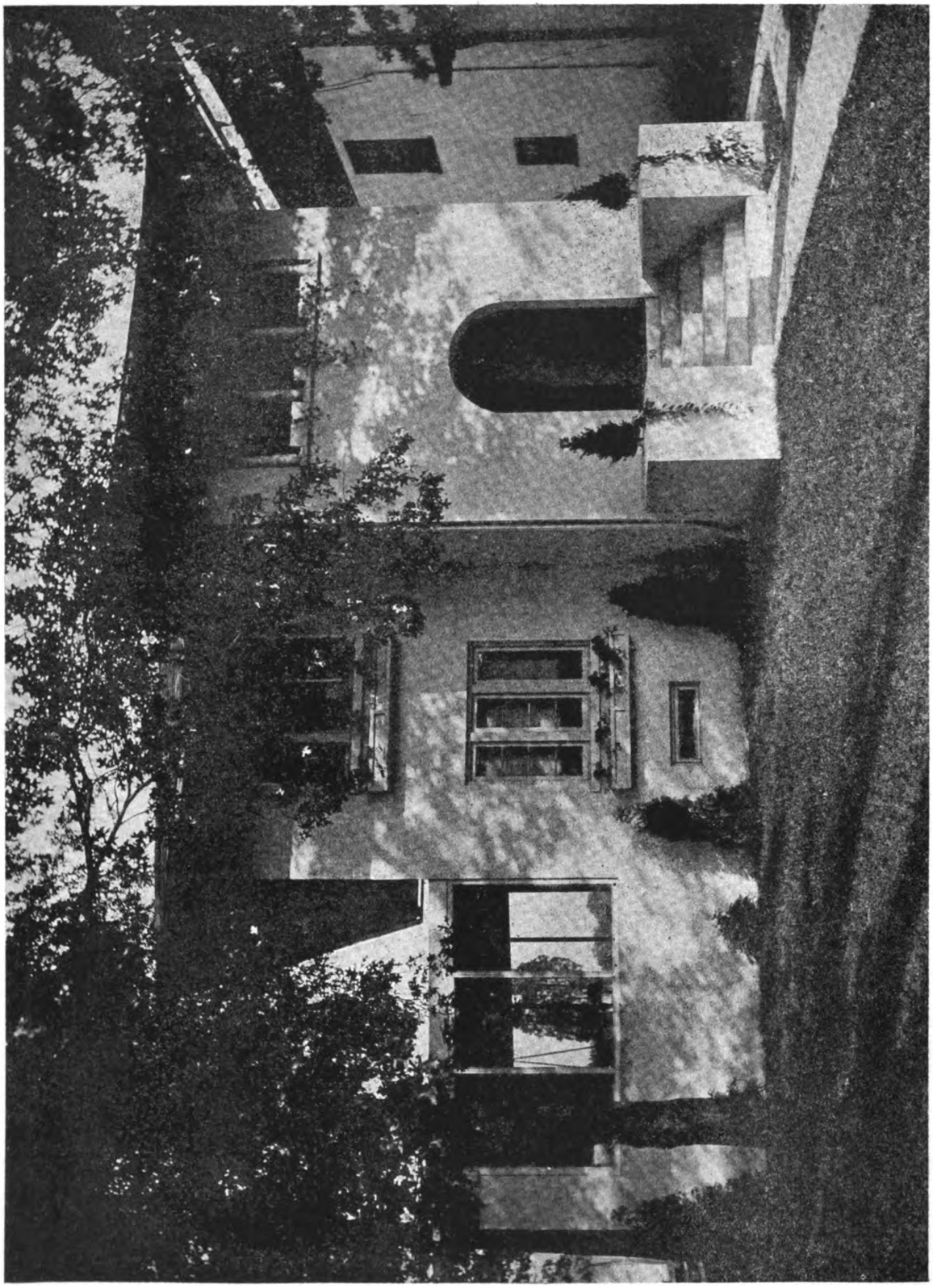

House of A. J. Wilhelm, Englewood, N. J.
K. W. Dalzell, Architect

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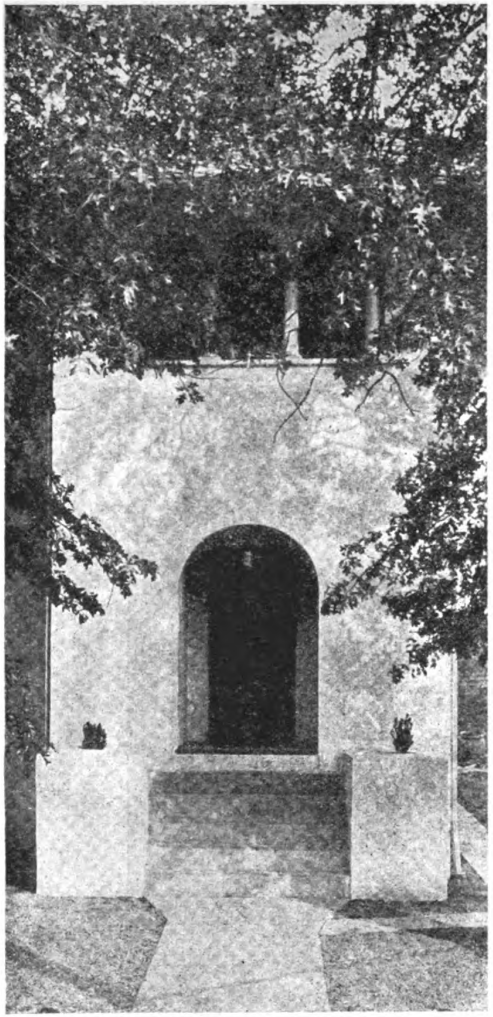
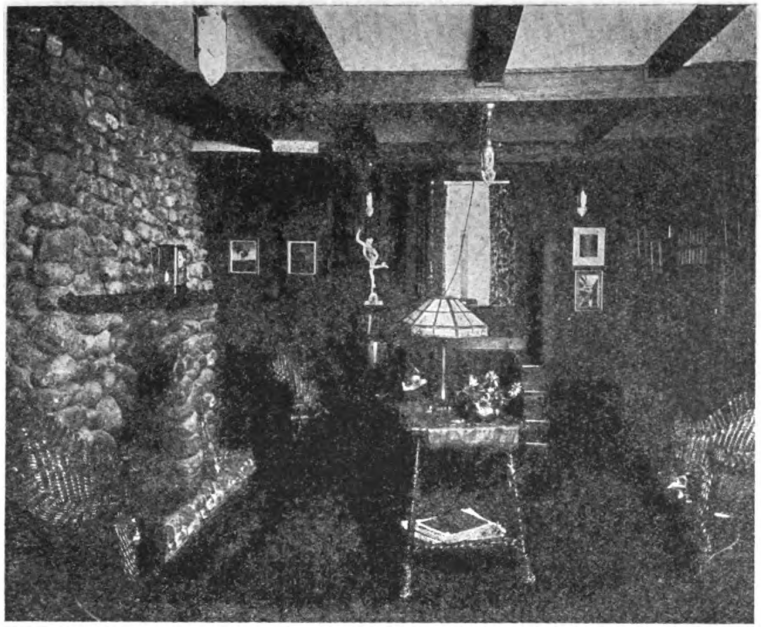


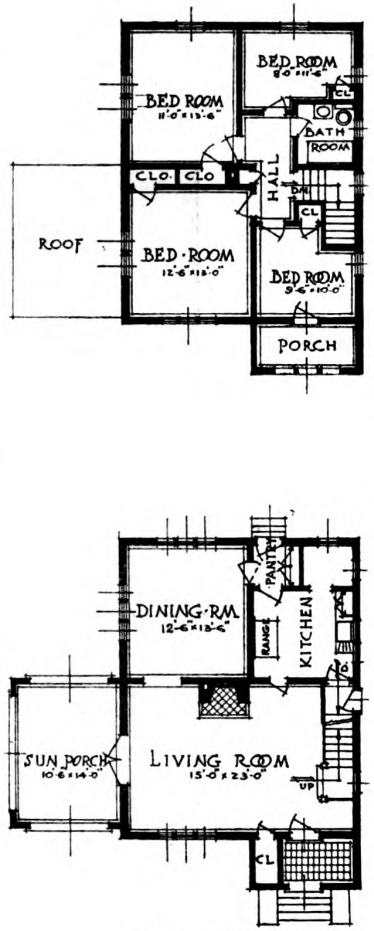
Detail of main entrance



The Wilhelm house is stucco over hollow tile, the stucco floated to a smooth surface. The roof is of red asbestos shingles. The arched entrance with loggia above is distinctly Italian in character. The wide overhanging eaves provide protection from the sun and rain.

The living room has a large stone fireplace and beamed ceiling with electric light fixtures of hammered iron dropping from the intersection of the beams. The dining room walls are wood paneled about half way and have sand finished plaster above the paneling.

The plaster in this house was applied direct to the tile without furring on the inside, and, while it is only an eight-inch wall, no dampness has shown through. However, it is safer to fur out the wall unless 12" T. C. blocks are used. Even then care must be exercised to see that there are no through mortar joints since the mortar will quickly absorb moisture and transmit it to the plaster on the interior of the wall.



Floor plans

House of A. J. Wilhelm, Maplewood, N. J.

K. W. Dalzell, Architect

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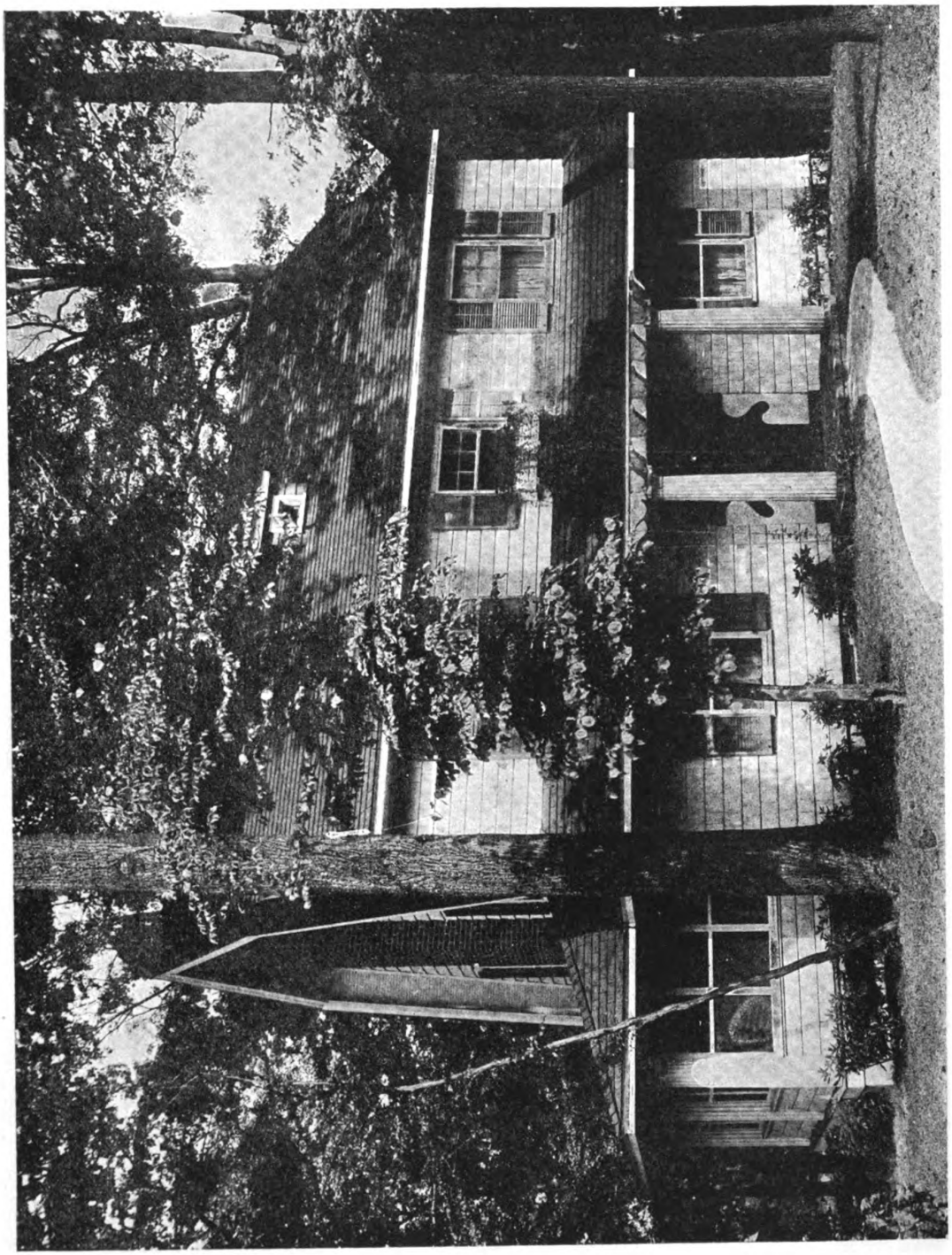

House of C. Warren Force, Maplewood, N. J.
K. W. Dalzell, Architect

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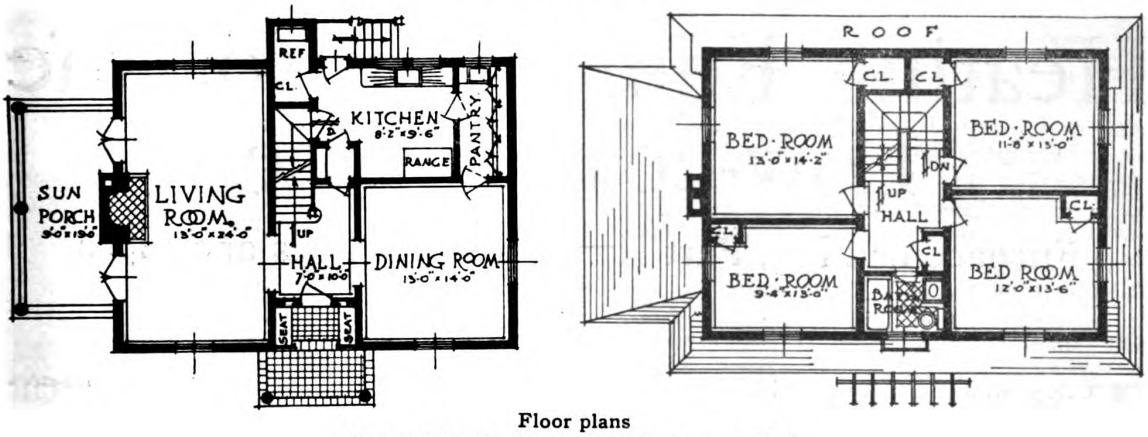

Floor plans
House of C. Warren Force, Maplewood, N. J.
K. W. Dalzell, Architect

THE home of Mr. C. Warren Force is somewhat on the Dutch Colonial type, but as it was not desired to cut off the corner space of the bedrooms with the sloping roof, the frame was built up straight and the gambrel roof effect secured with the overhang at the eaves.

By not running the hall all the way through the house, enough additional space is secured to build a pantry between the kitchen and dining room without making an extension. The double doors effectively shut off the kitchen and give space to hang coats as well. Building the stairs forward as in this house permits the placing of large closets in the two rear rooms and also allows access to the third floor without breaking the roof with a dormer. The enclosed stairway is also much less expensive both in labor and material than an open stairs with balusters and railing, although something may be sacrificed in appearance.

The walls are of rough sand finish plaster, tinted. The living room fireplace is of rough textured brick. The interior trim is of edge grain cypress, stained. The second and third floors are finished in white. There is one room and bath on the third floor.



Photo, Western Newspaper Union

Time, space and elevators are all saved in this garage at Washington, D. C., planned to avail of all the features of its site

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Heating Equipment for the Low-cost House

Furnace heating, Part II—Warm-air flues and pipes

By Charles L. Hubbard, Heating Engineer

THE general method to be followed in locating the flues has already been described in Part I and the next step is to determine the size. While there are various ways of doing this, one of the simplest is to assume an air velocity, which experience has shown to be about an average for dwelling house work. A safe figure, given by Professor Carpenter, is 240 feet per minute for the first floor, 300 for the second, and 360 for the third.

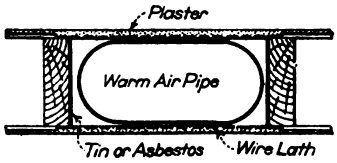

Fig. 6
Method of installing oval pipe

If air is admitted to the room at a temperature of 130 degrees, and cools to 70 degrees (the normal inside temperature) then each cubic foot will furnish

$$\frac{130-70}{55}$$

=1.1 thermal units towards offsetting the loss by transmission and leakage. Therefore, dividing the total heat loss per hour by 1.1 will give the cubic feet of air to be supplied in the same period of time, at a temperature of 130 degrees.

For example, the heat loss from the living room is 17,189 thermal units per hour, requiring an air supply of 17,189÷1.1=15,626 cubic feet per hour, or 15,626÷60=260 per minute. With a velocity of 240 feet per minute (for a first floor room) this will call for a flue having a sectional area of 260+240= 1.1 square feet or 144×1.1=159 square inches. The velocities given above are for round pipes and flues and these can usually be employed for first story floor registers and can often be carried to the second story in the corner of closets and in pilasters constructed especially for them.

Areas of round hot-air pipes of different diameters are given below.

AREAS OF ROUND HOT-AIR PIPES

Diameter of pipe, inches	Area in square inches	Area in square feet
6	28	0.196
7	38	0.267
8	50	0.349
9	64	0.442
10	79	0.545
11	95	0.660
12	113	0.785
13	133	0.922
14	154	1.07
15	177	1.23
16	201	1.40

When the flues are to be carried up in partitions, and flat pipes must be used, much better results will be obtained if the smaller dimension is limited to 4 inches, or still better 5 inches, and even in this case the larger dimension should not in general be more than three times the smaller. "Ovaled" pipes, so called, are better than rectangular ones, as with this form the corners are eliminated. An ovaled

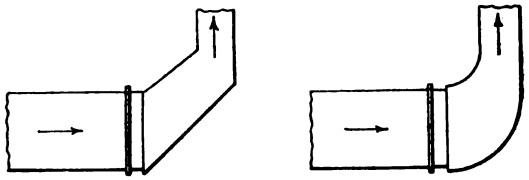

Fig. 7
Method of connecting round horizontal pipes with flat vertical flues

pipe, with the proper fire insulation for partitions, is shown in Fig. 6. A 7-inch pipe ovaled to 5 means that a 7-inch round pipe has been flattened out to a thickness of 5 inches.

Following is a table giving the areas of the common sizes of ovaled pipes used in furnace heating.

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AREAS OF OVAL HOT-AIR PIPES

Dimension of pipe, inches	Area in square inches
6 ovaled to 5	27
7 " " 4	31
7 " " 6	38
8 " " 5	43
9 " " 4	45
9 " " 5	51
9 " " 6	57
10 " " 6	67
11 " " 4	58
11 " " 5	67
12 " " 5	75
12 " " 6	85

When pipes of this form are used, the area should be increased about 10 per cent over that of the round pipe called for, to offset the effect of increased friction. While the flues in Figs. 3 (July issue), 4 and 5 are shown as rectangular, ovaled flues should be employed, of the sizes marked on plans (10 in. ov. to 5 in. indicating a 10-inch pipe ovaled to 5 inches). Approved methods of connecting round horizontal pipes with flat vertical flues are shown in Fig. 7.

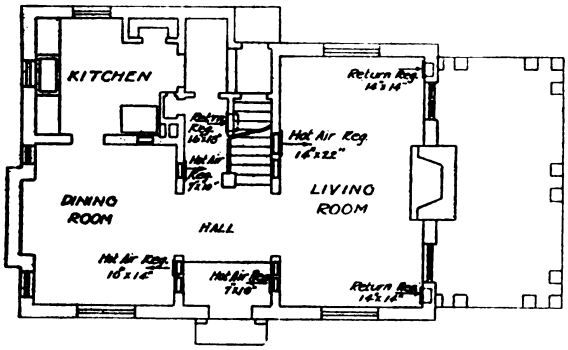

Fig. 4. Ground floor

STANDARD SIZES OF REGISTERS FOR VARIOUS DIAMETERS OF HOT-AIR PIPES

Diameter of pipe, inches	Size of register, inches
6	6 by 10
7	7 by 10
8	8 by 12
9	9 by 14
10	10 by 14
11	11 by 16
12	12 by 16
13	14 by 20
14	14 by 22
15	15 by 22
16	16 by 24

All warm-air pipes and registers shown in Figs. 3, 4 and 5 are based on the methods previously given.

AIR SUPPLY TO FURNACE

The best method of supplying cold air to a furnace, when practicable, is by means of a "cold-air room" instead of a duct. In the arrangement shown in Fig. 3 the space beneath the cellar stairs is enclosed with sheathing and lined with building paper. This has a hinged window opening into it for supplying outside air, while the bottom, under the broad stair, is connected with the furnace casing in the usual manner. This arrangement equalizes the wind pressure and furnishes a steadier flow of air to the furnace. The return ducts leading from the outer or east wall of the living room are for two purposes, one being for general re-circulation in cold weather, and the other for removing cool air near the floor on the far side of the room and thus drawing over the warm air from the inlet register on the opposite side. When the fireplace is in use, this will have practically the same result and a greater proportion of fresh air may be taken in from outside. The return ducts connect with the cold-air room at the floor so there is practically no danger of back drafts into the room.

By closing the inlet window and opening the hall return duct, all of the air may be returned from the building, and by closing this and opening the window into the cold-air room different amounts, the supply will be drawn partly from outside and partly from the living room, as may be desired. No dampers are placed in these two return ducts because the strength of draft through them will vary with the opening from outside. The size of the supply duct to the furnace is commonly made three-fourths that of the total area of all the hot-air pipes connecting with it. In the present case the area of the hot-air pipes is 550 square inches. The two return air ducts from the living room are each made

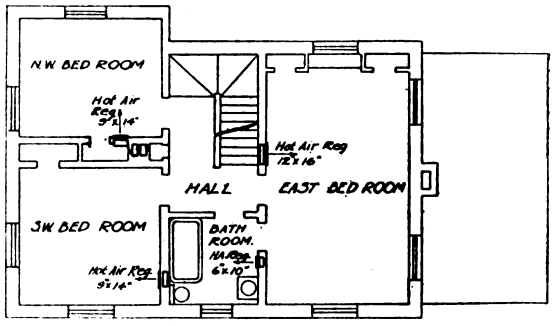

Fig. 5. Second floor

140 square inches and the hall duct 216 square inches, making a total of 496, or slightly less than the combined area of all the warm-air pipes. The outside inlet window has an area of three-fourths that of the warm-air pipes, or 410 square inches.

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The inlet window should be arranged for holding in any desired position, and all warm-air pipes furnished with adjusting dampers near the furnace.

Miscellaneous Notes

In computing the heat loss from the lower hall, the front door has been considered as all glass, in order to cover the excessive leakage.

Heat for the stairway and upper hall is furnished by a register on the first floor, near the foot of the stairs, as by this arrangement a better distribution of heat will be secured than is otherwise possible.

The necessary thickness of partitions is indicated by the dimensions of the flues which they are to carry.

Standard register sizes have been shown in all cases. If it is desired to change the proportion to better accommodate the finish, this may be done, provided the over-all area is kept the same.

If floor registers are preferred in any case, the change is easily made.



Interior of lean-to. Ample provision for sunlight is made. The tile floor simplifies the watering process. Note the steam pipes below the flower benches, much preferred to radiator heating

Decorating and Furnishing the Low-cost House

Housing the plants and flowers, Part II—The sun porch and conservatory

A PORCH with pillars may be readily converted into a plant room for winter use simply by having sash or window frames made to fit between the pillars so as to be easily taken down in summer to restore the porch character and the sashes stored in a convenient place until again wanted. During the winter such an arrangement not only affords a good conservatory, but at the same time helps to keep the adjacent rooms warm. A small coal stove may be used to

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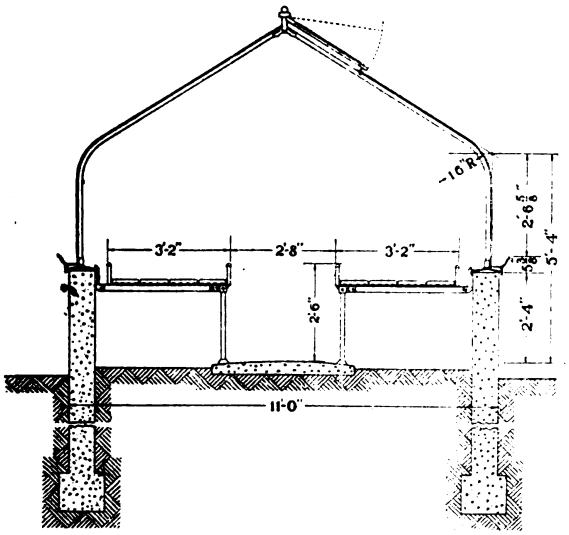
supply heat, or better, a suitable supply run from the main heating plant. Balconies may be converted in a similar way. Windows or any ventilating sash should be readily accessible and be so arranged that the plants do not obstruct easy access thereto. The sashes which are to be constantly opened and shut should be easily worked. These things are of course equally true for the simple bay window.

In planning a sun room of any consequence there must be ample provision for sunlight, facilities for watering, heating and temperature control. This includes protection from cold drafts in winter and excessive sun heat in summer. There should be easy access to out-of-doors so that the plants may be handled without disturbing the rest of the house, and also for the complete shutting off from the rest of the house when necessary for purposes of fumigation.

Whatever the size and shape of the structure, it



Construction of a two-compartment greenhouse

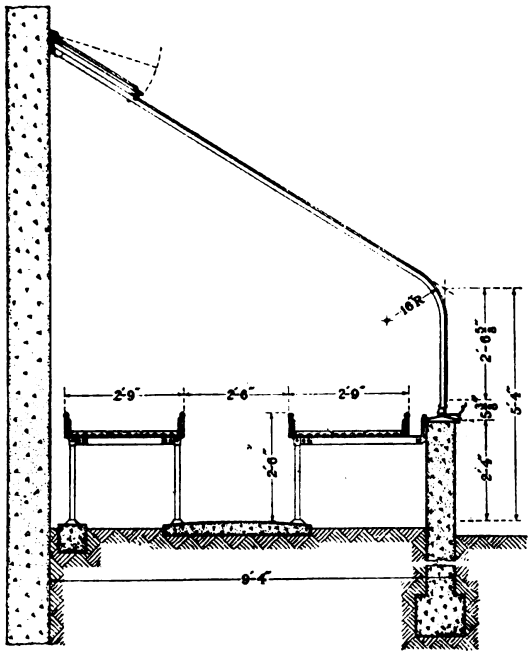
should be on the south, east or west side of the house, and should project so as to have three sides exposed to the light and air. If it is of one story, light should also be admitted from the roof where feasible. It is not necessary to have the whole roof of glass. If only a third of its area is of glass it will greatly improve the efficacy of the room as a conservatory. If it is only possible to use glass in the sides of the room, this should be carried as high as possible to admit a maximum of light from overhead.

The matter of properly heating the plant room is one of the most difficult and important problems to be solved. The best way is to extend the main cellar under it, thus furnishing a permanent foundation, warmth under the floor, and facilities for introducing pipes for heating, draining and watering. A coil of ordinary steam pipes carried around the three sides of the room and kept close to the walls is to be much preferred to any system of radiators. This holds for either steam or hot water. The pipes take less room, distribute the heat more uniformly and can be readily divided into pairs so that the heat may be regulated. Valves should be arranged so that one-third, two-thirds or the total radiation may be used at will. The air should be cooler at night than in daylight, for any growth that is stimulated by heat without a corresponding amount of daylight is weak and undesirable.

Storm windows are important. They make an absolutely frostproof double wall of glass and save in fuel economy. The plants may grow close up to the glass, even touching it without chilling them, and the glass is always clear, not being covered by frost in even the coldest weather.

Ventilation from out-of-doors should be secured from transoms above. These are best when hinged in the center so that when open, the lower part of the window is outside, and the upper is inside. By this arrangement cold air rushing in is deflected upwards by the inclined surface of the window and is slowly diffused through the room and warmed before it reaches the plants below. The floor should be of concrete or tile, sloping toward a drain, preferably in the center.

It is of course an item of expense to install such a room, but no more so than many of the non-



A typical lean-to

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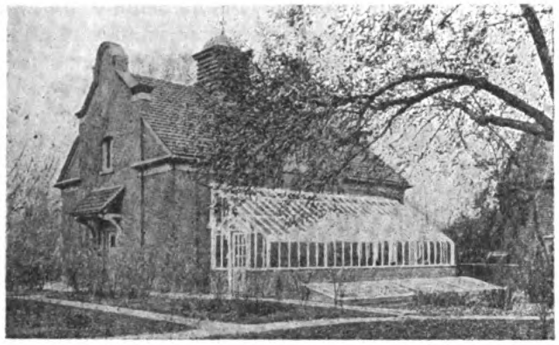
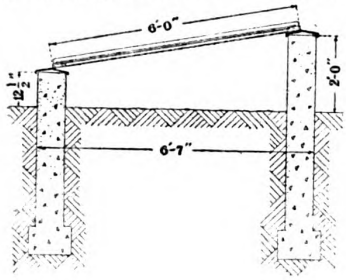


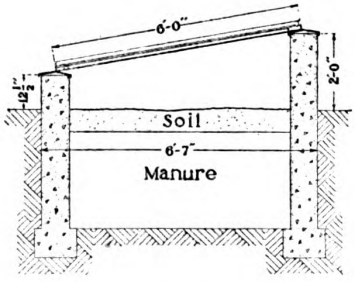
A brick garage with a two-compartment lean-to greenhouse and row of frames. The heating system in the garage can furnish heat for both structures. This type has no workroom. There is no door connecting the garage and the lean-to

essential things in the average house. Plants and flowers are a constant source of interest. Their cultivation may be used for pecuniary advantage, but they also give a fresh, live aspect to a house that can be supplied in no other way. The first cost is practically the only cost, and the satisfaction grows greater as the years pass.

The Half Span or Lean-to is an elaboration of the bay window conservatory and is built against an existing structure. For most purposes it should



Plan of cold-frame

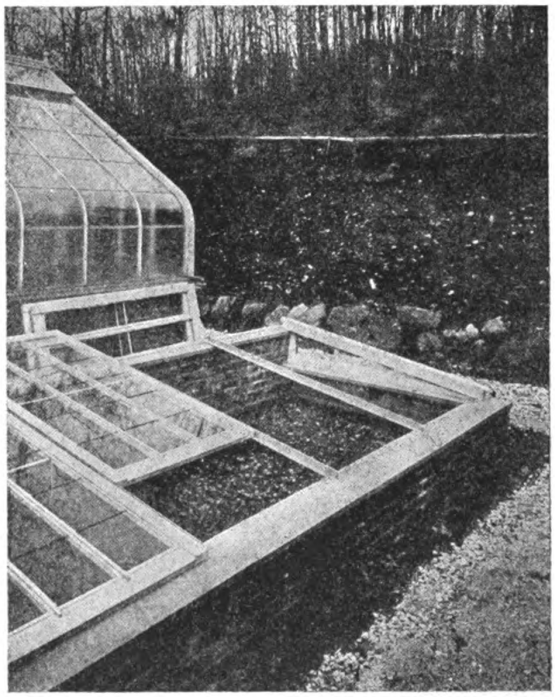


Plan of hot-bed

be located with the sloping roof facing south. A popular plan is to attach it to a garage where there is one. The heating system in one structure can then furnish the heat for both. It serves a purpose of economy if a small greenhouse can be so placed that heating pipes can be carried from near-by buildings. This overcomes the necessity for a workroom for housing the boiler. The potting, etc., can be done on an empty space on one of the benches. The omission of the workroom reduces the cost just that much. While a workroom is not a necessity for small houses, it is, however, a decided convenience.

If the garage is large enough so that part of it may be used as a separate workroom for the greenhouse, so much the better. But there should be no inside entrance between it and the garage, as the fumes of gasoline and burnt oil are destructive to the plants. It is also advisable to have the boiler cellar inaccessible from the garage. This eliminates fire dangers from escaping gasoline. Illustrations of conservatory and garage combinations are included with this article.

The workroom is the business end of the greenhouse. It is here that the bins of soil are kept for repotting of plants. It affords a convenient place for the potting bench and for packing flowers to be sent away. Seed and tool closets are there. In the cellar is the coal and boiler. In some of the less simple workrooms, a second story affords quarters for some of the help. Sometimes a gardener may have his office in the workroom building. Still



Note the heating pipe which comes from the greenhouse. In these frames things may be grown all winter. These frames comply with the description on page 48. See the standard sash, and the proper dimensions of the frames

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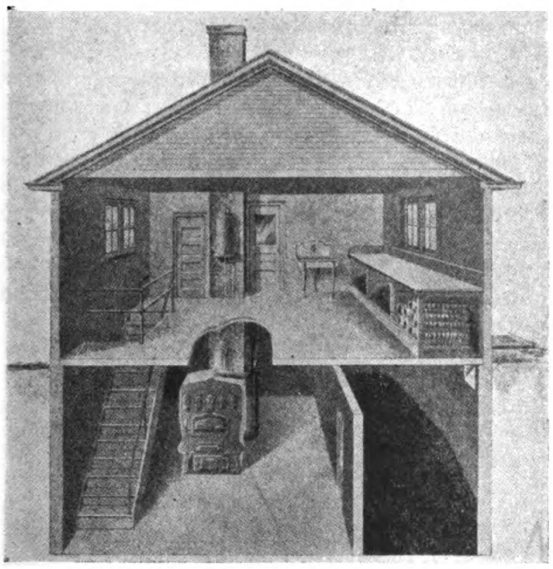
more elaborate ones are equipped with a toilet, a refrigerator for cut flowers, and other modern contrivances. A small workroom may be built underneath the greenhouse with good result, but it is

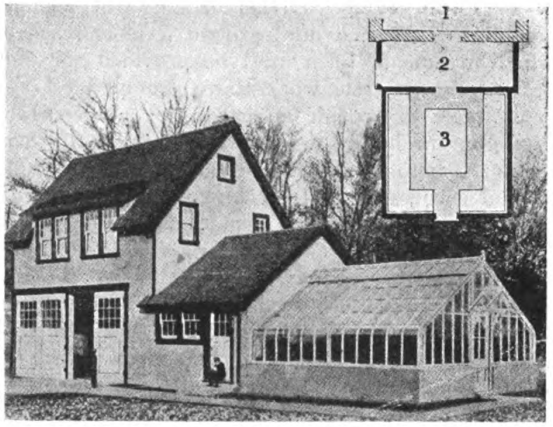


Good type of simple workroom. See space for pots under table, and bins of soil. This fills all the usual requirements of a workroom, affording place for seeds, tool chest, repotting, and the hundred details that suggest themselves

usually found that without any workroom at all, the greenhouse itself will be unpleasantly cluttered up with makeshift accommodations for all the necessary paraphernalia.

The requirements of a greenhouse compel that a large part of the structure shall be of glass, but there are many other portions for which concrete may be recommended. The cultivation of flowers demands that a greenhouse interior be filled with warm, moist air. This makes it certain that wood will be short-lived, because such atmospheric conditions are most favorable to the rotting of wood. Concrete is almost always used for the foundation and flooring, and now the beds or benches are also being made of this material. Perhaps the most adaptable culture bed is the raised concrete bench. This can be either monolithic or unit construction. Because of the changes frequently desired in the arrangement of greenhouse interiors, the unit constructed bed may be preferred to the monolithic.

In thinking of greenhouses, one naturally thinks also of concrete hotbeds which are really greenhouses on a small scale. As far as the structural characteristics are concerned, there is no difference between the hotbed and the cold frame. The difference in name only signifies a difference in operation. The hotbed is made hot by the manner in which the soil is prepared. Thirty or more inches of fresh stable manure are placed in the bed, then covered over with about eight inches of fine rich soil and the sash closed. In a short time the fresh manure heats in the process of decomposition and warms up the soil. Either hotbed or cold frame may be of any desired length, but should not be more than 6 feet wide. Six-inch walls are the desirable thickness. A sunny slope should be chosen as the location. The bed wall should be higher at the back than at the front, so as to secure proper incline for sash. A trench is dug first into which concrete for the enclosing walls is deposited. However, since the wall should extend below possible frost penetration, it is not convenient to dig a trench 6 inches wide to the required depth, so as a rule the entire area of the bed is excavated and



Greenhouse in combination with garage, separated by workroom. This simplifies heating and is an economical and popular form



These window boxes are properly planted with trailing foliage, always desirable as conserving light and air within the room, and keeping out of the way of shutters. In this house there are no shutters

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inside forms set up. If the earth is firm, no outside form is needed until ground level is reached, when an outside form must be provided for that part of the concrete work above ground level. It is desirable to provide an expansion and contraction joint in hotbed walls every 25 feet of their length, also to bend one or two quarter-inch rods around corners so that cracking will not occur at corners, due to volume changes in the concrete from temperature changes. Otherwise no reinforcement of the concrete is needed.

Before planning a hotbed, one should arrange for the necessary sashes, as these come in standard sizes and the bed can be so planned that there will be no special labor required properly to fit the sash in position. When finishing the upper or high wall, provision should be made for setting blocks in the concrete so that sash hinges can be attached to permit raising sash when desired to ventilate the beds.

It is also possible to run pipes from the greenhouse proper around the bottom edges of the hotbeds as shown in one of the pictures. In locating hotbeds and cold frames, the southern side of the greenhouse will usually be found most fruitful of results as providing as much sunlight as possible.

Builders and carpenters should not attempt to construct a greenhouse or conservatory without first consulting an experienced florist, any more than they would attempt to build a hospital without the counsel of a physician. It is a matter of pride among material dealers to get the best results from their product, and they will usually be found willing to impart a large amount of information to the laity to secure these results. Thus if one contemplates the use of concrete, he may with good advantage address a letter to some of the large dealers who exploit the uses of that type of construction and find out the best practice that their experience has evolved. There are also firms whose work is devoted exclusively to the construction of greenhouses. Their catalogues will be helpful to the prospective builder as giving information on heating and ventilating as well as the more obvious elements in construction.

The illustrations herewith have been selected with particular care, and it is hoped they will supplement quite completely what the limits of space impose as to text.

Calculating the Size of Timber Beams and Steel Girders

Some simple mathematics with which the builder should be familiar

By Ernest Irving Freese

ORDINARILY, the process of arriving at the required size of a beam or girder to safely withstand any given load, requires a special knowledge of higher mathematics as well as a thorough acquaintance with the principles of statics. And these qualifications are usually possessed only by the avowed mathematician or the professional engineer.

However, by making use of the accompanying tables, the above-named qualifications are rendered unnecessary, for the process is thereby reduced to one of mere inspection coupled with an application of common everyday arithmetic.

A few examples showing the correct use of the tables will give all the information necessary to enable anyone with a knowledge of multiplication and division to determine with accuracy the required size of any beam, whether of timber or of steel, to safely support any given load.

It will first be expedient to define the terms and symbols employed in the tables, so as to avoid any confusion or misunderstanding that might otherwise occur. These terms and the symbols, or letters, representing them are as follows:

CONCENTRATED LOAD: Any load is said to be *concentrated* upon a beam when all of it occurs at one particular point. A partition running crosswise of the joists, and supported by them, creates a concentrated load upon each joist at the point where the partition rests. The header-beams, which carry the tail-beams of a framed floor-opening, become concentrated loads upon the trimmer-beams. A bale

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of hay is a concentrated load when hanging from an overhead hay-beam.

UNIFORMLY DISTRIBUTED LOAD: A load is termed *uniformly distributed* when it is spread evenly over the full length of the beam. This is the most common case of loading that occurs in building construction. All floor-beams and ceiling-joists, not carrying a crosswise partition, and all beams and girders carrying either floor-joists or a lengthwise partition, or both, are under a uniformly distributed load. The "live load" on a floor is always considered as uniformly distributed. The weight of the beam itself is a uniformly distributed load upon it.

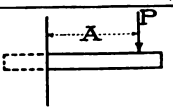
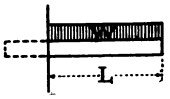
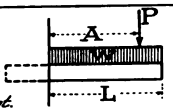
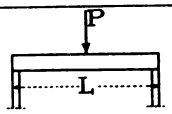
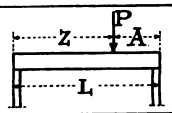
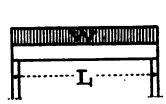
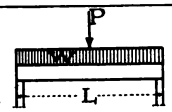
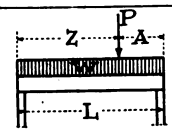
A beam or girder may be subject to either one, or both, of the above kinds of loads. The eight load-diagrams in Table No. 2 represent all cases of loading that are liable to occur in ordinary construction. The letter P stands for the *number of pounds* pressure upon the beam from the total *concentrated load*. The arrow represents the center of gravity of this load, or the point at which it rests upon the beam. The letters A and Z stand for the *number of inches*, from the near and far supports, to the center of this load. The letter W stands for the *number of pounds* weight of the total *uniformly distributed load*, while the shaded area represents the extent, or distribution, of this load. The letter L stands for the *number of inches* in the total length or clear span of the beam.

TABLE 1. GIVING THE ALLOWABLE SAFE WORKING STRESS, F, IN LBS. PER SQ. IN. FOR STEEL & TIMBER BEAMS.

Steel	16000
Long Leaf Yellow Pine	1500
Oregon Pine	1200
Oak	1200
Spruce	1200
Fir	1200
Short Leaf Yellow Pine	1000
White Pine	1000
Hemlock	900
Redwood	800

NOTE. This table shows the values of F to use in the calculations of Table 2, for finding the Required Section Modulus, S, for a beam of the given material. If a local bldg. ordinance is in effect, then the allowable safe working stress, F, as therein specified for the given material must be used in place of the value for same given in this table.

TABLE 2. SHOWING HOW TO CALCULATE THE REQUIRED SECTION MODULUS, S, FOR ANY BEAM UNDER ANY GIVEN CASE OF LOADING.

CASE 1. Overhanging beam carrying only a load, P, concentrated at any given point.		$M = P \times A$. $S = \frac{M}{F}$.
CASE 2. Overhanging beam carrying only a load, W, uniformly distributed.		$M = \frac{W \times L}{2}$. $S = \frac{M}{F}$.
CASE 3. Overhanging beam carrying both a load, W, uniformly distributed, & a load, P, concentrated at any given point.		$M = P \times A + \frac{W \times L}{2}$. $S = \frac{M}{F}$.
CASE 4. Beam supported at each end & carrying only a load, P, concentrated at the center.		$M = \frac{P \times L}{4}$. $S = \frac{M}{F}$.
CASE 5. Beam supported at each end and carrying only a load, P, concentrated at any given point.		$M = \frac{P \times A \times Z}{L}$. $S = \frac{M}{F}$.
CASE 6. Beam supported at each end & carrying only a load, W, uniformly distributed.		$M = \frac{W \times L}{8}$. $S = \frac{M}{F}$.
CASE 7. Beam supported at each end & carrying both a load, W, uniformly distributed, & a load, P, concentrated at the center.		$M = \frac{P \times L}{4}$ or $\frac{W \times L}{8}$. $S = \frac{M}{F}$
CASE 8. Beam supported at each end & carrying both a load, W, uniformly distributed, & a load, P, concentrated at any given point.		Use the GREATER of the following two values of M, for finding S: $M = \frac{W \times A \times Z}{2 \times L} + \frac{P \times A \times Z}{L}$ $M = \frac{A \times A \times P \times P}{2 \times W \times L} + \frac{A \times P}{2} + \frac{W \times L}{8}$. $S = \frac{M}{F}$

NOTE. In above formulas, the letters stand for the following values:— P = the total concentrated load, in POUNDS. W = the total uniformly distributed load, in POUNDS. L = the total length of beam, in INCHES. A & Z are distances in INCHES. M = the maximum bending moment, in INCH-POUNDS. F = the allowable safe working stress, in POUNDS PER SQ. INCH, either as given in Table #1 or as fixed by local building ordinance. S = the REQUIRED Section Modulus of the beam, found by dividing M by F. The size of beam is then found by looking in Table #3 or #4 for a beam that has a GIVEN Section Modulus equal to, or greater than, the REQUIRED Section Modulus. Use Table #3 for TIMBER beams, & Table #4 for Steel I-BEAMS.

BENDING MOMENT: This is a term used in engineering to designate the *amount of bending tendency* produced by any case of loading. This amount is represented by the letter M. Table 2 gives the simple formulas required in the calculation of the bending moment for the eight cases of loading shown. The formulas involve only simple arithmetic and, in solving them, it is only necessary to substitute the known quantities for the letters representing them, and then perform the operations indicated by the signs. For instance, suppose that an overhanging or cantilever beam is to support a concentrated load of 1,000 pounds at a point 5 feet from the support. Referring to the load-diagrams of Table 2, it is seen that this beam comes under Case 1 of loading, for which $M = P \times A$. But, $P = 1{,}000$ pounds; the total concentrated load. And $A = 5 \times 12 = 60$ inches; the distance from the support. Hence, substituting these known quantities for the letters representing them, gives: $M = 1{,}000 \times$

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60=60,000 inch-pounds, the bending moment.

ALLOWABLE SAFE WORKING STRESS: All loaded beams are subject to stress, and, when the material of the beam becomes stressed beyond its endurance, the beam fails. The stress at time of failure is termed the breaking or ultimate stress, which, divided by an allowed "factor of safety," gives the ***allowable safe working stress*** of the material. This working stress is always given in ***pounds per square inch***, and its amount is represented by the letter *F*. Table 1 gives the safe working stresses for steel and all kinds of structural timber, based on a factor of safety varying from 4 to 6, which is in accord with good engineering practice. For instance, if the beam is to be of steel, *F*=16,000 pounds per sq. inch; the safe stress. Or, if the beam is to be of Oregon pine timber, *F*=1,200 pounds per sq. inch; the safe stress.

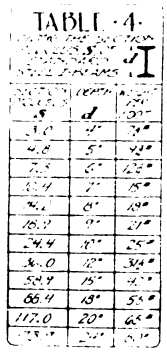
TABLE 4

Most building codes specify the safe stresses to be used for all structural materials. But, if no building code is in effect, the values as given in Table 1 should be used.

SECTION MODULUS: The ***section modulus*** of a beam is a purely geometrical quantity that determines the ***shape*** and ***size*** of the beam. It is represented by the letter *S*, and its ***required*** value can readily be found by dividing the bending moment of the beam (*M*) by the safe working stress of the material (*F*). Hence, the working stress (*S*) is given by the following easily remembered formula:

$$S=\frac{M}{F}. \qquad (1)$$

For instance, for a bending moment of 60,000 inch-pounds, and a working stress 1,200 pounds per sq. inch:

$$S=\frac{60,000}{1,200}=50,$$

which is the required section modulus of the beam.

After the section modulus has been calculated, as per the above formula, no further calculations are necessary, for the beam can then be taken directly from Table 3 if of timber, or from Table 4 if of steel. These two tables give the section modulus of all stock sizes of timber beams from 2 in. by 3 in. up to 20 in. by 24 in., and all light-section standard steel I-beams from 4-inch up to 24-inch. Hence, after the ***required*** section modulus is calculated, as shown above, it is only necessary to choose a beam from the tables that has a *given* section modulus equal to or greater than the *required* section modulus. In the instance given above the required section modulus was found to be 50 for a working stress of 1,200 pounds per sq. inch. This is the working stress of Oregon pine. Hence, looking in Table 3, it is found that a section modulus of 50 calls for a 3 in. by 10 in. beam. Of course, any other beam having a section modulus *greater* than 50 could also be used; say either a 6 in. by 8 in., or a 2 in. by 14 in. beam. In fact, in this case, the 2 in. by 14 in. beam might well be chosen, since it contains less lumber, is deeper, and, at the same time, has a greater section modulus than the 3 in. by 10 in. beam. Hence, the former will be more economical, stiffer and stronger, than the latter.

TABLE 3

GIVING THE SECTION MODULUS, S, OF ALL TIMBER BEAMS FROM 2"×3" UP TO 20"×24".

Size of beam is in inches.

b = the breadth
d = the depth

EXAMPLE: Suppose a beam requires a Section Modulus of 45. Look along the rows marked S and stop when 45, or the next higher value, is reached. In this case, the slippery point is 48. Then, the size of beam given for 48, or any other size beyond this, can safely be used — either the 10"×10", 4"×18", 8"×12", 6"×14" etc. In this case, the 4"×18" should be used, if conditions permit, because it contains the least lumber. It has the greatest DEPTH. The 4"×18" will therefore be the most economical as well as the STIFFEST, to carry the given load.

SECTION MODULUS S	3.0	4.5	5.3	8.0	10.6	12.0	18.0	21.3	24.0
SIZE OF BEAM b×d	2×3	3×3	2×4	3×4	4×4	2×6	3×6	2×8	4×6
S	32.0	33.3	36.0	42.6	48.0	50.0	64.0	65.3	66.6
b×d	3×8	2×10	6×6	4×8	2×12	3×10	6×8	2×14	4×10
S	72.0	85.3		96.0	98.0	100.	108.	128.	130.
b×d	3×12	8×8 or 2×16		4×12	3×14	6×10	2×18	3×16	4×14
S	133.	144.	162.	166.	170.	192.	196.	200.	216.
b×d	8×10	6×12	3×18	10×10	4×16	8×12	6×14	3×20	4×18
S	240.	256.	261.	266.	288.	322.	324.	326.	341.
b×d	10×12	6×16	8×14	4×20	12×12	4×22	6×18	10×14	8×16
S	392.	400.	426.	432.	457.	484.	512.	533.	540.
b×d	12×14	6×20	10×16	8×18	14×14	6×22	12×16	8×20	10×18
S	576.	597.	645.	648.	666.	682.	756.	768.	800.
b×d	6×24	14×16	8×22	12×18	10×20	16×16	14×18	8×24	12×20
S	806	864.	933.	960.	968.	972.	1066.	1129.	1152.
b×d	10×22	16×18	14×20	10×24	12×22	18×18	16×20	14×22	12×24
S	1200	1290.	1333.	1344.	1452.	1536	1613	1728.	1920.
b×d	18×20	16×22	20×20	14×24	18×22	16×24	20×22	18×24	20×24

Again, suppose that the above beam were to be of steel, but subject to the same bending moment of 60,000 inch-pounds. From Table 1 the safe allowable working stress of steel is found to be 16,000 pounds per sq. inch. Hence, since *M*=60,000, as before and *F*=16,000, for steel, then

$$S=\frac{M}{F}=\frac{60,000}{16,000}=3.7,$$

the required section modulus for a beam of steel.

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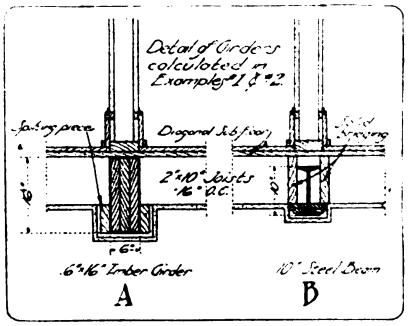
Looking in Table 4, it is seen that there is no standard steel beam having a given section modulus of 3.7. Therefore the next *higher* section modulus of 4.8 must be used, which calls for a 5-inch, 9¾" I-beam.

Two practical examples will now be worked out so as to render the process entirely understandable. It is to be remembered that the following method of procedure is the same in all cases, whether for timber or for steel, and whether for concentrated loads or for distributed loads, or both.

Example 1: A timber girder 16 feet long is required to span across a basement room. It must support the floor joists which rest upon it as well as a first-story non-bearing partition. The joists are 2 in. by 10 in., 16 in. on centers. The floor is double, and the basement ceiling is to be plastered. The



Construction details in connection with examples 1 and 2

floor area to be supported by the girder is 200 sq. feet, and a "live load" of 40 pounds per sq. foot of this area is to be included in the load to allow for the weight of furniture, people, etc. The partition to be supported is the full length of the girder, 8 ft. high, of 2 in. by 4 in. studs, plastered on both sides. There is an opening in the partition but this is to be figured solid so as to allow for the weight of the girder itself. What size girder will be required if the timber is long leaf yellow pine?

SOLUTION: *First,* calculate the total load which, in this case, is uniformly distributed. The floor area, and the plastered ceiling area, carried by the girder is 200 sq, feet. Hence, at 10 pounds per sq. foot for the weight of the plastering, 10 pounds per sq. foot for the weight of the double floor and joists, and 40 pounds per sq. foot for the live load, the total floor and ceiling load will amount to (10+10+40) times 200, or 60×200=12,000 pounds, total uniformly distributed floor and ceiling load.

The partition is 8 feet high, so that the partition area carried by the girder is 8×16=128 sq. feet. Hence, at 20 pounds per sq. foot for the weight of the plastering (the partition being plastered *both* sides), and say 2 pounds per sq. foot for the weight of the studding and plates, the total partition load will amount to (20+2) times 128, or 22×128=2,816 pounds, total uniformly distributed partition load.

The entire load on the girder will then equal the sum of the above two loads, or 12,000+2,816=14,816=W, the total uniformly distributed load (in pounds) to be supported by the girder.

Second, from Table 2 find which case of loading the girder comes under. It is found to be Case 6, which indicates a "beam supported at each end and carrying only a load, W, uniformly distributed."

Third, calculate the bending moment, M, by solving the formula for same given with this case of loading. The formula is

$$M=\frac{W\times L}{8}.$$

As already determined, W=14,816 ***pounds,*** the total uniformly distributed load carried by the girder.

And, L=16×12=192 ***inches,*** the total length or span of the girder.

Therefore, by substituting these known values for the letters representing them in the above formula, and solving, we get

$$M=\frac{14{,}816\times 192}{8}=355{,}584 \text{ inch-pounds},$$

the bending moment.

Fourth, from Table 1 find the safe allowable working stress of the material. In this case, the girder is to be of long leaf yellow pine. Hence, from Table 1, F=1,500 pounds per sq. inch.

Fifth, calculate the required section modulus, S, by solving the formula for same given in Table 2. It is to be noted that it is the same for all cases of loading, that is to say,

$$S=\frac{M}{F}.$$

Since M=355,584 inch-pounds, and F=1,500 pounds per sq. inch, by substituting these known values for the letters standing for them in the above formula, and solving, we get

$$S=\frac{355{,}584}{1{,}500}=237,$$

the *required section modulus for a timber beam.*

Sixth, consult Table 3, of timber beams, and pick out one that has a section modulus equal to or greater than 237. It is found that a 10 in. by 12 in. timber is the first one in the table to meet the requirement. Hence, either this one, or any other one that has a section modulus greater than 237, can safely be used as far as *strength* is concerned. However, in this case, *deflection* must also be taken into

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account, for the girder is to carry a plastered ceiling. Moreover, the deeper a girder is to carry a given load, the less lumber will it contain, and consequently greater economy is attained. Hence, the choice should always be given to the girder that has the *least number of sq. inches in its cross section,* provided that its section modulus is at least equal to that which is required, which, in this case, was found to be 237. Again looking in the table, it is found that, of all the beams therein having a given section modulus greater than 237, the 4 in. by 20 in. beam has the least cross sectional area, being 4×20 or 80 sq. inches. If this cannot be obtained, since it is a rather odd size, then the 6 in. by 16 in. or the 8 in. by 14 in. should be given preference over the 10 in. by 12 in., since all three of the deeper beams contain less lumber, and have a greater section modulus, than the 12-inch beam, and, therefore would be *more economical, stiffer and stronger,* than the latter. Of course the matter of head room must also be given consideration. The 6 in. by 16 in. girder will be assumed to have been decided upon, and a detail of same is given at "A" in the accompanying sketch.

Example 2: What size steel beam would be required to take the place of the timber girder in the first example?

Solution: The bending moment will be the same as found above, because the *load* is the same. Hence it is only necessary to find the required section modulus for *steel.*

Looking in Table 1, it is seen that the safe allowable working stress for steel is 16,000 pounds per sq. inch. Hence, in this case, $F=16{,}000$, and $M=355{,}584$. By formula (1) then, the required section modulus S is

$$S=\frac{355{,}584}{16{,}000}=22.2,$$

the *required section modulus for a steel beam.*

Looking in Table 4, it is seen that there is no standard steel beam having a section modulus of 22.2, so that the next *higher* value of 24.4 must be used, which calls for a 10-inch, 25-pound I-beam. This steel beam could be used in place of the 6 in. by 16 in. timber girder of example 1. A detail of the steel beam is also given at "B" in the accompanying sketch.

By adhering to the above method of design, the builder will have no difficulty in calculating the size of any timber beam or steel girder whatsoever, for any condition of loading given in Table 2. All "guesswork" will thereby be eliminated, and "thumb-rule" will no longer have to be relied upon. Very often a considerable saving can be made.

A House and Garage at Milwaukee, Wis.

Well worked out arrangement gives evidence of careful study

Designed by Stanley F. Kadow, Architect

PLACES in which to live are essential, but more and more is it becoming necessary to supplement the dwelling with that accessory building—the private garage.

Originally this latter building, most often constructed as a separate structure from the house proper, was placed at the rear and as far out of sight as possible. For this reason it was not thought necessary to spend much time planning an attractive garage, since its purpose was purely utilitarian, and it was not much in evidence. But as time passed it was found that the design and placement of the garage constituted a most serious problem. The location of this accessory structure at a distance from the dwelling was not desirable, and so today, the garage is usually placed closer to the house, often being incorporated as an integral part of it. This bringing of the garage into more prominent view naturally required its more careful designing, so that it might not mar the appearance of the house.

Then there came the necessity, in many cases, of housing not a single car, but several, this naturally requiring a more pretentious garage for such an owner. The question of a chauffeur's quarters also had to be considered. Since this individual was not constantly driving the car, a place had to be provided for him during the time he was not so en-

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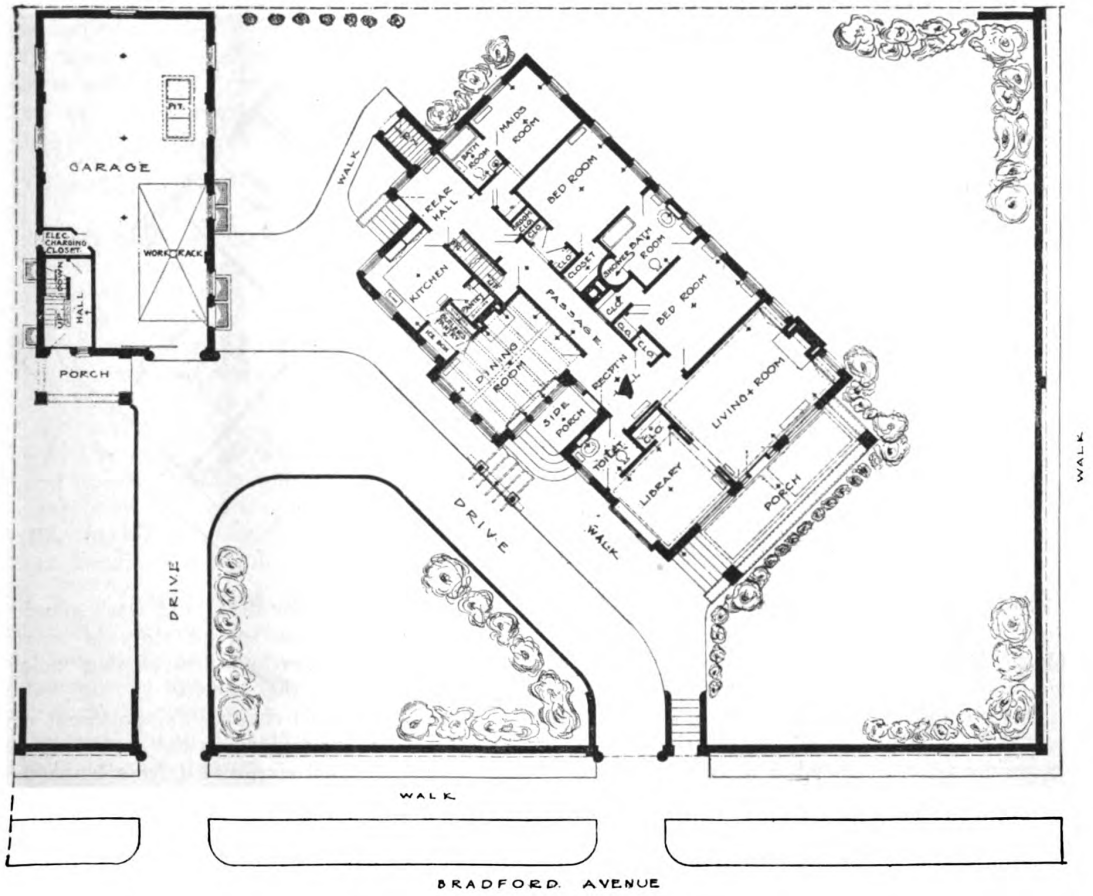
Exterior, as seen from Bradford Ave.



House and garage at Milwaukee, Wis.
Stanley F. Kadow, Architect

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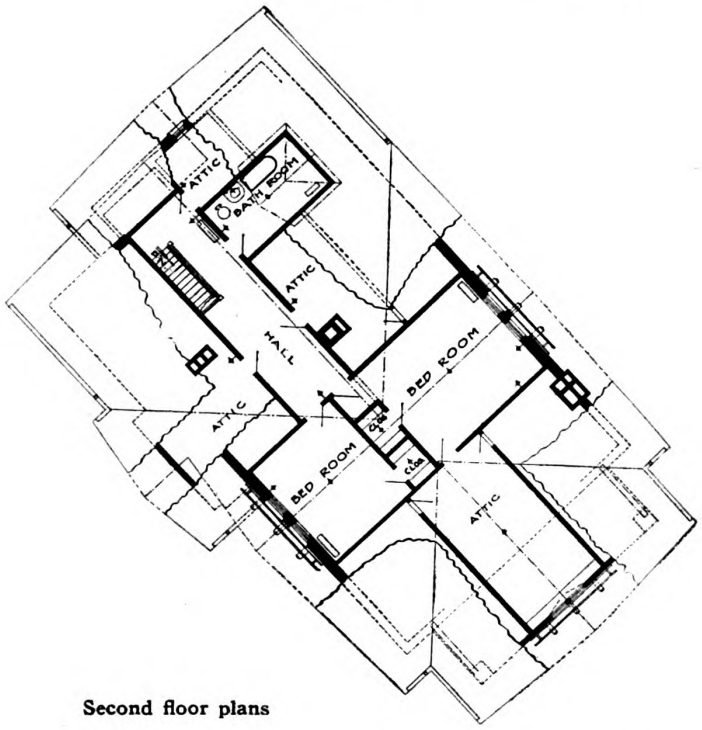
gaged. Plainly, he could not spend such time in the drawing room or on the front porch. Then, when the chauffeur resided at some distance from his employer's residence, it was difficult to get him at odd times. So by incorporating an apartment for the chauffeur's use above the garage, the whole problem was simplified and a more attractive garage building made possible.

In the house and garage designed by Stanley F. Kadow, Architect, and here illustrated, both the design and location of the buildings show careful study, and the result is a happy solution of the problem.





Second floor plans

By locating the long axis of the residence at an angle of 45 degrees with that of the garage, it was possible to lay out the grounds in a more attractive manner, work out a more compact driveway, and give a more comprehensive appearance to the development.

The residence is designed primarily along the bungalow plan, all rooms for the family being placed on the main floor.

The library, living room and enclosed porch are all arranged so that they may really be used as one large room, at times when a large number of guests are present, while the bedrooms are located to the rear of the house, and accessible from a private hall.

The kitchen is placed at the end opposite the library, living room, etc., and thus there is little chance of cooking odors entering these rooms. The kitchen is also the room in closest proximity to the garage, a walk leading from the rear hall entrance thereto. The maid's room and bath are directly to the rear of the kitchen, a most convenient location. The main bath, with recessed shower, is accessible to either of the master bedrooms.

This first floor contains all rooms necessary for the average sized family. In this building, however, in addition to an unfinished attic, there are two bedrooms and bath in the upper story.

The garage is of ample size for three cars, and is provided with a floor drain and wash stand.

The stairway to the second story is separated from the garage proper by a fire-resisting enclosure, and is entered from the exterior.

A very comfortable chauffeur's apartment of six rooms and bath is provided on the second story, all rooms being of good size, and a front balcony furnishes a place to sit out on warm evenings.

The exterior treatment is given no less care than that of the residence, and is made to harmonize therewith.

The walls of both buildings are of brick, and flower boxes and good planting lend added attractiveness to the ensemble. A low brick wall, with gate posts surmounted by electric lanterns at the driveway openings, surrounds the property.

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Good Salesmanship and Service Will Bring Business to the Builders—II.

By Robert F. Salaae

AFTER having organized the Service Department, even though it consist of but one bright man with practical knowledge of the craft, the builder should make the fact known among the public that he is now in a position to give *service* of an unusual character. One of the most effective ways of making this known is by means of a medium-sized display advertisement placed in the local weekly newspaper. Here is a little piece of "copy" which is published to give the reader an idea for writing an advertisement to suit his own business:

SERVICE THE SECRET OF SUCCESS

Let Our New Service Department Increase Your Business.

We are now in a position to offer you professional advice in matters of new building work, remodeling and repair work. This advice will be given free of charge by an expert who is capable of mapping out plans which would mean the best results at the lowest cost possible.

This service guarantees the highest quality of materials, the best of workmanship, and absolute satisfaction to the customer. Our Service Man will explain how your old properties can be remodeled into modern buildings at small expense.

Consult With Us Today!

Without a doubt the possibilities of the service idea as a business builder are wonderful indeed. For example, as the fact became known among the public that the builder's Service Department was for the benefit of the property owners, or for those contemplating the buying of property, the department would soon become very popular. Not only would the service expert give advice concerning changes and improvements in homes, churches, factories and other buildings, but he would also offer advice on matters of correct architectural style. Moreover, he would always be prepared to offer advice like the following example:

Standing on the main street of a small town in Pennsylvania is a three-story store and residence which had been vacant for more than two years. It was rather an old building. The general appearance of the front was not pleasing, and on account of standing idle for such a long period, the place was rapidly going into decay. The owner had even tried the plan of lowering the amount of the monthly rental in the effort to attract a tenant, but nobody seemed to be interested.

One evening a builder from a neighboring town called upon the owner of the vacant building and started to talk business in this manner:

"While visiting here on last Monday I noticed that store property of yours on Center Street, which I understand has been vacant for a long time. In looking over the place, I hit upon an idea which I believe would solve your problem. In fact, my plan, if carried out, would bring in for you at least seventy dollars per month in rentals for that building."

"I would naturally be interested in hearing your ideas," responded the owner. "Something must be done to rent that house, but to tell the truth, I cannot even sell it at the assessed valuation."

"Well, my plan would be putting in a new storefront, fixing up the rest of the front, and making four-room apartments out of the second and third floors," explained the builder. "The whole improvement would cost less than a thousand dollars, and your store and apartments would be rented immediately."

"What makes you feel so certain that the store would be rented so readily, even with the improvements suggested?" asked the owner. "I have already offered to fix up the place for anyone who will rent it, but my offer failed in attracting a tenant. As for the apartments, this is a small town, and I am doubtful about them being taken. How about janitor service?"

"The main reason why your store has remained vacant so long," replied the builder, "is because of the old-fashioned window and the poor appearance of the entire front. Appearances count for a great deal in these days. As for the apartments, they will rent in a small town as in a large city. No janitor

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would be necessary. The people occupying the store and the two apartments could take turns in looking after the furnace in the winter. As the building now stands, it is a dead loss to you. Why not have it remodeled now before it goes more into decay?"

It required a longer argument than that mentioned for the builder to convince the owner, but finally the owner decided to "take a chance and throw good money after bad," as he expressed it. The builder within a short time had the building remodeled, and the store was rented (before the work had all been completed) to a confectionery dealer of another town, who in passing the building had noticed the new plate glass front and other improvements being made. The two apartments were both rented within a month after the changes had been completed.

Strange to say, there is a builder located in the same town where this incident occurred, but it was necessary for a builder of a nearby town to call on the owner and make the suggestion for the improvement.

All of the buildings of the small towns should have "Service Departments" in connection with their business. When the builder feels that he could not afford to employ an expert, he can act as his own "Service Man," and by calling upon owners of the neighborhood, as well as upon owners in nearby sections, and by offering worth-while suggestions in the way of property improvements, he can "create" all the new business desired.

The service idea is of particular value in the smaller towns where nearly all of the householders are owners, ready to consider suggestions for improvements in their homes. Changing old-fashioned saloon parlors over into handsome Dutch hall living rooms is one branch of the remodeling business which can be developed more extensively in the smaller towns. The builders should call upon owners of homes and show them photographs of new style inclosed porches, Dutch hall living rooms, summer kitchens, etc., which they have recently built for other towns. The photographs will help in landing the orders.

Among the new things in buildings in the city of Philadelphia is a "double-decked" garage, and a "three-deck" garage. One of the advantages of either building is that no elevator is required to carry automobiles to the higher floor. In the case of the two-floor garage, the first floor is on a level with the street. The front of the building consists of attractive stores, with plate glass windows, on either side of a passage-way. One-half of this passage-way leads to the first floor garage. In the other one-half of the passage-way is an incline or ramp leading to the second floor. On both the first and second floors are a series of large turn-platforms, circular in form, and arranged so that the automobiles may be placed on the "wheel," the wheel turned by hand, and the automobile then "backed up" to its resting position on either side of the apartment.

The "three-deck" garage is built much like that of the two-story one except that there is a basement, and three passage-ways—one leading down to the basement, the second leading to the main floor, and the third leading on an incline to the second floor. The "turn-tables" are the same as with the "two-story" garage. These wheels are built of floorboards, joined together in octagonal form. The wheels are elevated only about an inch or two above the concrete floor. Around the rims of the wheels are loops of rope, and by pulling on these loops the motorist can move the platform easily.

Here is an idea which can be extended more widely by the builders in various parts of the country. Keep in mind the fact that no elevator is required for either one of these garages. The great saving of floor space is another advantage. The "turn-wheels" are still another. Why not introduce the turn-wheels idea to owners of garages who may not have thought of the plan?

Building Operations in June

The contracts let in June, 1920, as compared with those of May, this year, are as follows:

	Contracts let June, 1920	Contracts let May 1, 1920
Minnesota, North and South Dakota	$7,200,000	$10,400,000
Middle West	84,600,000	78,000,000
Ohio, West Virginia and Western Pennsylvania	44,236,000	44,800,000
Eastern Pennsylvania, Southern New Jersey, District of Columbia, Delaware and Maryland	22,489,000	26,100,000
New York and Northern New Jersey	69,502,000	78,000,000
New England	32,833,000	38,460,000

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Constructing a Winding Stairway—IV.

Laying out the Newel and Angle Posts 2 and 3

By Richard M. Van Gaasbeek

School of Science and Technology, Pratt Institute, Brooklyn, N. Y.

TO LAY OUT THE NEWEL.—Having determined upon the design or style of newel and angle posts to be used, it will be necessary to locate the exact position where the hand rail will meet the face of the posts. If the posts are plain boxed posts, no problem is presented, as they can be made long enough and cut off to suit after the hand rail is in position. If the posts are turned or paneled, a flat surface should be provided to receive the hand rails at their respective heights. It makes a poor appearance to have the hand rail finish in the center of a panel or against a turned portion of a post. Quite a problem is therefore presented in locating the various stations that the hand rail will intersect the different posts.

Details for the particular newel and angle posts used in this problem are shown in Fig. 18. The starting newel No. 1 has a base and receives one hand rail over string D. Angle post No. 2 is plain and must receive two hand rails, one over string D and one over string F. The posts give a paneled effect, square fillets being glued in at the respective heights to receive the hand rail and strings and allowing for the projection and finish below the

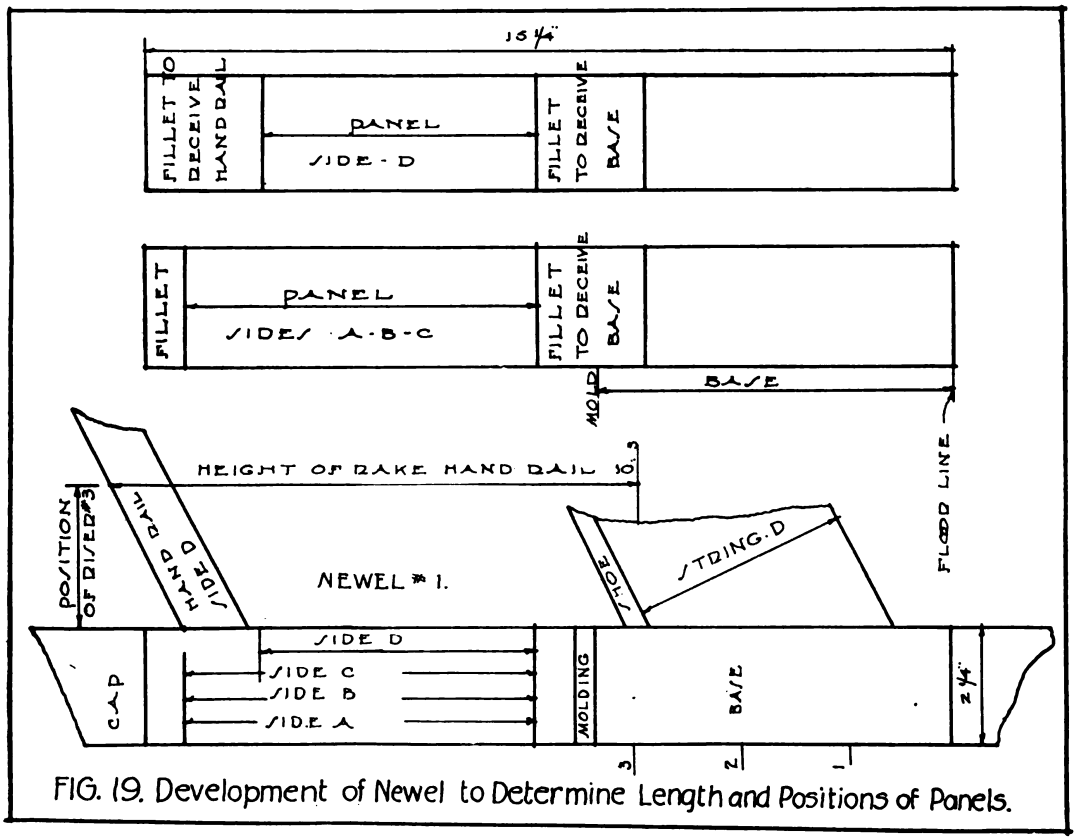

FIG. 19. Development of Newel to Determine Length and Positions of Panels.

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carriages and lath and plaster underneath the stairway. In laying out newel No. 1, lay out two parallel lines on a layout board or detail paper the width of the newel, apart as shown in Fig. 19. Square a line across for the floor level and begin working from this line. Measure up on the layout from the floor level the height of the base or 6¾" and square another line across. Allow ⅜" for the base molding and square across again at this point. The width of the top and bottom rails of the panels is a matter of individual judgment. Some mechanics prefer to have wider rails than others. In this problem the width of the top rail when finished will show the same margin below the cap molding as shown on the sides, the bottom rail showing twice as much or ¾". Measure then above the base molding ¾" and square a line across the layout. This gives the height for the beginning of the panel.

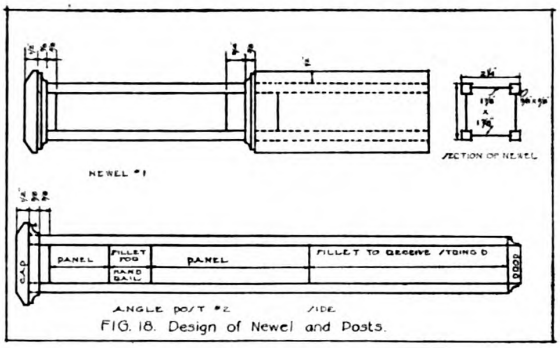

FIG. 18. Design of Newel and Posts.

Side D of the newel determines the height because the hand rail over string D finishes against this side. Experience has proven that a convenient height for the average person to grip the hand rail on the rake is about 2' 6" above the tread imme-

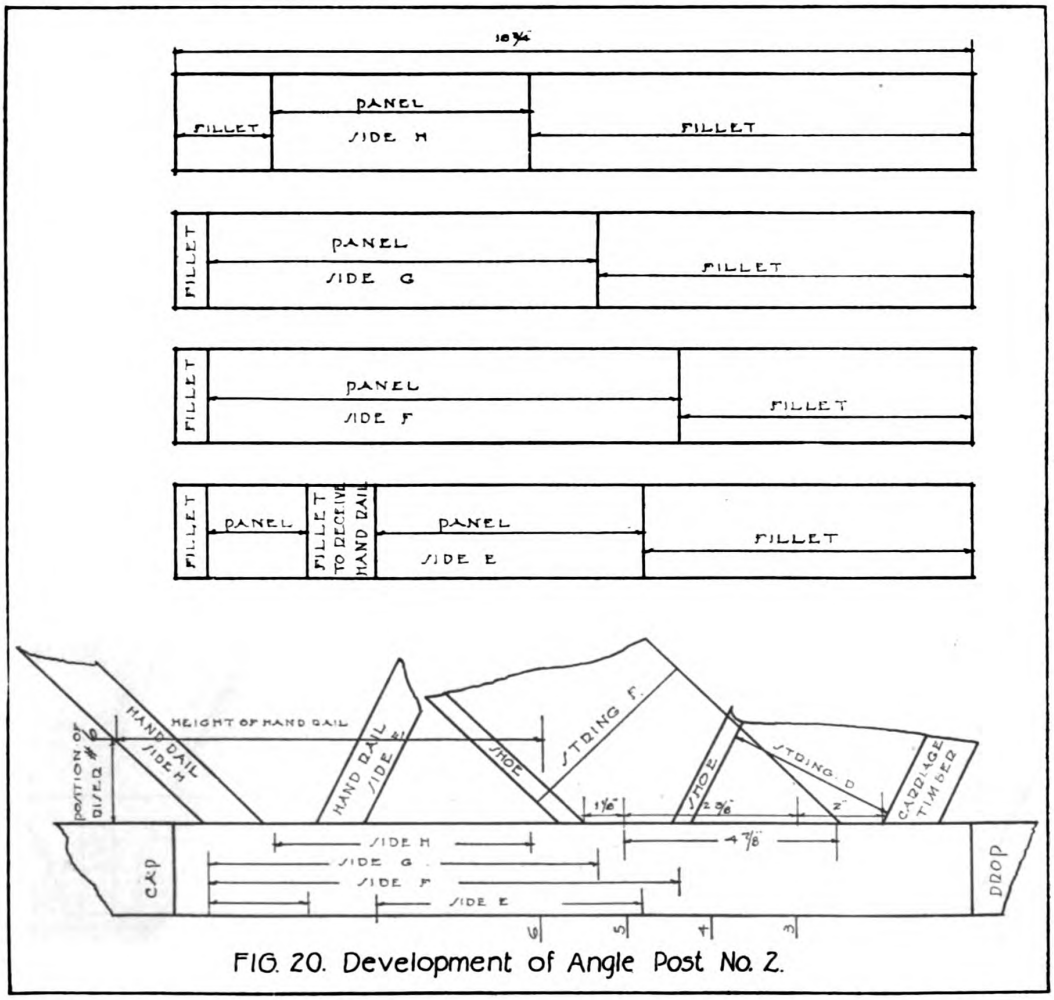

FIG. 20. Development of Angle Post No. 2.

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diately over the riser line. Referring to the layout Fig. 7, the nearest riser line is riser 3. This same point must be located on the layout Fig. 19. Riser 3 is 2⅝" from the face of the newel. Measure up on the layout from the floor the height of 3 risers and project this point out 2⅝" from the face of the newel as shown in Fig. 19. Produce a line from this point parallel to the face of the newel and measure up from the level of tread 3, the height of the hand rail above riser 3 or 10", this problem being 1/3 full size. Apply the pitch board to the layout and project this point down on the layout until it intersects the face of the newel, locating the position on the face of the newel where the top of the hand rail will finish. The thickness of the hand rail being ⅞", lay in a parallel line to the top of the hand rail ⅞" distant. Measure distances on the face of the newel from the top of the hand rail, ⅜" for the top rail and ⅜" the width of the cap molding. This gives the length of newel No. 1 or 15¼", the cap being fastened on the top, the molding breaking the joint. Glue a ¾" fillet in the sinkage flush with the top of the newel to form the top of the panel on sides A, B and C. On side D measure ¼" below the bottom of the hand rail and glue a piece wide enough to receive the hand rail or 2 3/16" flush with the top. Likewise glue fillets in at the bottom level as shown on Fig. 19 to receive the base and mold, showing a bottom rail ¾" above the base.

To Lay Out Angle Post No. 2.—Lay out two parallel lines on a layout board or detail paper as for the starting newel, the width of the post or 2¼" apart as shown in Fig. 20. Referring to the plan (Fig. 7), it will be seen that treads 3, 4 and 5 enter post 2 and that the height of tread

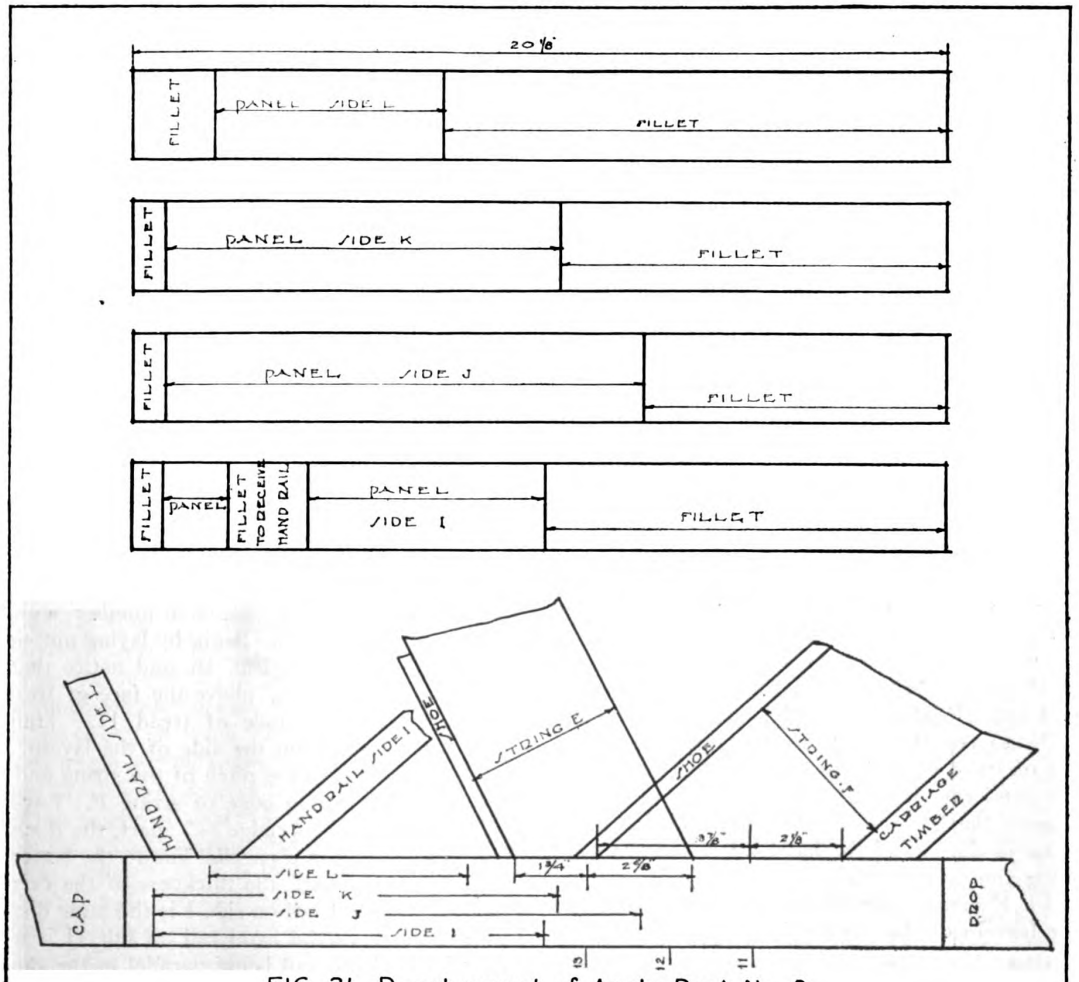

FIG. 21. Development of Angle Post No. 3.

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is necessary in locating the height of the hand rail over string F. Step off these heights for reference marks as shown in Fig. 20. Begin by laying out side E. Refer to the string D, Fig. 11 (June issue) and notice that the top of the string is a certain distance above the level of tread 3 and the bottom of the string is a certain distance below the level of the face of the tread, or 2⅜" above and 2" below the face line of the tread. Transfer these same distances on the side of the newel and apply the pitch board and line in the top and bottom of string D, measuring above the height of tread 3, 2⅜" and below the same tread 2". Lay in a parallel line to the top edge ⅜" apart, the thickness of the shoe. Lay in a parallel line to the bottom of the string 1¼" apart, the thickness of the carriage timbers to be used as support for the stairs. The hand rail on side E is the same distance above string D as the hand rail on side D is above string D, Fig. 19, as the hand rail must be parallel to the rake of the string. Measure this distance on the side of the post, Fig. 19, and transfer this height or 8⅞" to the corresponding position on the side of the post, Fig. 20. Apply the pitch board as before and line in the top of the hand rail. Produce another parallel line to it 1" apart, the thickness of the rail, and line in the bottom of the hand rail.

The next step will be to find the position of string F and the hand rail on side H. Referring to Fig. 16 (July issue) notice again that in the layout of string F the top of the string is 1⅛" above the face of tread 5 and the bottom of the string is 4⅞" below the face of tread 5. Transfer these same distance on the side of the post, Fig. 20, measuring above the level of tread 5, 1⅛" and below the level of tread 5, 4⅞" and apply a bevel set to the same pitch as string F, noticing that string F is not the same pitch as string D, and line in the top and bottom of string F. Lay in a parallel line to the top edge of the string ⅜" apart, the thickness of the shoe.

Referring again to Fig. 16, it will readily be seen that the nearest riser line to the post is riser 6, which is located 2" from the face of the newel and at which point the height of the hand rail should be laid out. Produce a parallel line on the layout, Fig. 20, to the side of the post beginning at the height of tread 6. Measure on this line the height of the hand rail, 10" (2' 6" full size) from tread 6 and apply the bevel set to the pitch of the string and line in the top of the hand rail as shown until it meets the face of the post. Produce a parallel line to it 1" apart, the thickness of the rail, and line in the bottom of the hand rail.

Having determined where the hand rail and strings meet the face of the post, the paneling can very readily be laid out. The drop should be below the ceiling and the post long enough to reach below the carriage timbers, lath and plaster and to receive the drop. The distance the drop should be below the ceiling is a matter of individual judgment. One mechanic might like to have the drop just below the plaster while another would prefer to have it 5" or 6" below the ceiling. In this particular problem the bottom of the post is laid out ¾" below the carriage timber, which determines the position of the fillets to be glued in. The top of the post should project beyond the top of the hand rail on side H, ¾", ⅜" for the molding and ⅜" for the top rail of the panel. This gives the required length or 18¾" for post 2.

To determine the positions of the fillets, begin by laying out side E as shown in Fig. 20. Stop the fillet ¾" above the shoe on string D. Measure ¼" above and below where the hand rail touches the post and stop the fillet at the top in line with the top of the hand rail on side H. In other words, glue a fillet in flush with the bottom 7¾" long; a fillet 1⅝" long to receive hand rail E, and a fillet ¾" long flush with the top, making two panels as shown. For side F the fillet should receive tread 4. Measure ¾" above the height of tread 4 on the layout and glue in fillets as shown, leaving only one panel. For side G the fillet should receive tread 5. Measure ¾" above the height of tread 5 on the layout and glue in fillets as shown, leaving also only one panel. Side H receives string F and hand rail. Measure ¾" above the shoe on string F. Measure ¼" below the hand rail over the same string. Glue in a fillet flush with the top 2⅜" to receive the hand rail and a fillet 10½" long flush with the bottom, leaving one panel.

To Lay Out Angle Post No. 3.—Lay out two parallel lines on a layout board or detail paper, the width of the post or 2¼" apart as previously described for laying out the newel and post No. 2. Referring to the plan (Fig. 7) it will be seen that treads 11, 12 and 13 enter post 3. Step off these heights as shown, Fig. 21, and number with the corresponding numbers. Begin by laying out side I. Refer to the string F, Fig. 16, and notice that the top of the string is 3⅞" above the face of tread 11 and 2⅛" below the face of tread 11. Transfer these same distance on the side of the layout, Fig. 21. Set the bevel to the pitch of the string and line in the top and bottom edge of string F. Lay in a parallel line to the top edge ⅜" apart, the thickness of the shoe. Lay in a parallel line to the bottom of the string, 1¼" apart, the thickness of the carriage timbers. The hand rail on side I is the same distance above string F as the hand rail on side H is above string F, the hand rail being parallel to the rake of the string. Measure the distance on the side of the layout Fig. 20 from the top of the string to the top

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of the hand rail or 8⅞". Transfer this height to the corresponding position on the side of the layout Fig. 21. Apply the bevel set to the pitch of the string and line in the top of the hand rail. Produce another parallel line to it 1" apart the thickness of the rail and line in the bottom of the hand rail.

The next step is to find the position of String E and the hand rail on side L. Referring to Fig. 11 notice again that in the layout of string E, the top of the string is 1¾" above the face of tread 13 and the bottom of the string 2⅝" below the face of tread 13. Transfer these distances on the side of the layout Fig. 21, measuring above the level and below the level of tread 13. Apply the pitch board (Fig. 4) and line in the top and bottom of string E, noticing that string E is the same pitch as string D. Lay in a parallel line to the top edge ⅜" apart the thickness of the shoe. The hand rail is the same distance above string E as the hand rail is above string D. Measure this distance on the side of the layout, Fig. 19, and transfer this distance or 8⅞" to the corresponding position on the side of the post Fig. 21. Apply the pitch board as before and line in the top of the hand rail. Produce another line parallel to it and 1" apart, the thickness of the rail and line in the bottom of the hand rail.

Having determined where the hand rail and strings meet the face of the post, the paneling can very readily be laid out. The drop should be below the ceiling and the post long enough to reach below the carriage timbers and ceiling to receive the drop, or ¾" below the carriage timber, Fig. 21. The top of the post should project beyond the top of the hand rail on side L, ¾" which will give the required length of the post or 20⅛".

To determine the position of the fillets begin by laying out side I. Stop the fillet ¾" above the shoe on string F. Measure ¼" above and below where the hand rail touches the post and stop the fillet at the top in line with the top of the hand rail on side L. In other words, glue a fillet in flush with the bottom 9⅞" long, a fillet 1⅞" long to receive the hand rail over string F and a fillet ¾" long flush with the top of the post, making two panels as shown. For Side J the fillets should receive tread 12. Measure ¾" above the height of tread 12 on the layout and glue in fillets as shown, making only one panel. For Side K the fillets should receive tread 13. Measure ¾" above the height of tread 13 on the layout and glue in fillets as shown, leaving also only one panel. Side 1 receives string E and hand rail. Measure ¾" above the shoe on string E. Measure ¼" below the hand rail over the same string. Glue in a fillet flush with the top of the post 2" long to receive the hand rail and a fillet 11¾" long flush with the bottom of the post, making one panel.

(To be continued)

The Iron Age Catalogue of American Exports, 9x12, 1,216 pp., Illustrated

The Iron Age Publishing Company has just published The Iron Age Catalogue of American Exports, for distribution in the civilized countries of the world. It contains the catalogues of leading American manufacturers of engineering, railway, foundry and electric equipment and supplies, iron and steel, machinery and tools, hardware and cutlery.

The Iron Age Catalogue of American Exports is designed to give the manufacturers, engineers, importers and other buyers in all countries a compendium of readily understandable data of the products manufactured in this country. In order that the foreign buyer may be adequately advised of products which American manufacturers have to offer, it is written in five control languages of the world, English, Spanish, French, Portuguese and Russian.

The translations were made with the view of preserving idioms of the various languages so that no difficulty will arise in understanding. To further facilitate this, metric equivalents are used throughout.

The catalogue contains over three thousand illustrations and is replete with specifications, data and other information which will make it useful to the technical as well as other buyers.

Building Age Awarded Prize at N.Y. Own-Your-Home Exposition

A prize of $50 was awarded to BUILDING AGE by the officers of the Second New York Own-Your-Home Exposition for having the largest percentage of visitors from its allotment of tickets.

The letter advising us of this award, signed by R. H. Sexton, Managing Director, stated, relative to the large return shown from tickets allotted to BUILDING AGE:

"It shows that you used great discretion in sending out these tickets." We did.

Open Shop Wins

The open shop plan of employment has been perpetuated for the city of New Orleans through the outcome of a controversy precipitated by strikes in the construction industries to force a closed shop.

After a strike lasting three weeks, a satisfactory agreement was reached and signed with the carpenters under which open shop conditions will be preserved. The wage award adopted provides for a rate of 95 cents per hour from June 1 to December 1, 1920, and $1.00 per hour from December 1 to June 1, 1921. The agreement provides that union carpenters shall not be discriminated against.

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Lumber Market Review

Strong indication of stabilization in the lumber market now present

BUILDING AGE'S prediction that the lumber market would shortly begin to take on a tone of stabilization began to materialize early in July and at this time the market is steadier than it has been at any time this year. There are still instances of concessions being made by certain distributors, but the larger producers in all sections of the country are showing a growing tendency to hold for "list" prices.

The movement to stabilize the market apparently resulted from the demoralized transportation situation and not from any fear on the part of producers or distributors that values would decline to a point where it would be unprofitable to produce or sell lumber. Records of the national and sectional lumber manufacturing organizations show that production is still keeping ahead of shipments and new business placed, but there has been a general tendency during the past month to curtail production, both on the Pacific Coast and in the South. This also was the result of the car shortage and the general railorad situation. Many of the largest producers of lumber have been virtually out of the market for several weeks. Some of them have closed down their plants entirely, while others are operating five days a week, ten hours a day, when they normally run two shifts of ten hours each per day and from six to seven days a week. Western red cedar shingle mills have produced practically nothing since the middle of July, and the shingle market, while not up to its peak of a few months ago, is decidedly stronger than it has been.

The most noticeable change in the situation since July 1 has been in Southern yellow pine and Douglas fir, both of which were dropping rapidly. Flooring, partition and ceiling are wholesaling at about the same price as they did four weeks ago and common boards are considerably stronger. Spruce and yellow pine lath are showing a better tone and production is decreasing.

For this period of the year buying would be considered fairly normal but for the fact that retail yards were virtually out of the buying market throughout the spring and their stocks are in such condition that they must replenish them. They have begun to realize this fact, as shown by the increase in the number of inquiries now in circulation. The demand, for the most part, comes from the country yards, but in the Middle West buying is general. The great consuming territory known as the Metropolitan district, which includes New York City, has been the last to awaken to the fact that if stocks are to be replenished before the fall crop movement begins, action must be taken quickly, for, while the scarcity of freight cars has been a serious drawback to the industry for the past several months, this scarcity is nothing compared with the situation which will be confronted in the autumn. Retail dealers who have failed to recognize this condition will find themselves short of material to meet the expected heavy demand this fall and winter. Consuming industrials fully realized the situation weeks ago and most of them have contracted for the remainder of their 1920 lumber requirements. Most of the railroads in the United States also realized the condition and have purchased all of the car material, timber and ties they can afford to buy this year.

The flattering crop reports issued by the U. S. Department of Agriculture are directly responsible for the active buying by rural retail dealers, especially those in the great agricultural sections of the Middle West and South. Lumber and other building materials will be in great demand in those localities after the fall crop is harvested. The prosperity of the farmer subsequently will be reflected in the industrial and commercial centers directly dependent upon the farming element and building activity in those towns and cities will undoubtedly require all of the lumber that can be produced and delivered with the limited transportation facilities available at that time.

All of this has been carefully taken into consideration by the producer of lumber, and he is wisely refraining from flooding his storage space with lumber at a time when cars cannot be had to deliver his product, and when he knows full well that to pile up a lot of surplus lumber would mean to weaken the market. By waiting until the fall demand materializes, he will sell just as much lumber and will receive a much better price for it.

Wholesale distributors, for the most part, are doing very little business, except a few large concerns which had contracted ahead for the output of certain mills and which must, for financial reasons, turn over their stock. These are the ones who are still making price concessions, but each week they are growing fewer in number.

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HAVE any of the readers of BUILDING AGE ever spilt, quite by accident perhaps, a bottle of ink, the ink running all over desk, papers and clothes and playing havoc in general to the detriment of things in general?

That's exactly what happened to me the other day. You see the bottle was on the desk and in partly swinging around in my chair a book I held hit the ink bottle sufficiently hard to topple it over, the ink splashing over everything. I tried to wipe it up with a cloth, in fact used several cloths without much satisfaction. I never quite realized before the amount of ink in an ounce bottle.

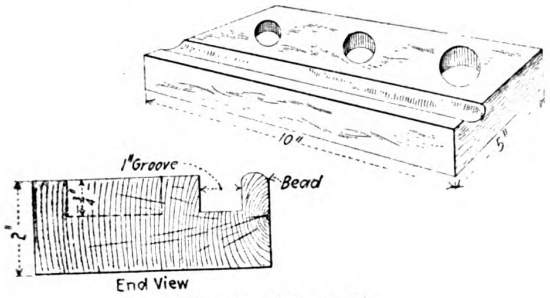

Fig. 1. Ink stand

Resolving never again to experience a like calamity I made an ink stand out of yellow pine (not the hard, resinous kind) as illustrated in Fig. 1. The holes should be bored ¾ of an inch deep of the right diameter for the bottles to fit in tight. A bead worked on the edge followed by a groove one inch wide plowed the same depth as the holes is handy to place pencils and penholders in. The stand will look well if given a natural finish. After sand-papering smooth apply a filler, letting it dry overnight, then a coat of varnish, or a heavier body may be obtained by giving it a coat of shellac over the filler, followed by the varnish, and a glossy effect can be obtained by rubbing the varnish when dry with a piece of felt cut from an old boot.

R. W. W.

Proportioning Concrete

A NUMBER of inquiries have been received by the Editor from readers of BUILDING AGE, requesting information on the proper proportioning of concrete. For this reason, a brief statement as to the theory of concrete proportioning and its practical application will here be given.

To make concrete, four elements are necessary—(1) cement; (2) fine aggregate—usually sand; (3) coarse aggregate—broken stone, gravel, slag or cinders; and (4) water. The proper proportions of each of these materials, and their intimate mechanical mixture produce an artificial stone, the ultimate strength, durability and other characteristics of which will vary according to the proportions used.

Broken stone or similar coarse aggregate, no matter how firmly compacted, contains a large proportion of voids, varying from 30 to 50 per cent. of the gross volume. Similarly, the sand or fine aggregate, even when compacted, would, if viewed with the microscope, show voids of from 25 per cent. and upwards of the gross volume, depending on the coarseness and shape of the grains. If these voids in each instance were carefully measured, it would then be possible to proportion the several materials in such a manner that just sufficient cement would be used to fill the voids in the sand (and provide a coating for the sand particles) and the volume of this mixture of sand and cement would be just sufficient to fill the voids in the broken stone. If this were true, the volume of concrete obtained from the proper proportions of cement, sand and stone would not exceed the gross volume of the stone. The addition of water would cause a slight "bulking."

Now, since such a careful analysis each time the materials for making concrete are assembled on a job, would require much time and would materially increase the cost of the work, it has not proven practical to do this, and certain general and arbitrary proportions have been commonly specified and used. By this method, the ideal condition described above is not attained, but on the whole, fairly good concrete has been produced. The mixes commonly specified vary from 1 part cement to 1½ parts sand and 3 parts stone (by volume) to a 1:4:8 mix. The greater the proportion of cement to the total volume of the aggregate the stronger concrete will be produced, and the mix is termed a "rich" one. Where a low proportion of cement is used the mix is termed a "lean" one, and a low strength may be expected. The rich mixes, such as 1:1½:3 or 1:2:4, are used for structural work, as in reinforced concrete buildings. The leaner mixes, such as 1:3:6 and 1:4:8, are usually used as a base for cellar floors, sidewalks, etc., and are topped by a richer surface of cement and sand, troweled smooth. A 1:2½:5 or 1:3:6 mix will usually prove satisfactory for footings, cellar walls, etc., when there are no excessively heavy loads to support.

Cement is usually measured by the barrel (4 bags) which contains 3.8 cu. ft. A common method of measurement is to consider one sack of cement equal to a cubic foot. This gives slightly too little cement in the mix. Sand and stone are measured by the yard. The common method of measuring and estimating concrete is by the cubic yard.

The following table, from Walker's book on estimating, gives quantities of cement (in bbls.), sand and stone (in cu. yds.) to make 1 cu. yd. of concrete for various

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mixes and can be used as a guide. Experience will teach each contractor to make such variations as may be necessary for the particular materials he is using:

Proportions: Cement	Sand	Stone*	Cement Barrels	Bags	Sand Cu. Yds.	Stone Cu. Yds.
1	1½	3	1.96	7.84	0.45	0.89
1	2	4	1.53	6.12	0.47	0.93
1	2½	4	1.42	5.68	0.54	0.87
1	2½	4½	1.33	5.32	0.51	0.91
1	2	5	1.33	5.32	0.39	1.03
1	2½	5	1.26	5.04	0.48	0.96
1	3	5	1.17	4.68	0.54	0.89
1	3½	5½	1.06	4.24	0.56	0.89
1	3	6	1.06	4.24	0.48	0.97
1	3½	6	1.00	4.00	0.53	0.92
1	3	7	0.94	3.76	0.42	1.05
1	3½	7	0.91	3.64	0.49	0.98
1	4	7	0.87	3.48	0.53	0.93
1	4	7½	0.84	3.36	0.51	0.96
1	4	8	0.81	3.24	0.49	0.98

*Using 2½ inch stone or gravel with small stone screened out.

A Simply Constructed Vestibule

WHERE a front entrance leads directly into a public room of a building, an inside storm door is an ideal fixture to keep out the inward rush of cold air, thereby helping to save the fuel bill. Heaviness and bungleness is to be avoided in constructing this feature. One made in sections similar to that illustrated in Fig. 2, paneled with wall board, will prove light yet substantial. The sides and top are hooked together and the bottom hooked to floor. 2"x2" white pine strips spaced 16 inches on centers or 2"x4" spaced 32 inches are used for the vertical supports and to nail the wall board to. The top is made the same way with an overhang of say two inches. Both sides may be finished identical or only one side finished to conform to the room. A window may be cut in if necessary. It is best to have the door opening into the room to one side and

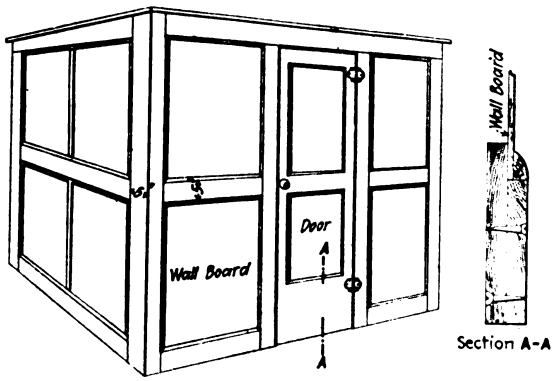

Fig. 2. Storm vestibule

out of line with the main entrance door since this arrangement helps to keep out any drafts resulting from the frequent opening and closing of doors.

A method of constructing a light, substantial door is shown to the right of Fig. 2. Instead of mortising the frame together, this is made of 4 and 5-inch width boards, the corners being lapped and held by screws. Using boards of two different widths in this way provides a rebate in which to fit the wall board, which is held in place by nailing a moulding strip along the edges. As the door is not required to be heavy, ⅝-inch thick material is adequate, making a complete door 1¼ inches thick. A rim lock and surface butts are suitable for these doors.

Eight feet square is about the average size for an inside storm door, but of course they can be made most any dimension suitable to the room.

Where there are transoms the height will be regulated by the transoms, as the doors must not obstruct them. But where there are no transoms, if desired, the top may be dispensed with, letting the sides run clear to the room ceiling.

Making Screens During Spare Time

THE making of full-length window screens is a profitable employment during slack times. If the carpenter has a shop with a combination wood-worker or only a rip saw he can turn odds and ends of scrap material into money that would otherwise go for waste. Last spring I made a lot of screens out of white pine, constructed as shown in Fig. 3. One and one-eighth material is none too

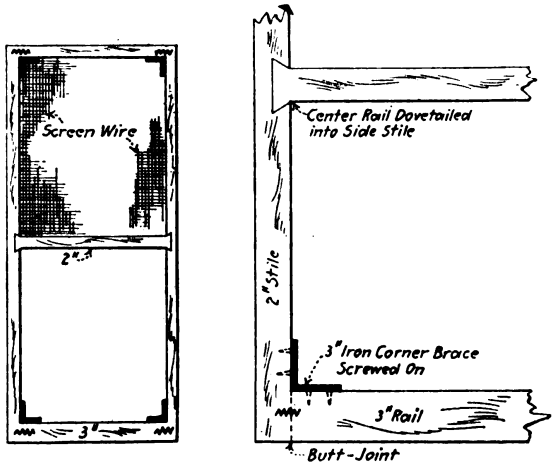

Fig. 3. Fly Screen

thick, as the frame will not warp so readily as ⅞ stuff will. Kiln-dried stock is none too good at best (as I once heard a carpenter remark, "the beesum is gone from it") I dovetailed the center rail into the side stiles and instead of mortising the corners just butt jointed them, using some corrugated joint fasteners (sometimes called dovetails) at the joints and a 3-inch inside wrought steel corner brace with screws, and I'm thoroughly convinced this way in making frames is better than mortising them together, as it preserves the full strength of the frame at the weakest place—the joints. The wire is tacked along the edge of frames and covered with a bead or half-round moulding strip. There are several designs of screen hangers, most all are good, but the most suitable are those which are interchangeable with storm sash.

R. W. W.

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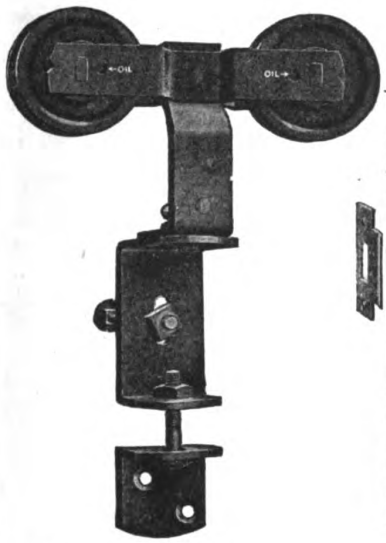
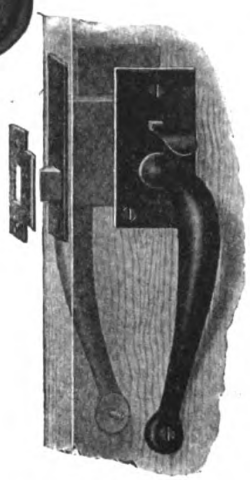
The Most Pleasing and Practical Design for Modern Garages~



The Hanger operates on a swivel and turns on the track without sticking or binding in any way



The No. 27 Latch has no complicated parts to get out of order

There is no satisfaction for either builder or owner in hard-operating, sticking garage doors.

Garage doors equipped with the National sets, Nos. 805 or 806, assure an easy-working, sliding and swinging construction at all times.

Doors fitted with National sets are absolutely weather-tight. Snow and ice cannot interfere with their operation. If the floor rises or swells, doors are adjustable.

Write for booklet, "National Garage Hardware" and mention dealer's name.

National Mfg. Company

Sterling, Ill.

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Letting Contracts on Bids

From L. B. M., South Dakota.—When a school-house is to be constructed and the board advertises for sealed bids, requiring checks for five per cent. of amounts bid to be deposited, can the board let the contract to whomsoever they desire, or would they have to let it to the lowest responsible bidder?

Answer.—Except as there may be a statute in force in the particular state, requiring the contract to be let to the lowest responsible bidder, the board is entitled to disregard the bids and let the contract to whomsoever that body may choose, provided that the action is taken in good faith and in the exercise of reasonable discretion. The law on this subject has been authoritatively summarized in the following language:

"The statutes usually provide that a school-board, committee or officer in letting contracts on behalf of the school-district, such as for the construction or improvement of a school building, * * * shall give due notice by advertisement of the intention to receive bids, and shall determine the specifications for such bids. It is also usually provided that such contract shall be let to the lowest responsible bidder, upon his giving bond for the faithful performance of his contract, and provided his bid is in proper form and is received within proper time. Under some statutes, where the terms and conditions are left to the discretion of the school-board, it may change the specifications after bids have been received so as to reduce the cost of the school building, if it does not change the general plans of the building. * * *

"Under some statutes the school-board or officers may in their discretion reject any and all bids, and where the bids contain separate items, may accept any part of the bid which is lower than the same part of any other bid. **And it is usually within the power of the school-board or officers to exercise their discretion in determining the lowest responsible bidder, and in the exercise of such discretion they may accept a bid notwithstanding it is not the lowest bid made, particularly where they have reserved the right to reject any and all bids, although they will not be permitted to exercise such discretion to accomplish fraud and favoritism.** * * * In the absence of statute requiring the school board of officers to advertise for bids, they may let a contract in any manner they may deem proper provided they do not abuse such discretionary power; **and if they do advertise when they are not required to do so, they may, after receiving proposals, act independently of them in awarding the contract, if in doing so they act in good faith and with reasonable discretion."** 35 Cyc. 956-957.

A Pennsylvania court seems to reflect the law as recognized by most judges in holding that a board of school directors acting in good faith and without fraud or corruption may award a contract to one who is not the lowest bidder, if considerations of skill, promptness, or efficiency on the part of the bidder prompt them to do so. And it seems quite clear that a court will not attempt to interfere with a school board's determination that one other than the lowest bidder was the lowest responsible bidder unless it appears that the board has not acted in good faith or reasonably.

Our attention has not been called to any South Dakota statute affecting the right of a school board to exercise reasonable discretion in determining who is the lowest responsible bidder for certain work. And we are of the opinion that an award to one other than the lowest bidder cannot be set aside in the absence of proof that the board has acted unfairly and unreasonably.

What Are the Rights of Adjoining Property Owners?

Building contractors are frequently annoyed and delayed in the performance of their undertakings by controversies between the owner and adjacent property owners. Hence, although the builder may not be a direct party to such a dispute, he is nevertheless interested.

A practical illustration of how the contractor may be affected is afforded in the following query received from one of our North Dakota subscribers:

"Where it so happens that trees are so close to a line that excavating on an adjoining lot cuts off big roots, can a man claim any recourse for the trees? This is holding up a job for me now."

In our judgment there is no room for doubting the right of the owner who is building to excavate up to the property line, although he thereby severs the roots of trees whose trunks are on adjacent land. (1 Corpus Juris, 1233.) The intrusion of the roots across the line constitutes a trespass and the owner of the land so trespassed upon may cut away all the roots up to the line, no matter what may be the effect on the tree.

While we are on this subject it is worth while to note an authoritative summary of general rules of law applying to excavations near boundary lines:

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How Would You Build Your Own Home?



WITH permanent yet economical construction! You would put up a home of enduring materials to save yourself unending painting and repairing expense and general depreciation.

Particular attention would be paid to the walls to insure their being well built and capable of resisting heat and cold, maintaining a cool, pleasant house in summer, and a warm, fuel-saving house in winter. You would also want the structure damp-proof to guard the health of your family.

Being a contractor, you realize the prime importance of these considerations. When people come to you to build their homes, confident of your knowledge and ability, see that they receive these benefits given by the use of Hollow Building Tile.

HOLLOW TILE

The Most Economical Form of Permanent Construction

Made in large units, Hollow Tile is easily, quickly and economically laid. A burned-clay material, it resists the destructive action of fire and time—first costs are last costs. The air cells of the tile, sealed up in the finished wall, preserve dryness and a uniform, comfortable temperature.

Hollow Tile under the trade mark of MASTERTILE has been extensively advertised, and you will find your patrons already partial to it when you make your recommendations.

MASTERTILE
THE TRADE-MARK OF THE HOLLOW BUILDING TILE ASSOCIATION AND YOUR GUARANTEE OF A PRODUCT MADE IN ACCORDANCE WITH ASSOCIATION STANDARDS

Building contractors will receive valuable information and suggestions in our "Hollow Tile Manual" and in our "Home Book". Write for them to Department 198

THE HOLLOW BUILDING TILE ASSOCIATION

REPRESENTING AMERICA'S LEADING MANUFACTURERS

CONWAY BUILDING, CHICAGO

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"As a landowner has the entire dominion over the whole of his estate he has the undoubted right to excavate on his own land and close to the line of the adjoining owner; but in doing so he must prevent his neighbor's soil from falling, and if by depriving the adjoining land of its natural support he causes it to crumble, sink, or fall away either by reason of its own weight or by the action of the elements, he will be liable for all damages sustained, unless he supports the soil artificially, or unless the adjoining landowner has consented to the removal of the soil from his land.

"The actionable wrong in such a case consists not in excavating on one's own land, but in allowing the land of the other owner to fall. There must, however, be some appreciable injury. The mere subsidence of soil is not necessarily an injury, and no action will lie for causing the soil to sink by excavation on adjoining land where the damage is inappreciable, or is caused by some other agency.

"As the removal of lateral support is a violation of an absolute right incident to ownership of the adjoining property, it is actionable whether or not precaution against injury was taken or the excavation was conducted negligently, unless by agreement the excavation is to be conducted in a particular manner." 1 Corpus Juris, 1214, 1215.

In some states these general rules constituting part of the common law have been qualified by statute in some respects, and builders who have not already done so should familiarize themselves with any special statutory provisions existing, in their respective states on this subject.

The interest of builders in this subject is increased by reason of the established rule of law that a contracting excavator, as well as the owner who employs him, may be held liable for any wrongful injury to adjacent property.

New Catalogs of Interest to the Trade

These catalogs may be secured direct from the manufacturer. If you prefer, write the date of this issue and the numbers of any catalogs on a postal and mail it to "Building Age," 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.

187. The Pierce Downdraft. Pierce, Butler & Pierce Mfg. Corporation, New York City.—An illustrated booklet describing the construction features and advantages of the Pierce Downdraft which is a superior boiler for steam or hot water heating. Prices are given.

188. Batchelder Tiles. Batchelder-Wilson Company, Los Angeles, Cal.—An illustrated catalog describing the tile products manufactured by this company. These are especially appropriate for fireplaces, pavements, fountains, exterior and interior enrichment. Prices are included.

189. "Modern Way" Warm Air Furnace. The Modern Way Furnace Company, Fort Wayne, Ind.—Illustrated calendar for the month of May shows cuts of both the pipe and pipeless furnaces made by this firm.

190. Better Light and Good Ventilation Means Good Health and More Profit. Western Blind & Screen Company, Los Angeles, Cal. Folder illustrating and describing the benefits derived from the use of Western Venetian blinds which supply indirect daylight and perfect ventilation. Several buildings in which these blinds are employed are reproduced.

191. Clinton Mortar Colors. Clinton Metallic Paint Company, Clinton, N. Y.—Booklet illustrating and describing these Clinton mortar colors which are made in various shades of red, brown, buff, chocolate and black, either in dry or in pulp form. Samples shown.

192. Water, Plenty of It for Man and Beast. Humphreys Mfg. Company, Mansfield, Ohio.—Thirty-page book illustrating and describing the various pumps gotten out by this concern. Contains some very useful data. Free engineering service is furnished.

193. Doorways. Richards-Wilcox Mfg. Company, Aurora, Ill.—The May issue of this house organ contains many illustrations describing the OveR-Way system of conveying equipment.

194. Roofing Facts and Figures. Wm. L. Barrell Company, New York City.—Booklet illustrating and explaining the various uses and advantages of Con-ser-tex Canvas Roofing, which is ideal for porch floors, sun parlors, sleeping balconies, etc.

195. Black Rock Wallboard. Black Rock Wallboard Company, Buffalo, N. Y.—Illustrated literature describing the satisfactory results obtained from the use of this wallboard, which has a moisture-repellent black center.

196. Neponset Paroid Roofing. Bird & Son, Inc., East Walpole, Mass.—Folder illustrating and describing this roofing which is finished in rolls that will cover 100 square feet of roofing surface, each roll being complete with nails, cement and proper laying directions.

197. Cabot's Stains and Quilt. Samuel Cabot, Inc., Boston, Mass.—Literature describing and illustrating the various stains manufactured by this firm. Gives advantages of Cabot's Quilt, which is a very efficient heat insulator. Samples furnished on request.

198. Caldwell Sash Balances. Caldwell Mfg. Company, Rochester, N. Y.—Circular illustrating and describing these balances which render box frames unnecessary.

199. Sta-So Non-Fading Slate Roof Surface. Sta-So Milling Company, Poultney, Vt.—Literature describing and illustrating this roofing material which cannot fade, resists weather and resists fire.

200. Stock Fire Proof Doors. A. C. Chesley Company, Inc., New York City.—Booklet describing and illustrating these fire proof doors, standard sizes of which are carried in stock.

201. Empire Pipeless. Co-operative Foundry Company, Rochester, N. Y.—Catalog fully illustrating and describing the construction and operation of this pipe-

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Matching Artistic Designs



TRUE artistic results in architecture can only be obtained when all units blend to produce a harmonious whole. Very often a small detail carelessly selected destroys an effect which otherwise would be perfect.

It is not enough therefore that hinges should give activity to the doors they make possible. They must blend with various architectural designs—promote the artistic effect desired.

McKinney Hinges and Butts serve this purpose well. Whether massive door or small casement window, there is a McKinney Hinge to match perfectly. And no matter what the design, they effectively meet everyday strain—in silence!

McKinney Hinges and Butts have established an enviable record during the last half century. Today they are the standards in their field. The name "McKinney" insures the proposed building permanent hinge service throughout its entire life.

Architects and builders realize the importance of hinges in giving life and activity to the building they plan and erect. They appreciate, too, the value of perfect harmony.

If you do not have the McKinney catalog in your files let us forward you our latest edition. You'll find it always helpful in visualizing the best answer to hinge questions, matching artistic designs, and meeting standard hinge needs.

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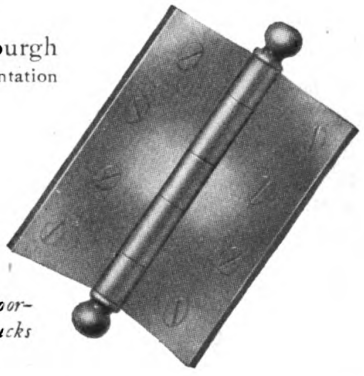
McKINNEY
Hinges and Butts



Also manufacturers of McKinney garage and farm building door-hardware, furniture hardware and McKinney One-Man Trucks

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less furnace which burns hard or soft coal, coke, wood or gas.

202. Portfolio of Homes. Cree-Dipt Company, Inc., North Tonawanda, N. Y.—Portfolio containing 50 large photographs of homes on which the Creo-Dipt stained shingles were used. These shingles come bundled ready to lay, and require no additional brush-coating.

203. Disston Saws. Henry Disston & Sons, Inc., Philadelphia, Pa.—Illustrated literature describing the advantages derived from the use of Disston saws.

204. Rex Flintkote Roofing. The Flintkote Company, Inc., Boston, Mass.—Literature describing this roof covering which is both water proof and fire resisting.

205. Highwood Dumbwaiters. Highwood Dumbwaiter Company, Leonia, N. J.—Catalog illustrating and describing these dumbwaiters, which come complete ready to install.

206. Hydrex Dampproofing Paint. Hydrex Felt & Engineering Company, New York City.—Literature describing this dampproofing paint, which consists of a pure mineral base, with a solvent which is very volatile and exceedingly penetrating. It forms a thick, durable protective coating, and is a quick dryer, drying in less than half an hour.

207. High Grade Window and Door Specialties. H. B. Ives Company, New Haven, Conn.—Illustrated folder describing the line of builders' hardware manufactured by this company.

208. Tool Chest Catalog. C. E. Jennings & Company, New York City.—Illustrated catalog describing the various styles of tool chests, outfits, cases and cabinets, also boys' and household tool chests, etc., manufactured by this company. A price list is included.

209. Improved Boring Machine. R. E. Kidder Company, Worcester, Mass.—Literature illustrating and describing the construction and operation of this boring machine.

210. Roofing Slate. Knickerbocker Slate Corporation, New York City.—Illustrated folder describing the various kinds of roofing slate manufactured by this concern. The various colors in which this slate is furnished are also listed.

211. Builders' Level. Kolesch & Company, New York City.—Literature illustrating and describing this level, which is light in weight and which will endure hard usage.

212. Fiberlic Wall Board. MacAndrews & Forbes Company, New York City.—Illustrated literature pointing out the salient features which make this a superior wall board.

213. The Carpenter's Catalog. Mack & Company, Rochester, N. Y.—Catalog illustrating and describing various kinds of planes, chisels, etc., manufactured by this company.

214. Merchant's Old Method Roofing Tin. Merchants & Evans Company, Philadelphia, Pa.—Literature illustrating and describing this durable, fire-resisting roofing material.

215. Monash No. 6 Four-Way Drain Automatic Air Valve. Monash-Younker Company, New York City.—Illustrated literature describing the operation of this valve, which is self-cleaning.

216. Walter's and Cooper's Metal Shingles. National Sheet Metal Roofing Company, Jersey City, N. J.—Literature illustrating and describing these shingles which are made in painted tin or genuine re-dipped galvanized tin. Full-size samples, and also prices, sent on request.

217. Red-Lead in Paste Form. National Lead Company, New York City. Booklet illustrating and describing this Dutch Boy red-lead which covers evenly and smoothly, affording uniform, complete protection against rust.

218. Perfection Lettering and Drawing Pen. New York Blue Print Paper Company, New York City.—Circular No. 0 fully illustrates and describes this pen, which is made in eight sizes to suit all requirements.

219. Specialties for Builders. Niagara Falls Metal Stamping Works, Niagara Falls, N. Y.—Folder No. 57-A illustrates and describes some of these specialties, among which are wall plugs, galvanized veneer ties, sash pulleys, sash chain, steel chandelier chain, etc.

220. Niagara Wallboard. Niagara Wallboard Company, Buffalo, N. Y.—Literature pointing out the advantages of Niagara wallboard.

221. Yankee Tool Book. North Bros. Mfg. Company, Philadelphia, Pa.—Booklet illustrating and describing some of the tools manufactured by this company, with special reference to the "Yankee" ratchet driver No. 10.

222. Forstner Bits. The Progressive Mfg. Company, Torrington, Conn.—Literature illustrating and describing some of the tools manufactured by this company.

223. Porete. Porete Mfg. Company, Newark, N. J. —Illustrated pamphlet describing this new building material just being marketed by the above company. Porete is a fireproof material made of Portland cement and sand only, reinforced with wirecloth, made in sheets about 1" thick. It can be nailed to wooden studs and beams. It weighs no more than wood. The various uses to which Porete can be applied are given, the illustrations making clear the important features pointed out.

224. Walter Concretile. Walter Concrete Tile Machinery Co., Indianapolis, Ind.—Book containing many full page illustrations of attractive homes on which Walter concretile roofs, which are waterproof and fireproof, have been used.

225. Peerless Fireplace Furniture. Peerless Mfg. Company, Louisville, Ky.—Catalog "S" illustrates and describes a selection of latest patterns of open fireplace accessories. Prices given.

226. The Ferguson Sewage Disposal System. Ferguson Segment Block Company, St. Louis, Mo.—Illustrated leaflet describing the advantages of this sewage disposal system which is especially adaptable to suburban districts, small town and farm homes.

227. Hercules Bodies. Hercules Body Mfg. Company, Evansville, Ind.—Illustrated booklet describing the various types of bodies for delivery purposes which this company manufactures.

228. "Fronting the World." George L. Mesker & Company, Evansville, Ind.—Illustrated book showing the Mesker store fronts. Several testimonials are given.

229. "Homes Built on the Wisdom of Ages." The Bishopric Mfg. Company, Cincinnati, Ohio.—Illustrated book shows many buildings in which Bishopric stucco and plaster board are used.

230. The Concrete Builder. Portland Cement Association, Chicago, Ill.—The May-June issue contains several interesting articles dealing with the use of concrete for farm and home. Extensively illustrated.

231. Highway Trailer. Highway Trailer Company, Edgerton, Wis.—Illustrated folder describing the various models of trailers manufactured by this company. Prices included.

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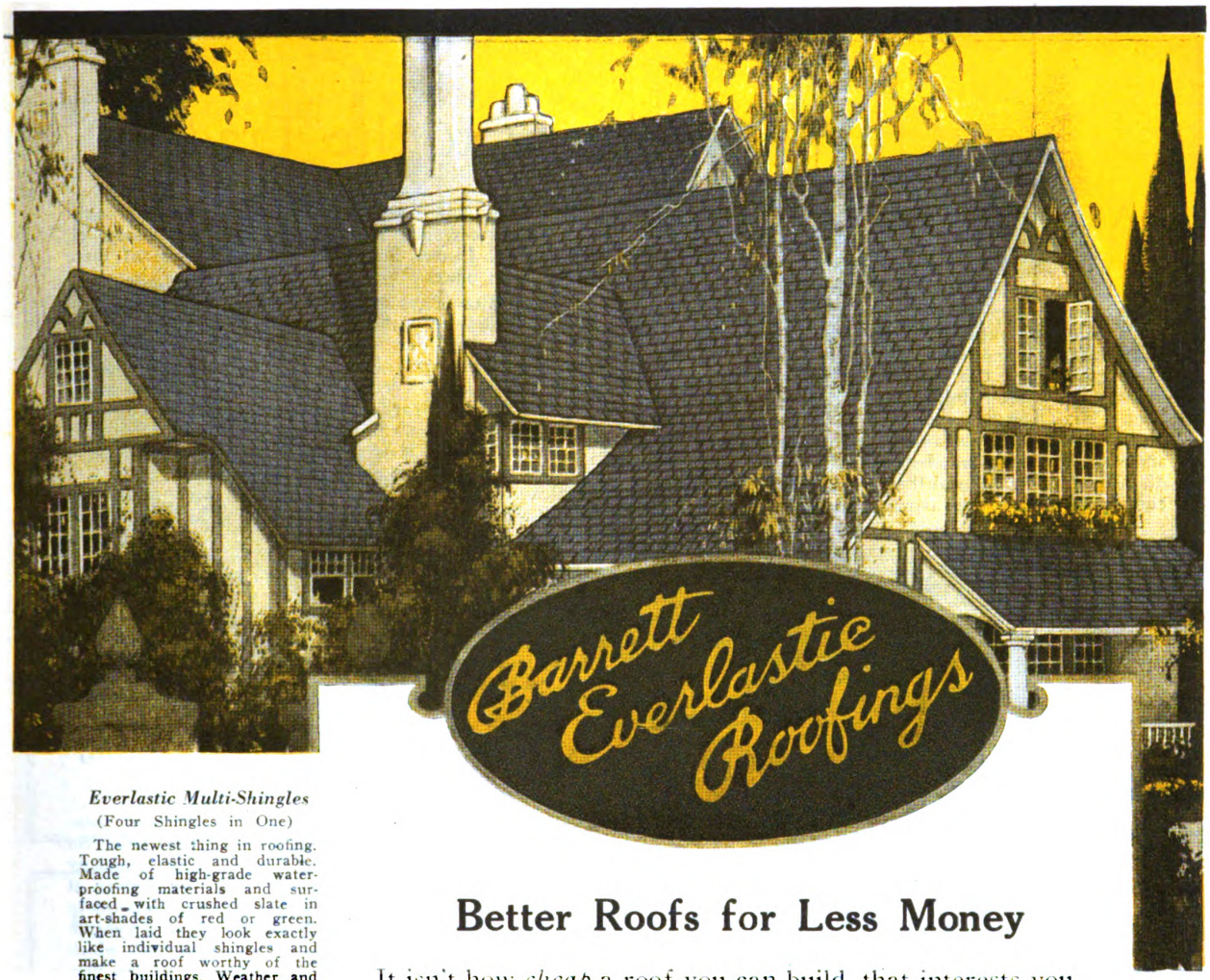

Everlastic Multi-Shingles
(Four Shingles in One)

The newest thing in roofing. Tough, elastic and durable. Made of high-grade waterproofing materials and surfaced with crushed slate in art-shades of red or green. When laid they look exactly like individual shingles and make a roof worthy of the finest buildings. Weather and fire-resisting. Need no painting.

Everlastic Single Shingles

Same material and art-finish (red or green) as the Multi-Shingles, but made in individual shingles; size, 8x12¾ inches. A finished roof of Everlastic Single Shingles is far more beautiful than an ordinary shingle roof, and costs less per year of service.

Everlastic
Slate-Surfaced Roofing

The most beautiful and enduring roll roofing made. Surfaced with crushed slate in art-shades of red or green. Very durable; requires no painting. Nails and cement in each roll.

Everlastic
"Rubber" Roofing

This is one of our most popular roofings. It is tough, pliable, elastic, durable and very low in price. It is easy to lay; no skilled labor required. Nails and cement included in each roll.

Better Roofs for Less Money

It isn't how *cheap* a roof you can build, that interests you. What you want to know is *how cheaply you can build a good roof.*

The way to find out is to use Barrett Everlastic Roofings—the roofings that are easily and quickly laid and that give maximum service at minimum cost.

They come in four different styles (two kinds of shingles and two roll roofings). Both styles of shingles and one of the roll roofings are surfaced with real crushed slate in permanent natural art-tones of red or green. They are highly artistic and very economical.

On residences, factories and all other steep-roofed buildings, Barrett Everlastic Roofings enable you to build better roofs for less money.

Barrett Everlastic Roofings are carried by enterprising dealers everywhere. If your dealer does not carry them, write us and we will tell you where you can be supplied.

Illustrated booklets describing each of the four styles of Everlastic will be sent free on request.

The Barrett Company

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh Detroit
New Orleans Birmingham Kansas City Minneapolis Dallas Nashville Syracuse Seattle Peoria
Atlanta Duluth Salt Lake City Bangor Washington Johnstown Lebanon Youngstown Milwaukee
Toledo Columbus Richmond Latrobe Bethlehem Elizabeth Buffalo Baltimore

THE BARRETT COMPANY, Limited: Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.

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News Items of Interest to the Trade

A Pioneer in the Water-proofing Business

E. A. Oldershaw, now in charge of the Water-Proofing Department of the Mitchell-Rand Mfg. Company, New York, enjoys an experience of nearly twenty years in the structural paint and water-proofing business. He is one of the pioneers in this line of industry, and has seen the business grow from infancy to its present large proportions. Mr. Oldershaw was largely instrumental in introducing damp-proof paints and compounds to the trade, and was the first to see the importance of plastic material of this nature—a material that could be applied by a troweling method and give assured satisfaction. The plastic



E. A. OLDERSHAW

method now has come to be recognized as a prominent feature of modern water-proofing, being susceptible to construction work of wide variety. The Mitchell-Rand Mfg. Co. is producing well-known products of this kind under the names of M-R Damp-Proof Compound and M-R Water-Proof Plastic, and has organized its own department to take contracts direct for the application of these materials in water-proofing and damp-proofing work. Mr. Oldershaw will give his entire attention to this branch of the business, and this company's trade will have the benefit of his broad experience and technical knowledge in special methods of application and special cases of treating walls.

Beaver Board and Vulcanite Consolidate

The Beaver Board Companies, Buffalo, New York, announce that the Beaver Board and Vulcanite sales forces have been consolidated and that in the future both products will be sold by the Beaver Board sales force. Vulcanite Roofing will be handled by the Roofing Division of The Beaver Board Companies, under the direction of Mr. Frank L. Campbell, sales manager, and the Sales Administration Offices of the Vulcanite Roofing Company will be moved to Buffalo, New York.

Direct communication with the trade will be maintained through the fifteen district sales offices of The Beaver Board Companies, located at convenient points throughout the country, and dealers are urged to address all Vulcanite or Beaver Board mail to the nearest of these district sales offices.

District sales offices are located at Boston, New York, Buffalo, Baltimore, Atlanta, Cleveland, Detroit, Chicago, Minneapolis, St. Louis, Kansas City, Dallas, Denver and San Francisco and a new one has recently been opened at Cincinnati, Ohio. With these extensive facilities available The Beaver Board Companies are prepared to give over-night or convenient mail service to any section of the country, and it is felt that the trade everywhere can be given unusually prompt and efficient care.

Vulcanite Roofing has six factories located at Albany, N. Y.; Franklin, O.; Anderson, Ind.; Chicago, Kansas City, and San Francisco, thus insuring short freight hauls and reasonable rates to every section of the country. Under Beaver Board management these production facilities are being further expanded and extensive improvements made in many of these plants. The sales of Vulcanite have been for many months far in excess of the supply, and it is planned to build up the manufacturing end to care for any possible demand.

A New Bestwall Factory at Akron, N. Y.

There is a lot said about increased production these days, but facts are a lot more encouraging than talk. So it is of interest to note that the Bestwall Mfg. Company has just started the wheels turning in its new factory at Akron, N. Y., 25 miles East of Buffalo on the West-Shore Railroad. The factory is located near an excellent gypsum deposit necessary to the manufacture of its product, which was used in constructing the roof and sides of the new factory. The plant has an annual capacity of thirty million feet.

New District Manager for Josam Manufacturing Co.

Mr. Leo Mayer has been appointed the Chicago district manager for the Josam Mfg. Company, with offices at the Building Material Exhibit, Insurance Exchange Building. For fifteen years Mr. Mayer has represented the Erie City Iron Works, Erie, Pa., in Chicago, and will undoubtedly give the same prompt and careful attention to the requirements of the plumbing industry that has characterized his work in his former field. The company is to be congratulated on this valuable addition to its sales organization.

Triangle Equipment Company

Announcement is made of the formation of the Triangle Equipment Company, which has been organized to deal in railway and contractors' equipment of all descriptions. This concern is in a particularly advantageous position to secure material of this nature which the Government has for sale, and is placing its facilities at the disposal of any firms desiring to avail themselves of this opportunity. W. P. Gleason is President; Richard E. Lewis, Manager.

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Awarded Gold Medal at Panama Pacific Exposition 1915



Pat. Oct. 21, 1913

The Peak of Efficiency

ALPINA

REVOLVING SYPHON VENTILATOR

Meets every requirement for thoroughly ventilating foundries, factories, etc., hospitals, schools, churches and other public buildings.

The Alpina Ventilator has unequalled capacity, is noiseless and rotates easily on brass ball bearings which are entirely enclosed and protected from the weather. There is no back draft where the Alpina Syphon Revolving Ventilator is used.

Illustrated booklet on Ventilation and full particulars mailed on request.

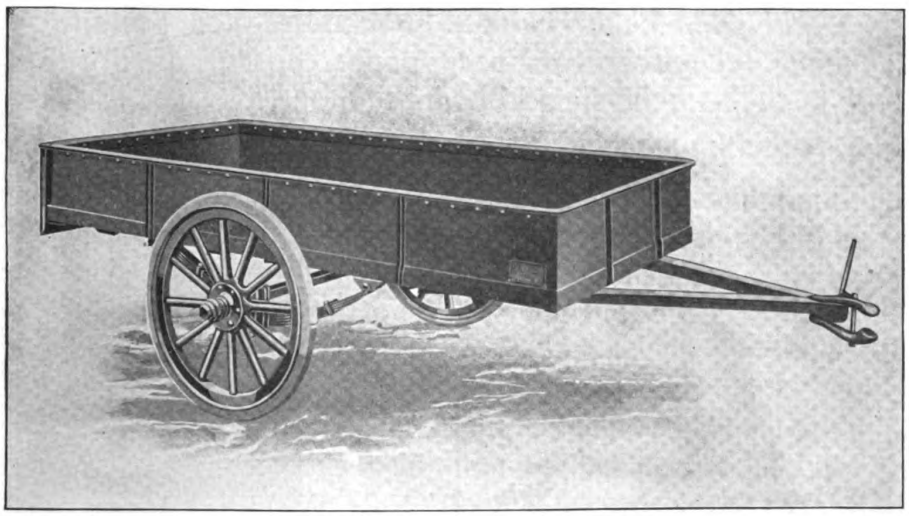
Milwaukee Corrugating Co.

Milwaukee, Wisconsin

Branch at Kansas City, Mo. Minneapolis Sales Office, Lumber Exchange

CONTRACTOR'S HANDY AUTO TRAILER

SPEED — ECONOMY — STRENGTH



Capacity—2,000 pounds. Body—8 feet long, 46 inches wide, 12 inches high. Body and under frame built of open hearth steel. Axles—1½ inch square bed, special high carbon steel. Springs—Semi-elliptic, oil tempered and double heat treated. Bearings—Roller. Wheels—1½ inch spoke, artillery type, second growth hickory. Tires—32-2, solid rubber. Weight—534 lbs. Other models with gates at front; also extension tongue which permits carrying lumber, poles, ladders, etc., 30 feet long.

Write for Catalog A

ALL STEEL TRAILERS — EVERY TYPE — 1 TO 10 TONS CAPACITY

ROGERS BROTHERS COMPANY **Albion, Penna.**

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NEPONSET the Waterproof Building Paper for Many Uses

The house sheathed with Neponset Black Waterproof Building Paper is protected from dampness and draughty walls and floors as long as it stands.

This building paper never deteriorates. It is always waterproof—it keeps the walls back of clapboards, under stucco, or the space between floors or beneath the roofing *dry* and *air-tight*.

A Neponset-protected house is shielded from the elements, and in consequence less fuel is required to keep it warm than houses with ordinary sheathing.

Neponset Black Waterproof Building Paper costs a little more per building than ordinary paper, but its quality is the success of its economy.

Other uses for this paper include:

Temporary roofing and siding
Lining cellars
Banking around cellars
For cold-storage warehouses
To cover fresh cement walks
Case lining, etc.

BIRD & SON, inc., Dept. B. East Walpole, Mass.
(Established 1795)
CHICAGO NEW YORK
Canadian Office and Plant:—Hamilton, Ont.
Makers of the NEPONSET Twin Shingles, NEPONSET Roll Roofings and NEPONSET Board

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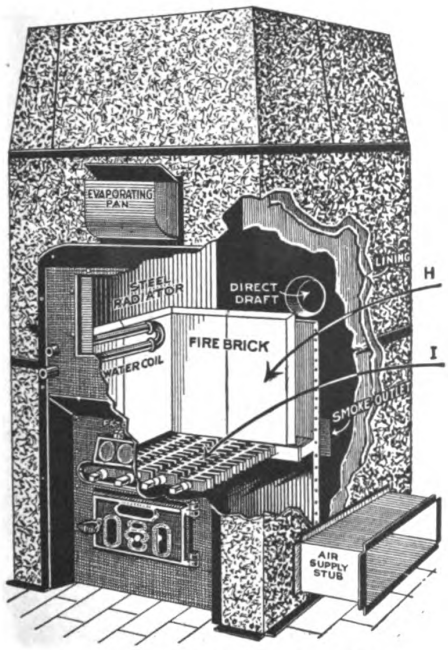
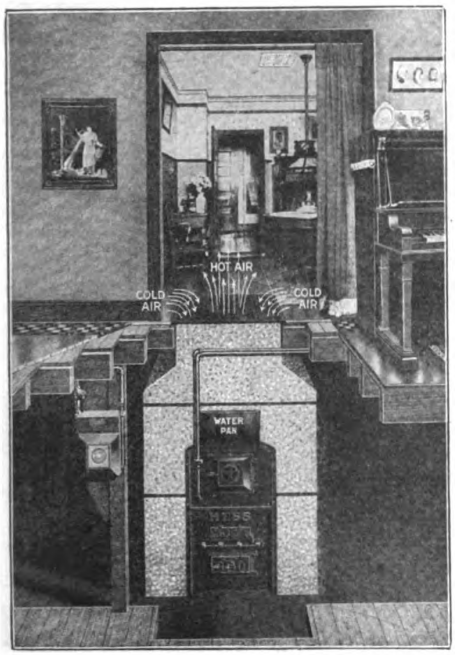
The Power of a Furnace



The Hess Welded Steel Pipe Furnace



The Hess Welded Steel Pipeless Furnace

Lies in

1. **The Area of the Fire Surface.**
2. **The Area of the Radiating Surface.**

The Hess Furnace

is square, not round: because the square form contains more square feet of radiating surface than the round form. Same with the fire box.

The HESS fire box, locomotive type, is adapted to any and every kind of fuel. There are no dead corners—but perfect combustion delivers all the heat your fuel contains.

When you compare other furnaces with the HESS, learn the respective areas of the grates and fire surfaces—and then you will understand, partly, why HESS WELDED STEEL FURNACES (pipe or pipeless) give complete satisfaction everywhere.

Our hand book on furnace heating is instructive and interesting. It's free for the asking. Get one and learn how to provide comfort in your home for all time.

Contractors

everywhere are buying and installing HESS furnaces. Ask for our contractor's proposition.

HESS WARMING & VENTILATING CO.

1201F TACOMA BLDG., CHICAGO

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A Man and a Paint Brush

THEY will do more work for you, every hour, when the paint used is Dutch Boy White-Lead.

There's a simple reason for this reduction of your labor cost. Dutch Boy White-Lead, mixed with pure linseed oil, brushes out so easily and thoroughly that the painter finds it easy to cover a greater surface in a given time.

Less Paint is Needed

Less paint is required for a given job, because of the superior covering power of Dutch Boy White-Lead.

Lowest in Cost per Gallon

And it is a fact that this standard, reliable paint is lower in price per gallon, today, than any other paint you would think of using.

Send for Descriptive Booklet

NATIONAL LEAD COMPANY

New York Boston Buffalo Chicago Cincinnati
Cleveland St. Louis San Francisco

JOHN T. LEWIS & BROS. CO., Philadelphia
NATIONAL LEAD & OIL CO., Pittsburgh

Save the surface and you save all: to save the surface, White-Lead it.

Dutch Boy White-Lead

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DUPLEX TRUCKS

BUILT FOR BUSINESS



Patented Spring Suspension prevents damage to Radiator

Motor Meter set in Radiator shell prevents loss by theft

Two Wonderful Runs That Show the Remarkable Stamina and Power of the Duplex Limited

Duplex Limited carrying 3060 pound load from Los Angeles to El Centro via San Diego, 267 miles in 8 hours 26 minutes. Los Angeles to San Diego, 132 miles in 3 hours 49 minutes. San Diego to El Centro, 135 miles in 4 hours 37 minutes. Average speed 34 miles per hour. Entire distance without stop. No relief driver. Rain from Santa Ana to Oceanside. Speed limit observed in all towns in transit.

DUPLEX BUILT FOR BUSINESS

Duplex Limited carrying 3750 pounds of potatoes from New Orleans to Baton Rouge, 124.6 miles in 6 hours 55 minutes running time. Elapsed time 10 hours 10 minutes with 3 hours 15 minutes lost by ferry delays. The motor never missed and the water in radiator boiled only once and that after a 12 mile pull through "gumbo." After a 46 mile run in 2 hours to Port Allen the motor meter registered "warm."

HERE in this Duplex Limited is the definite practical achievement of the motor truck industry's aim to produce a truck that could freight 1½ to 2 tons at high speed.

This Duplex Limited is no mere city delivery wagon—but a strong rugged *road truck* capable of hauling 3000 to 5000 pounds over city or country roads, and doing it on *schedule* time.

Designed and built for pneumatic tires—not merely equipped with them—the Limited travels easily and smoothly enough for even very fragile freight. Minimum vibration and shock saves wear and tear—and adds longer life to the truck.

Its motor is wonderfully rugged and powerful—and when turning over only about 1300 r. p. m. it drives the truck along at 25 miles an hour on high. Gear ratio is 5½ to 1 insuring high speed at minimum wear on motor and other moving parts.

Electrically equipped throughout — which means economy of gasoline as drivers will shut off motor when truck is not running.

The Radiator is suspended in patented Duplex Spring Suspension—which allows ¼ inch sidewise and 1 inch up and down movement before radiator touches anything solid. Prevents damage to radiator solderings and eliminates the great source of radiator leakage.

Lamps equipped with Nitrogen bulbs are mounted on radiator to prevent bulb damage by vibration.

Motor meter made part of radiator shell to prevent loss by theft.

Ball bearings used throughout—engineering tests show it requires 29 times less power to move a given load when ball bearings are used. *This means a gasoline saving due to less friction.*

Special flapper valve in oil filler pipe keeps sand and grit out of oil reservoir.

From every angle of mechanical value and economical operation this Duplex Limited is a real truck—the very kind you've been looking for in your business.

Have the Duplex dealer demonstrate the Limited. It *makes good*—and will *cut your trucking costs and give reliable service.* Write for complete details.

If you have heavy hauling to do—write for booklets about the Duplex 4-Wheel Drive—America's Leading Heavy Duty Truck. "DUPLEX DOINGS"—The Truck Owner's Magazine sent free to all truck users.

Address Dept. 117



Duplex Limited lifted clear of ground by wire around windshield frame. Strength of cowl means safety and less vibration.

Duplex Truck Company

Lansing • Michigan

One of the Oldest and Most Successful Truck Companies in America

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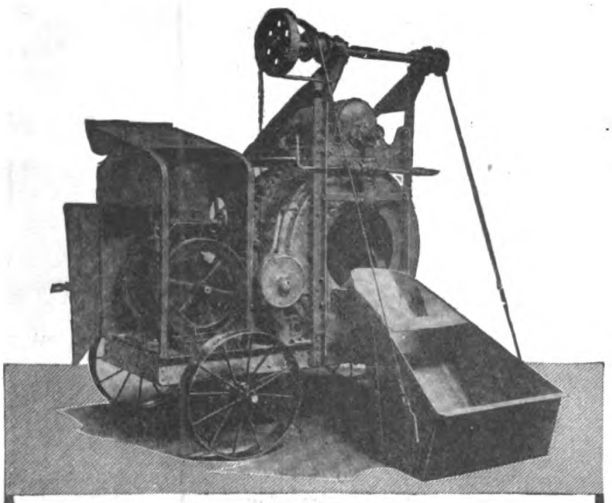
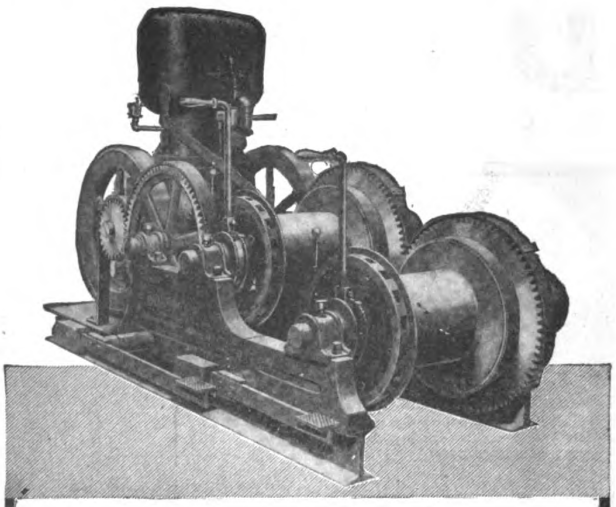




Faster Discharging CONCRETE MIXERS

FOUR BIG 1920 FEATURES THAT OVERCOME "HIGH WAGE" PROBLEM

FASTER CHARGING—
Large drum openings—non choking hoppers that are steep enough to dump self without pounding.

FASTER DISCHARGING—
7 to 15 second discharge thru patented action—every bucket discharges—easy to clean.

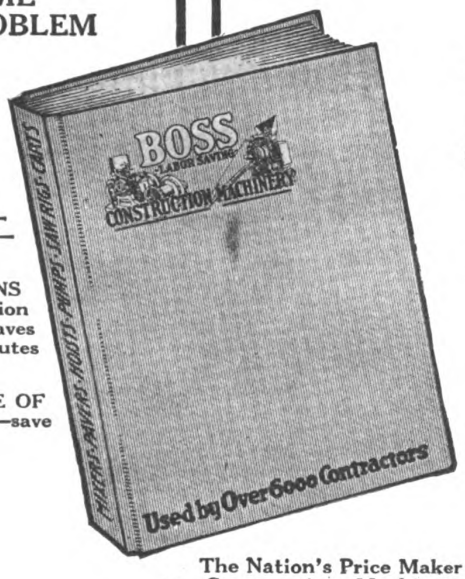
BROKEN GEARS AND LOOSE CHAINS ELIMINATED—Steel roller pinion drive runs smoother—quieter and saves power—tooth replaced in 4 minutes without taking pinion off shaft.

BEARINGS GUARANTEED FOR LIFE OF MIXER—Hyatt Roller Bearings—save 17% power—70% of oil.

Built in sizes to fit all jobs
½, 1, 2, 3, 4 Bag capacities
Gasoline, Steam, Electric

$325.00 BUYS OUR ½ BAG LOW CHARGER
with Novo engine

One of the many real bargains in our big catalog



The Nation's Price Maker on Construction Machinery
WRITE FOR YOUR COPY TO-DAY AND NEW 1920 PRICES AND TERMS

The American Cement Machine Co. Inc.
Keokuk Iowa
THE 300,000 H.P. ELECTRIC CITY

BRANCH OFFICES—WAREHOUSES IN ALL PRINCIPAL CITIES

Contractors Hoists
WITH HYATT ROLLER BEARINGS

BOSS
GASOLINE
ELECTRIC
HOISTS

COMMANDS LARGEST SALES OF ANY GASOLINE HOIST

Over 20 Car Loads Sold in One Order Shipped to France

Widely Used For

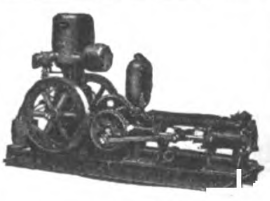
MATERIAL ELEVATORS
PILE DRIVING
EXCAVATING
DRAG LINES
CONCRETE TOWERS
GENERAL CONSTRUCTION WORK

Built in 7 Sizes
SINGLE OR DOUBLE DRUM—REVERSING OR TWO SPEED IF WANTED.

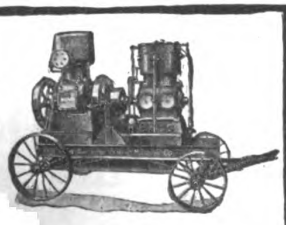
1920 FEATURES
S. K. F. BALL BEARING THRUSTS
HYATT ROLLER BEARING
MACHINE CUT STEEL ENGINE PINIONS
STEEL FRAMES



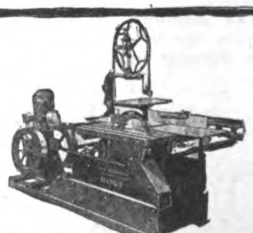
One and Two-Bag Pavers—High Drum.



Force—Trench or Diaphragm Pumps—Gas, Steam or



Portable Air Compressors.



Portable Saw Rigs. All Attachments.

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Put your home under this fire-proof blanket

When your house is covered with Ambler Asbestos Shingles, laid in the Ambler way, you have over your entire roof what is virtually a fire-proof blanket.

You have absolutely protected your roof from flying sparks and embers and also all the natural destructive forces.

Durability and fire-resistance are the chief characteristics of all

AMBLER ASBESTOS
BUILDING PRODUCTS

Ambler Asbestos Shingles. Made in three styles, four permanent colors. Newport grey, natural slate, red and green. Lie snug to the roof, forming water-tight and fire-tight covering. Also ¼ inch mixed color shingles in seven shades of reds, browns and greys.

Ambler Asbestos Building Lumber. For siding, partitions, fire doors and wherever fire resistance is essential.

Ambler Asbestos Corrugated Roofing and Siding. For industrial, railroad and farm buildings.

Ambler Linabestos Wallboard. Wherever a superior flame-proof, fire-resisting wall-board is wanted.

Send for samples and literature showing reproductions of installations.

Asbestos Shingle, Slate & Sheathing Co.

Ambler, Penna.

Factors
KEASBEY & MATTISON CO.
Ambler, Penna.

BRANCH OFFICES:
Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Minneapolis, New York, Philadelphia, Pittsburgh and Washington

Manufacturers of: Ambler Linabestos Wallboard, Ambler Asbestos Building Lumber, Ambler Asbestos Shingles, Ambler Asbestos Corrugated Roofing and Siding. 85% Magnesia and Asbestos Pipe and Boiler Covering, Asbestos Textiles.

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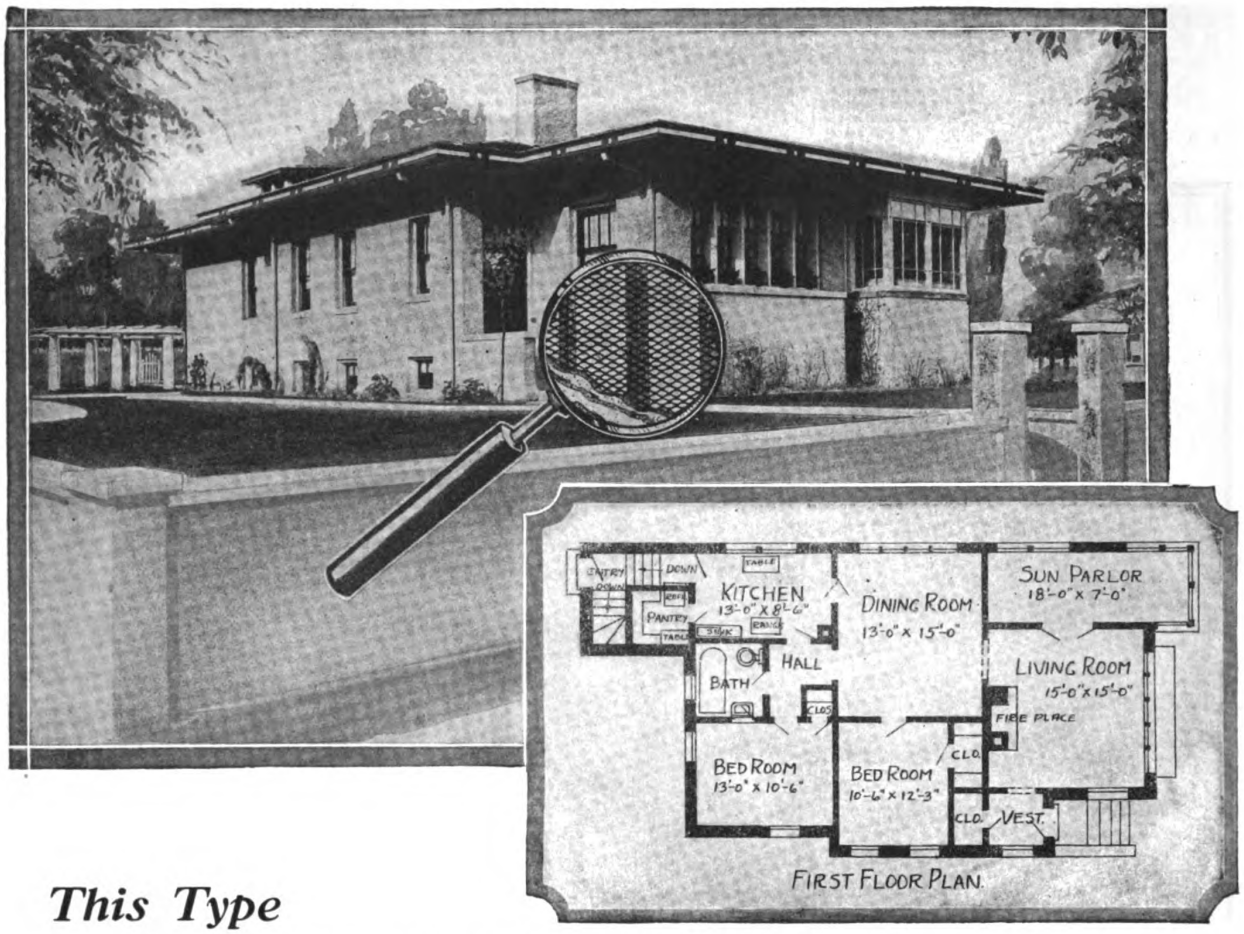

This Type

of Construction Not Only Means a Saving But Also a Better Job

For your exterior wall construction use metal lath, back plastered. It saves you the price of sheathing, amounting to around $250.00 on an average sized house, and you secure a better job.

Recent tests conducted at Omaha, under the supervision of the Omaha Building Code Revision Committee, have again proved the superiority of this type of construction. A sample of *metal lath exterior wall construction proved to be the stiffest of all the six different common types tested, and showed no cracks under 3500 pounds pressure.*

This test substantiates the findings of the United States Bureau of Standards, which tested ten different types of wall construction over a period of several years, and gave metal lath, back plastered—no sheathing—the only 100% rating.

Pretty good evidence that back plastered metal lath will give you satisfactory service in your work.

Builders find

Kno-Burn

metal lath a most satisfactory material for stucco and interior plaster construction because it is easy to handle on the job, and its meshes grip the covering, holding it firmly and securely, *preventing cracks* and making a thoroughly satisfactory job.

You will find our book, "Fireproof Construction," to contain a lot of helpful suggestions. Send for it today and also samples of this economical lath.

NORTHWESTERN EXPANDED METAL CO.
904 OLD COLONY BUILDING
CHICAGO

New York Atlanta Los Angeles Boston Cincinnati

North Western Expanded Metal Company

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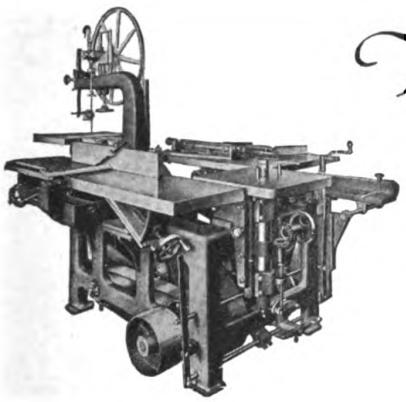


The FAMOUS "31" UNIVERSAL WOODWORKER

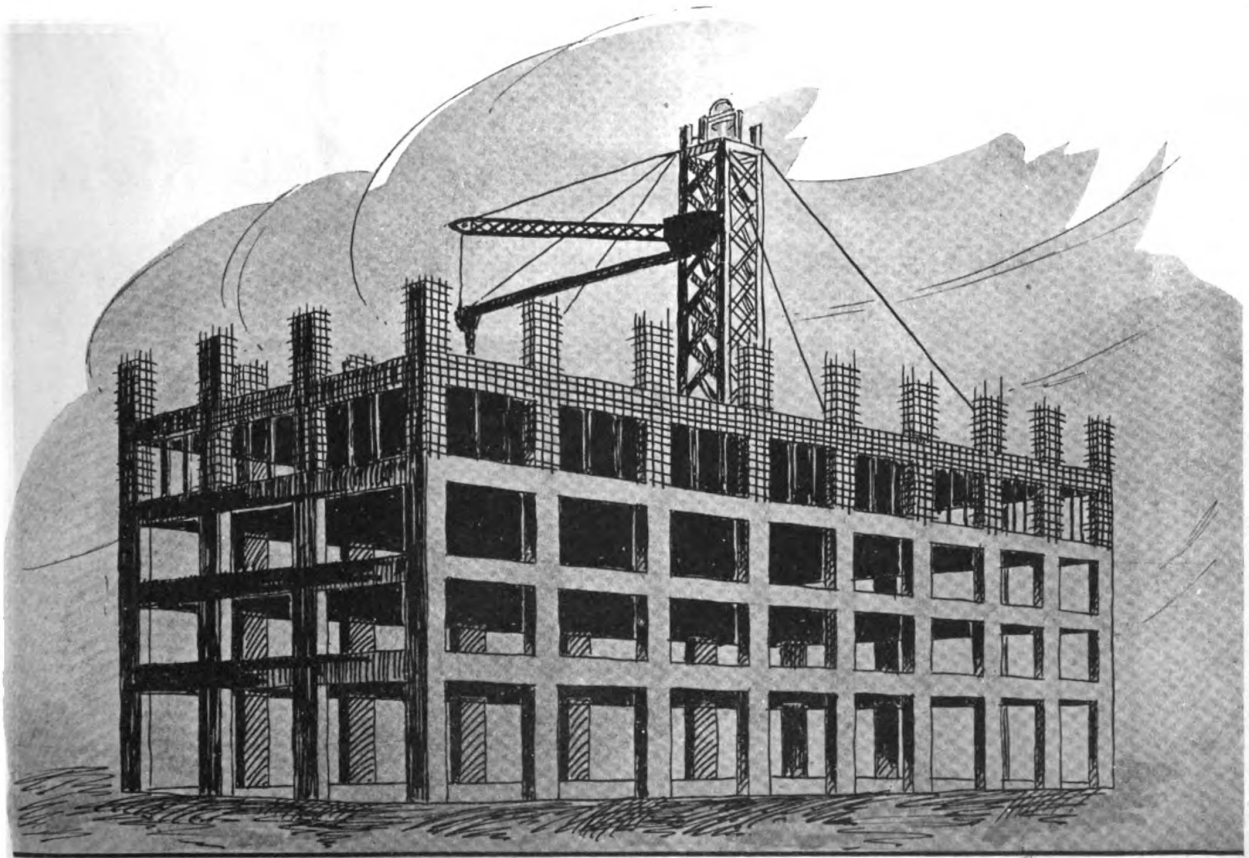
In every kind of building construction work, the Famous "31" Universal Woodworker can save both time and money by turning out the mill work right on the job.

During the dull season the Famous "31" proves its value by enabling you to get ahead on future work, as well as by producing immediate revenue.

The Famous line of Woodworking Machines is of real interest to every contractor and builder.

Write for descriptive catalog and prices.

The Sidney Machine Tool Co.
Sidney, Ohio



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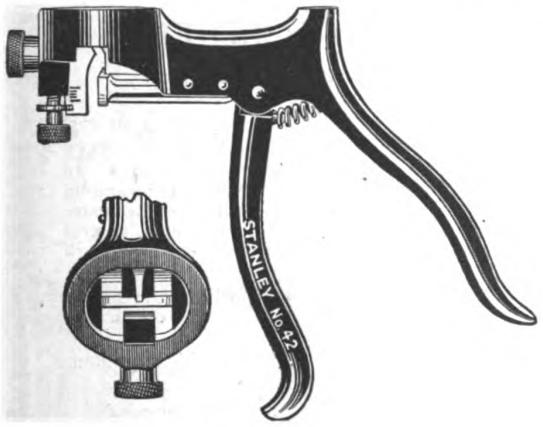
Stanley Tools

Stanley "Pistol Grip" Adjustable Saw Set No. 42



This Saw Set embodies several unique and important features not heretofore seen in tools of this description.

The shape of the Body and Handle enables the user to operate the tool with great ease and with the least possible exertion, and the Saw is held firmly against the gauge while the tooth is being set.

It can be readily adjusted by means of the knurled thumb screw to give a greater or less set to the teeth of the saw, according as the saw is to be used for coarse or fine work. As the anvil or part against which the plunger works is graduated, the same adjustment can be easily obtained for duplicate work.

The tool is so designed that the saw teeth are in plain view, which enables the user to quickly adjust the tool to the tooth to be set.

The plunger and anvil are made of tool steel—hardened and tempered. All parts are carefully machined and are interchangeable.

The tool is given a fine black finish.

Packed one in a box. For Sale by Hardware Dealers.

STANLEY RULE & LEVEL CO.
NEW BRITAIN, CONN. U.S.A.



A Natco Hollow Tile Garage is easily heated, will not require repairs or replacements and can be made an attractive addition to your home.

Every Natco Home Sells Another

The Building Supply Dealer who furnishes material for a Natco Home or the Building Contractor who builds one, is surely building for the future. The beauty, safety, economy and permanency of Natco Hollow Tile as a building material is their best insurance against dissatisfied customers.

Building Supply Dealers should write at once for the Natco dealer proposition. It will surely be to their advantage to find out how they can benefit personally by being the Natco agent in their territory.

NATIONAL FIRE PROOFING COMPANY
252 FEDERAL STREET **PITTSBURGH, PA.**



A stucco finish on a Natco Hollow Tile Wall becomes a part of the wall itself.



A Natco home where neither heat, cold or moisture can penetrate.

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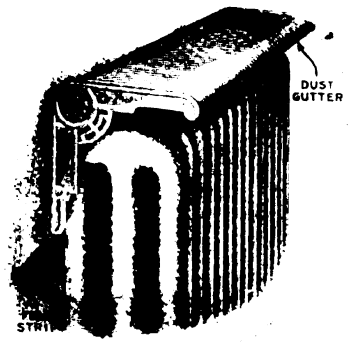

ASSURES CLEAN WALLS AND HEALTHFUL HEAT

ACME RADIATOR SHIELD
with copper water pan

Your clients will doubly appreciate the thoughtfulness on your part indicated by the provision of Acme Radiator Shields.

Acme Shields come either with or without copper water pans. In either style they save your clients the cost of frequent redecorating due to stains and smudges from unprotected radiators. The water pan feature is doubly valuable, however, as it not only assures healthful heat but also prevents damage to furniture and woodwork caused by dry, moisture-absorbing heat.

Acme Shields save their cost in a single season, whether in hotels, apartment houses, office buildings, clubs, institutions or private homes.

We also make Acme Shields for warm air registers, with or without water pan.

Write for catalog and further information before it slips your mind

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TIN PLATE OF KNOWN QUALITY

IN HIS ROOF

HE knows a roof does either of two things,—it merely *covers* or it absolutely *protects* his property investment.

Anonymous material does not assure him of full value of his dollars. Whitaker I. C. Old Style roofing plate does.

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WHEELING CORRUGATING DEPARTMENT
WHEELING, W. VA.

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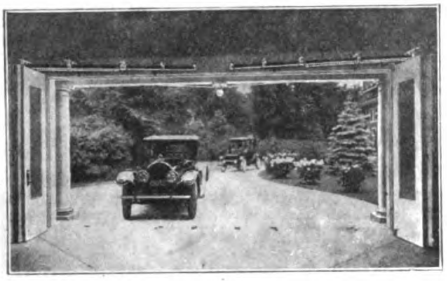
AMERICAN BEAUTIES

This old world we're livin' in
Is mighty hard to beat.
There is a thorn on every rose,
But ain't the roses sweet—
—*Selected*



Slidetite Patented

The "American Beauty" of Garage Door Hardware



Catalog NA-22 displays hundreds of sets of distinctive fixtures for doors which operate inside and outside of the doorway suitable for every conceivable condition, so plainly detailed that the reader may select unerringly the exact set suited for his garage, his taste and his purse.

A copy of this beautiful book will be mailed to anyone interested in garage door hardware, on request.

Contains Correct Measurements of Every Auto Manufactured

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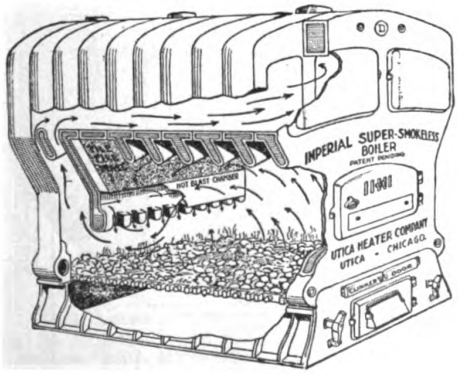
Richards-Wilcox Mfg. Co.
A Hanger for any Door that Slides
CHICAGO ST. LOUIS LOS ANGELES PHILADELPHIA — AURORA, ILLINOIS, U.S.A. — BOSTON NEW YORK MINNEAPOLIS SAN FRANCISCO
LONDON, ONT.

RICHARDS-WILCOX R&W AURORA TRADE MARK

Imperial Super-Smokeless Boilers

CONSTITUTE the latest development in low pressure cast iron boiler construction. They burn soft coal, hard coal or coke—and even with the cheapest soft coal eliminate all objectionable smoke. The tile fire wall at the rear of the fire box breaks up smoke particles and forms a hollow baffle.

Especially designed for home, factory and office



Below is the Hot Blast Chamber, into which is admitted air (oxygen) which causes complete combustion of the smoke and distilled gases in a secondary combustion. This is the secret of the truly remarkable fuel economy of the Imperial Super-Smokeless Boiler.

The use of cheap fuel, and the practically complete combustion (which means that little fuel is needed) are great economy factors.

Infrequent firing saves labor and janitor service, makes further economy possible.

Our complete description cannot fail to interest anyone in the heating business.

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Utica, New York

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The PARKS a time and labor saver

"This rig eliminates a vast amount of hard work and time," say Magel Bros., general contractors of San Jose, Ill. "Two labor hours set it up complete, and two labor hours load it into a Ford" ready to ship to another job.

Parks machines are saving their cost *over and over* for hundreds of contractors in every State.

Angle-steel frame, light, strong, portable, set up solid and firm. Easy to operate, always on the job and built to last. Guaranteed 10 years.

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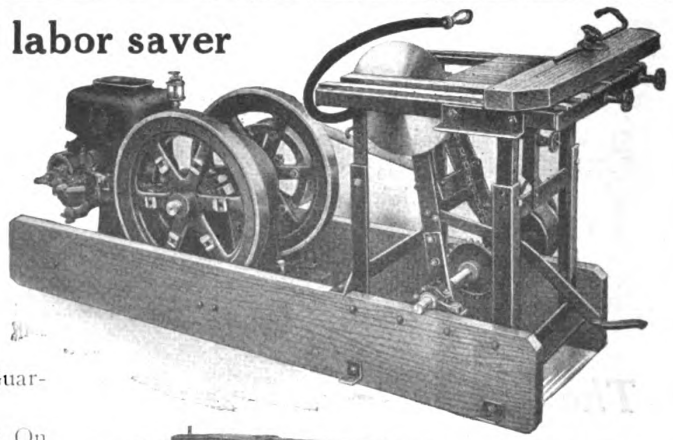
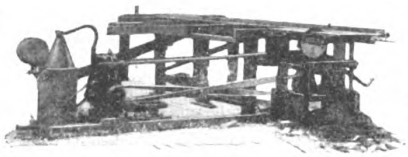
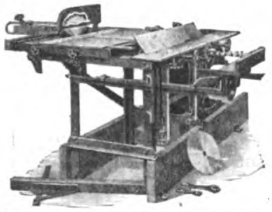




Parks No. B-90 Swing Cut-off Saw, set up ready to go on job for Magel Brothers, San Jose, Ill.

This Parks outfit $150 complete

Rip and cross-cut saw, 6 inch jointer, 12 inch sander and boring machine; joints, bores, bevels, tenons, mitres, saws and sands. 2 to 4 H.P., 550 R.P.M. Weight 575 lbs. Price does not include engine.



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Chicago Office and Show Room, 617 Machinery Hall
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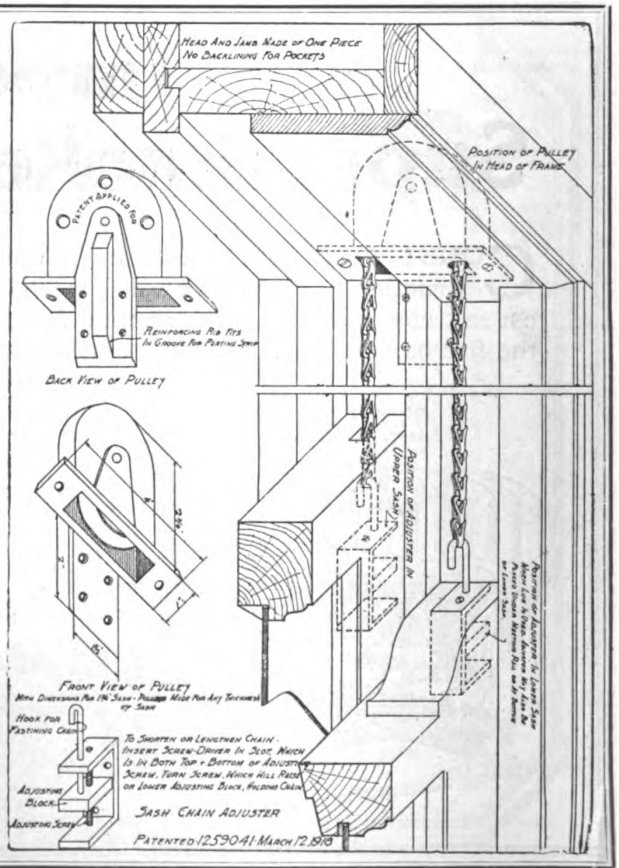

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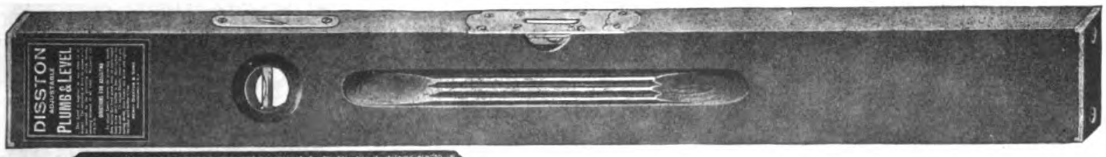

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DISSTON Levels are made from specially treated hardwood stock—wood that has been scientifically cured in the Disston plant, so treated as to allow the least possible warp. It is admitted that Disston Levels cause less trouble from warping than any others.

The House of Disston has developed the most perfect level adjustment on the market. The turning of two small screws enables anyone to true up the bubble. This is a most simple and positive arrangement to offset the almost inevitable slight variation due to heat, cold, dampness, etc.

Disston Levels are made as carefully and as expertly as Disston Saws, and are guaranteed right as are all Disston Brand products.

HENRY DISSTON & SONS, Inc.

GENERAL OFFICES: PHILADELPHIA, U. S. A.

$5.00 BRINGS IT TO YOU

DO YOUR OWN LEVELING WITH YOUR OWN LEVEL



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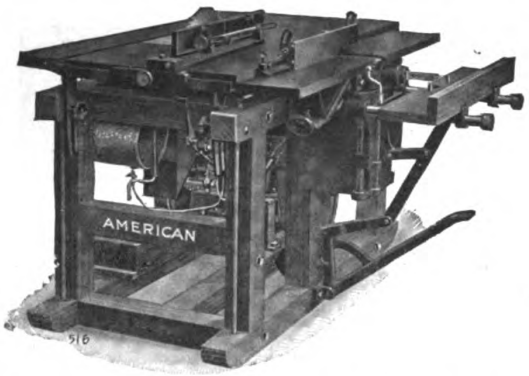

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"AMERICAN" SPEED-MAKERS

For Builders

With this "American" Woodworker and this "American" Hoist, you'll be able to keep to your schedules in spite of labor shortage. They'll place many added man-power at your disposal—and cut your costs as well. Write for the two Bulletins—Woodworker No. 77 and Hoists No. 10.

American Saw Mill Machinery Co.

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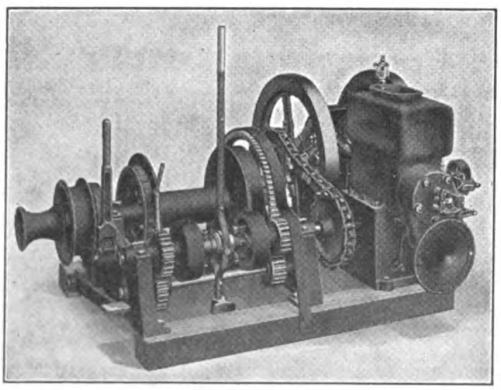

"American" No. 4 Hoist with Self-Contained Gasoline Engine; Also Furnished with Electric Motor or for Belt Drive



You can see the quality that's built into a Starrett tool. No matter what sort of tool it is, if the Starrett name is on it, it has the Starrett quality.

Next time you want a really good scraper, get a Starrett Universal. It will do everything you expect of a scraper, and do it in the simplest, best way possible.

The Starrett Catalog No 21, "P" lists 2100 fine tools. Write for a free copy.

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The World's Greatest Toolmakers

Mfrs. of Hack Saws Unexcelled

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The Sargent Auto-Set Bench Plane is the most dependable plane on the market for finishing work.

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Many "R.I.W." Protective Products furnished this hotel for water-proofing, coloring cement floors, stain-proofing stone, etc.

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ALL that is necessary when considering the protection of concrete, metal or wood is the kind of

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Many mighty structures—great giants of steel and stone—will last for generations because their vital parts are protected from rust and the gnawing teeth of time by "R.I.W." Protective Products.

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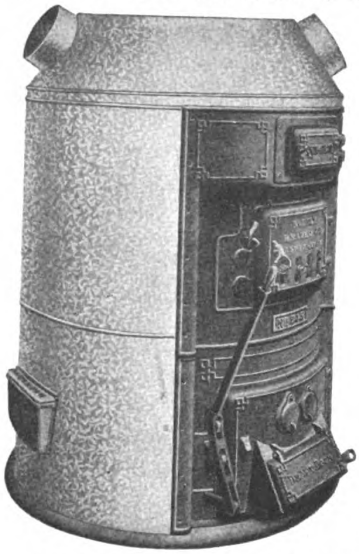
The Sta-so label tells the Sta-so story—"Cannot fade; resists fire; resists weather." Insist that your stock of slate-surfaced roofing bear this Sta-so label.

The RYBOLT HEATER

—A Money Making Proposition

This unusual heater is a real money-maker for both the user and the contractor and builder.

The user is gratified by its exceptional economy of fuel and the contractor and builder by its simplicity of installation, resulting in a saving of time and materials. As for the construction and operation of the Rybolt Heater—it is designed on scientific principles of heating engineering established by years of practical experience and built from selected materials in the most substantial form possible; it is easy to keep in condition and operates efficiently at all times.



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COMPO Board is the original and only wall board with the wood-core center. The wood-core is a patented feature found only in genuine Compo Board. It is made of kiln-dried wood slats cemented between specially prepared moisture-proof paper. Will last indefinitely and always remain smooth.

Any kind of decorative scheme may be used on it to advantage. Paper, paint or kalsomine it. The wood core keeps it rigid, strong and durable. Use instead of plaster or for covering old, cracked plaster—walls, ceilings, partitions, etc. It is moisture proof, keeps heat out in summer, keeps cold out in winter. Handles and saws like lumber.

Ask for Compo Board by name and look for the wood core. Sample and interesting Booklet on request.

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MINNEAPOLIS MINNESOTA

M & F C
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Fiberlic Wall Board

The *material* from which it is made, the fact that the pulp is *chemically cleansed* and that the *fibre lengths* give the finished product that *natural reinforcement* that is lacking in ground wood boards, is in itself a guarantee of the superiority of Fiberlic for *strong, permanent, economical* and *sanitary construction.*

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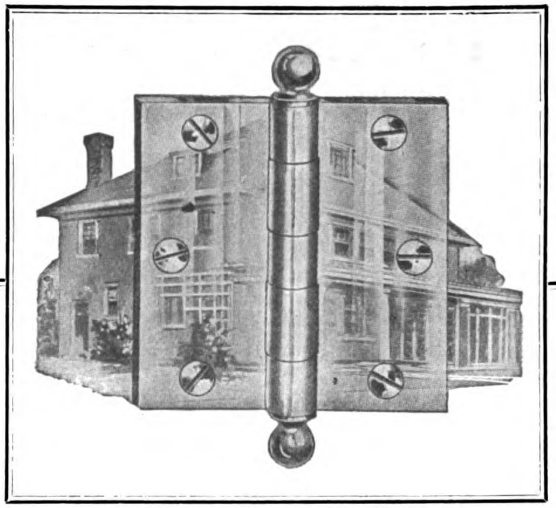

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ATTENTION!!

is called to the hinges on the door. To some people door hinges may seem rather small and unimportant—nevertheless, their mission in helping to make or mar the appearance of the rooms in a modern home is worthy of serious thought. The

GRIFFIN

"The Door Butt of America"

is designed along lines that insure both beauty to the home and *service* whenever the doors are opened and closed.

The Griffin operates freely and easily, it is amply strong for heavy doors and it is such a pleasing fixture that architects and home builders are glad to specify and use it.

Being finished in the various Griffin hardware finishes, it is in wide demand for the better class of houses and office buildings.

Send for illustrated catalog and circulars.

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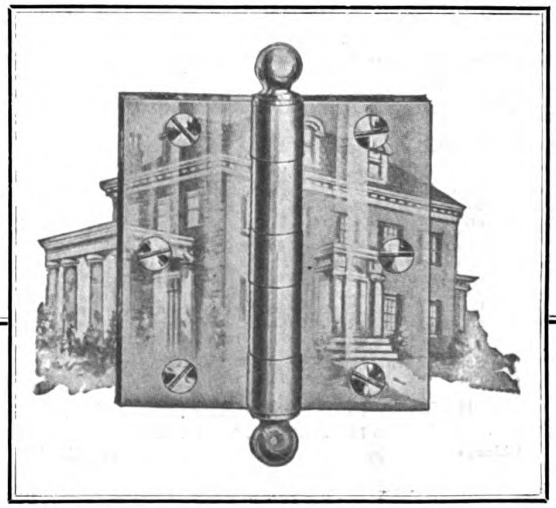

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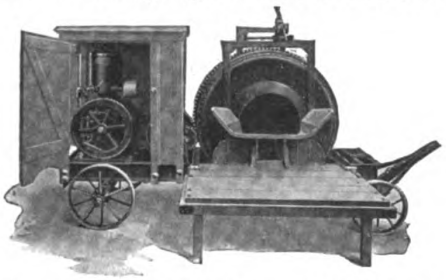
"THE STANDARD"

Low Charging Concrete Mixers



Increase Production—Cut Costs

Speed and thorough mixing are the most important points to be considered when you are in the market for a concrete mixer. The faster you can place thoroughly mixed concrete, the more money you will make on the job.
"The Standard" Concrete Mixer is adapted to every sort of a building project.
In addition to Concrete Mixers, "The Standard" line includes Hoists, Pumps, Air Compressors, Wheelbarrows, Engines. Block Machines—everything needed by the contractor.

Ask for Catalog No. 48 and specify the particular items in which you are interested.

The Standard Scale & Supply Co.

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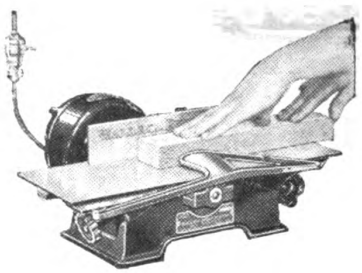

Save the Wasted Steps!

Take the machine to the job instead of wasting time taking the job to the machine.

Do the work at the bench on WALLACE Bench Planers, Jointers and Saws—saves hand work also.

J. D. WALLACE & CO.
1419 Jackson Blvd. Chicago



The enormous covering capacity of HYDREX DAMPPROOFING PAINT

One gallon of Hydrex Dampproofing Paint will cover from 100 to 125 square feet of stone, concrete or brick surface.

Hydrex Dampproofing Paint is a heavy bodied, black paint applied cold with a brush. It consists of a pure mineral base, with a solvent which is very volatile and exceedingly penetrating. It is much heavier bodied than the average dampproofing paint, and forms a thick, durable protective coating. It is a quick dryer, drying in less than half an hour.

Samples sent upon request.

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FORSTNER Labor Saving AUGER BIT

Bores Any Arc of a Circle



Many New Uses

The Forstner Auger Bit, unlike other bits, is guided by its circular rim instead of its center, consequently it will bore any arc of a circle, and can be guided in any direction regardless of grain or knots, leaving a true polished surface. Takes the place of a chisel, gouge, scroll-saw, or lathe tool combined. For core boxes, fine and delicate patterns, veneers, screen work, scalloping, fancy scroll twist columns, newels, ribbon molding and mortising.

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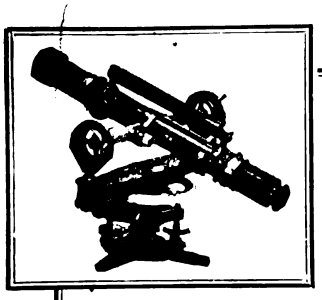

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Our improved twelve-inch convertible level has been designed especially for builders, architects and contractors, because it is a level which can also be used for taking angles. This combined arrangement which allows conversion from use as a level to the taking of vertical angles is superior to all others since the change occupies but a few seconds, and its cost is comparatively small. Investigate for yourself this really remarkable instrument.

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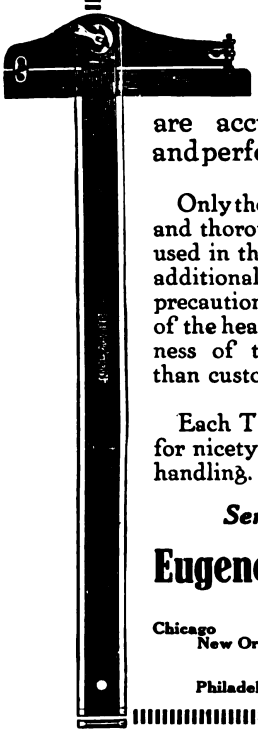

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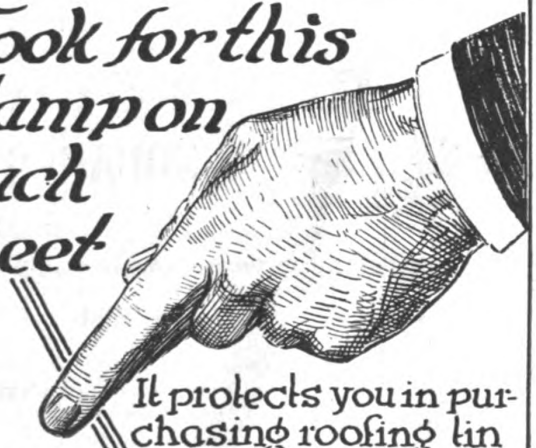

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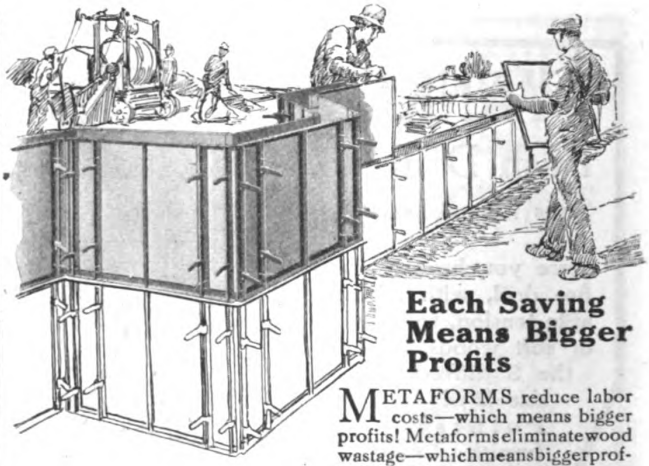

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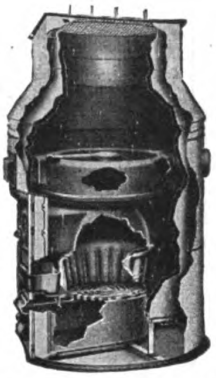

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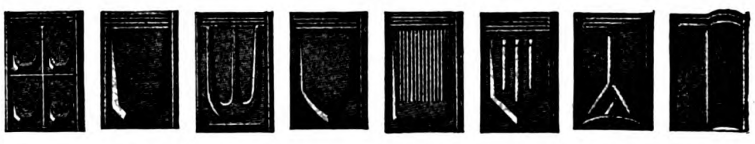

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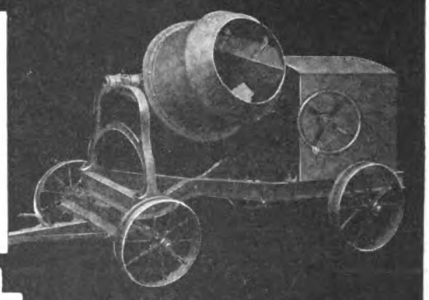

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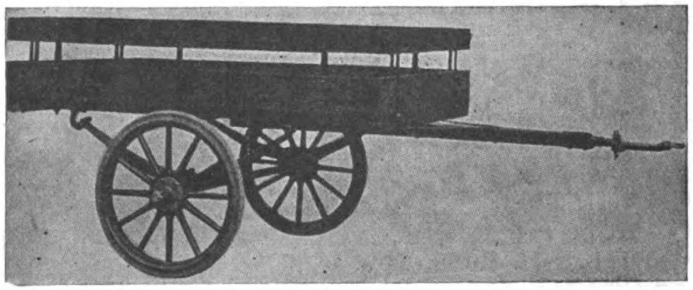

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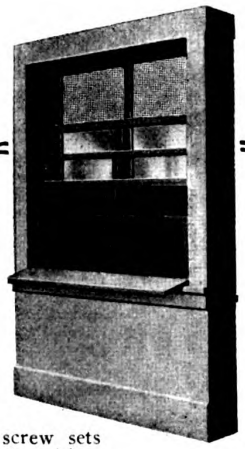

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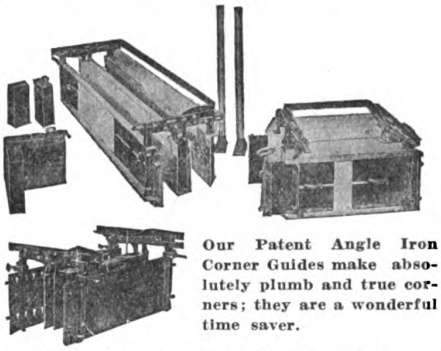

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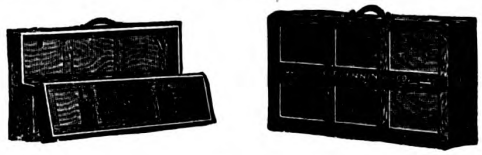

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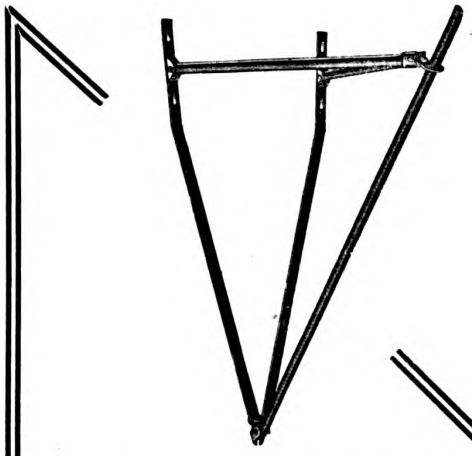

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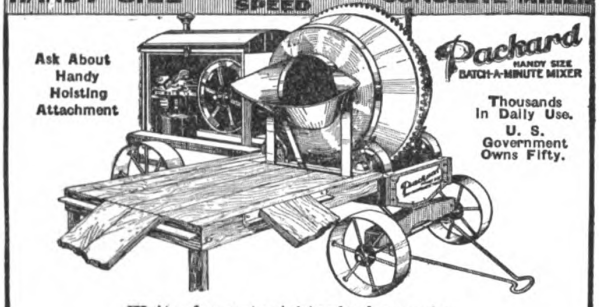

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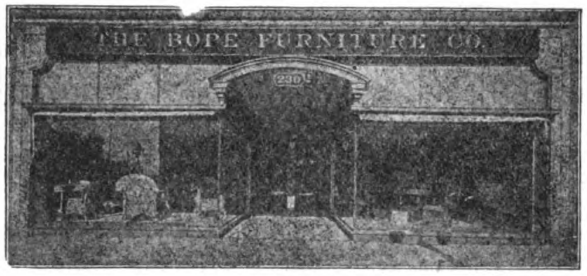

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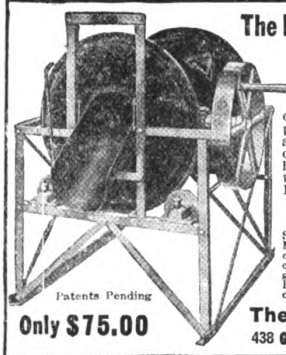

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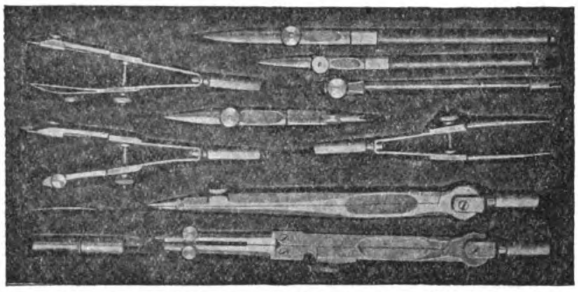

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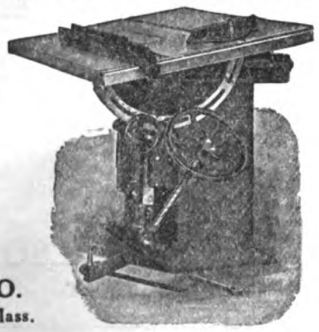

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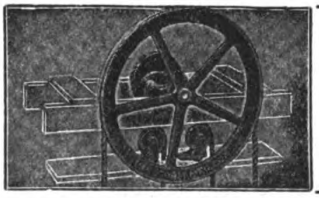

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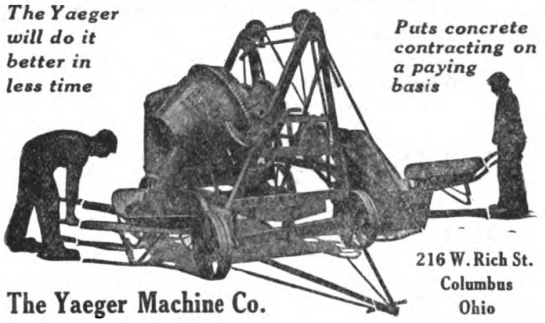

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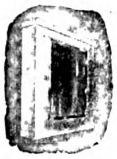

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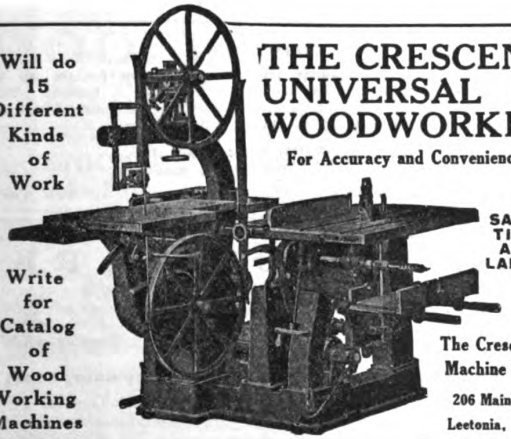

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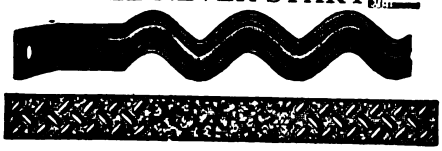

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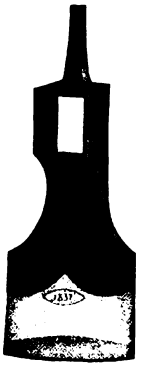

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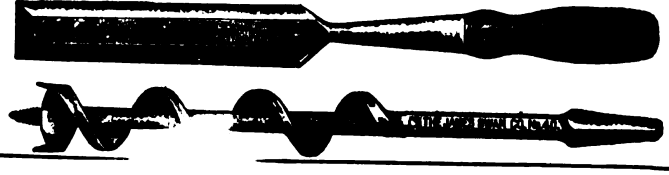

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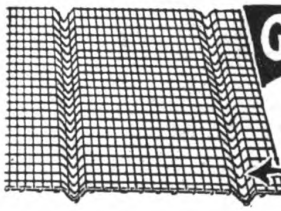

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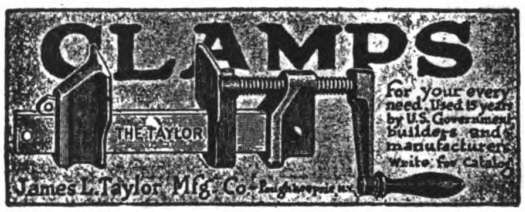

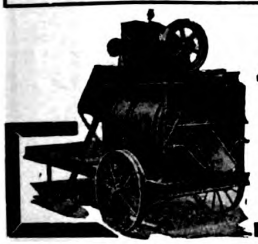

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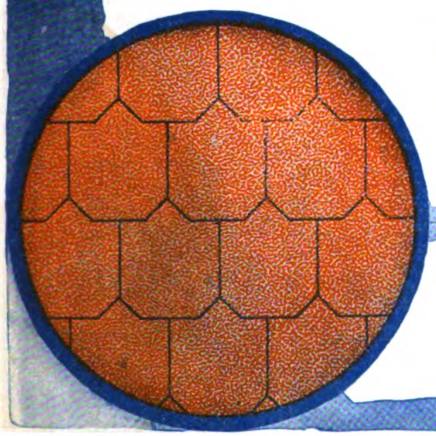

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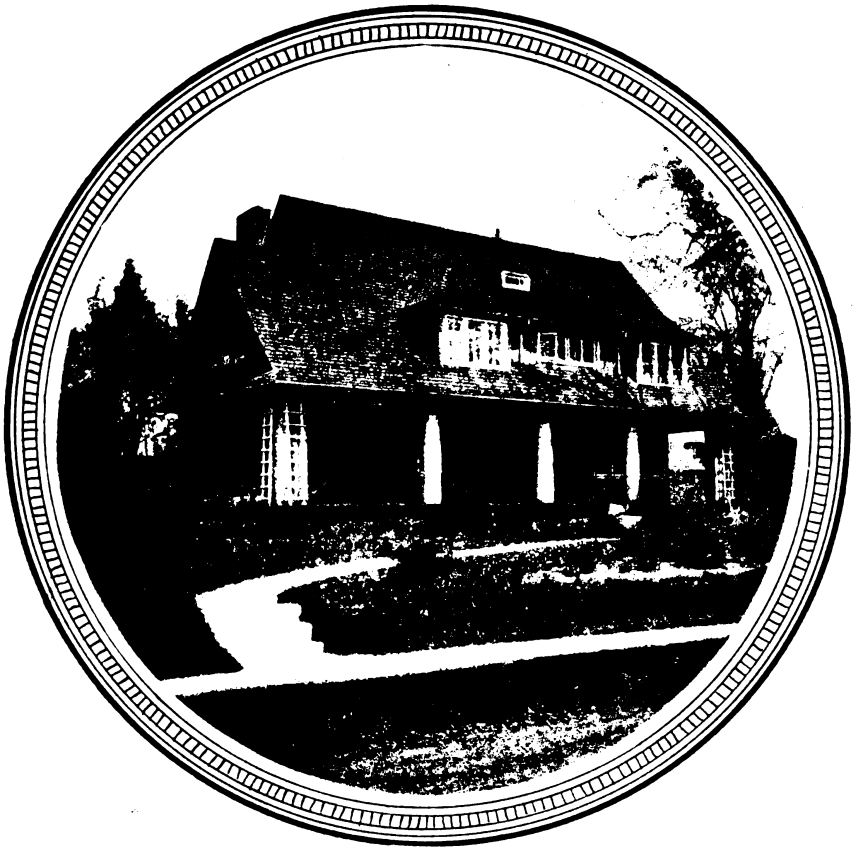

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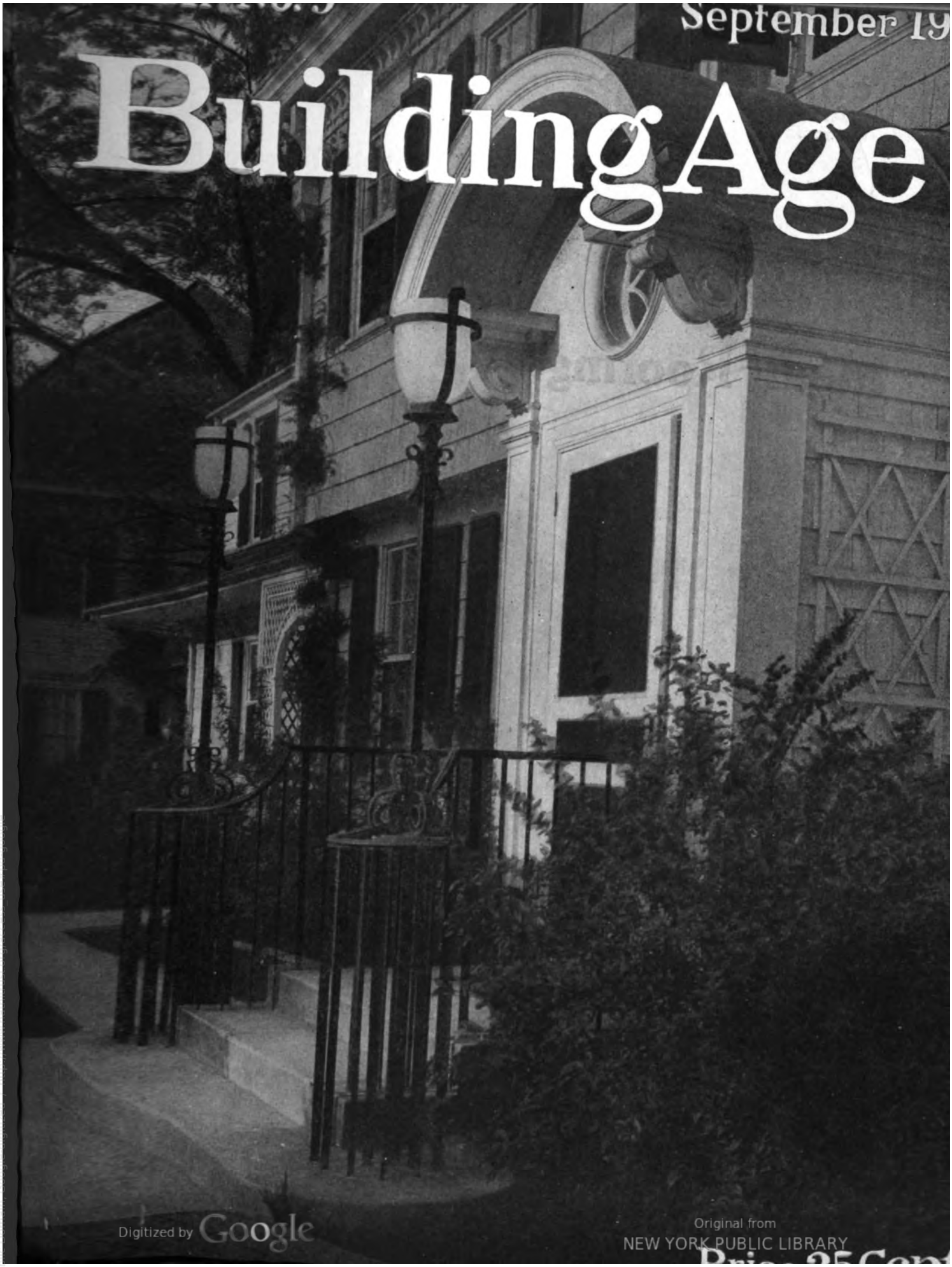

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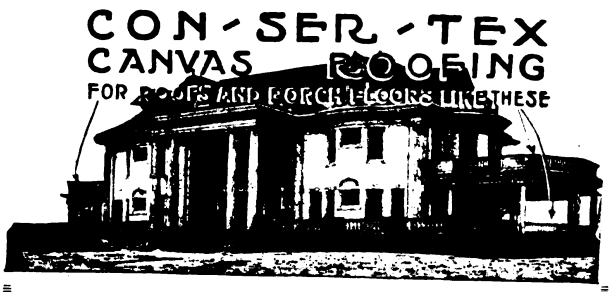

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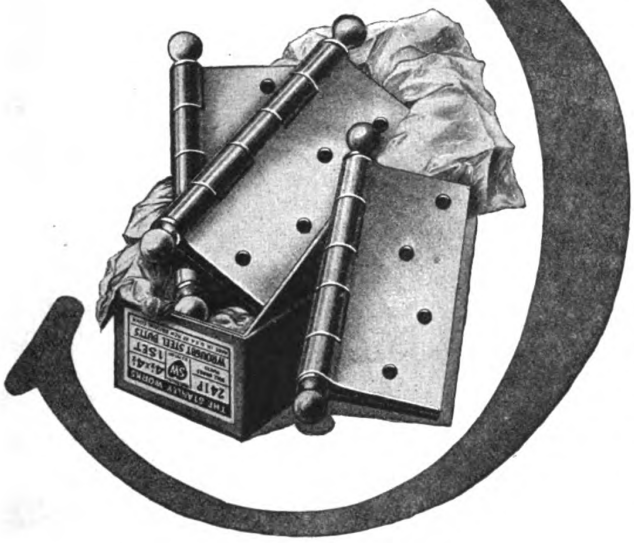

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BUILDING AGE

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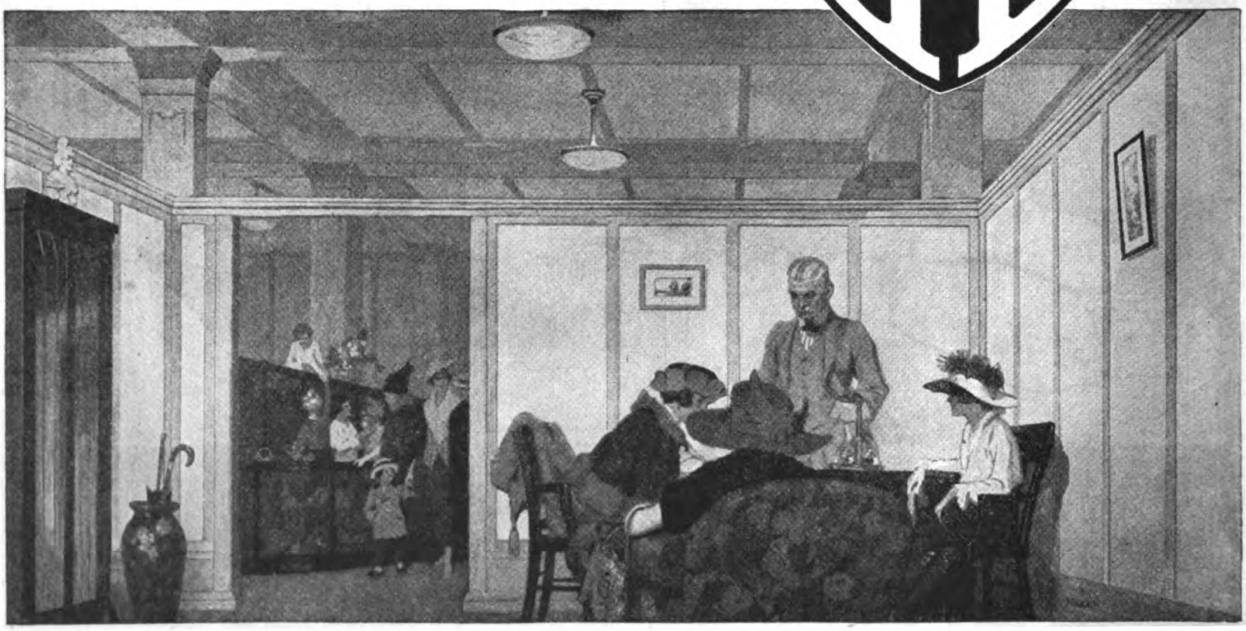

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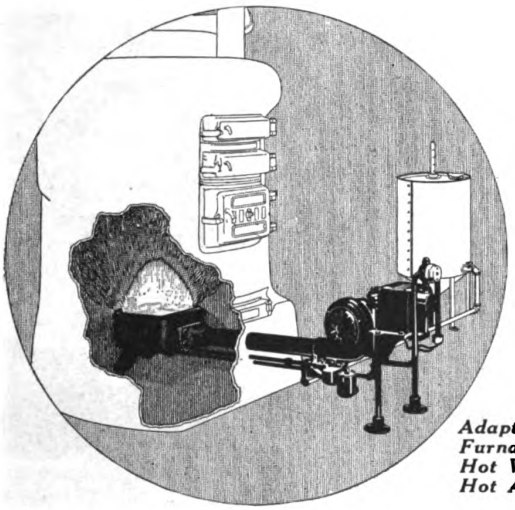

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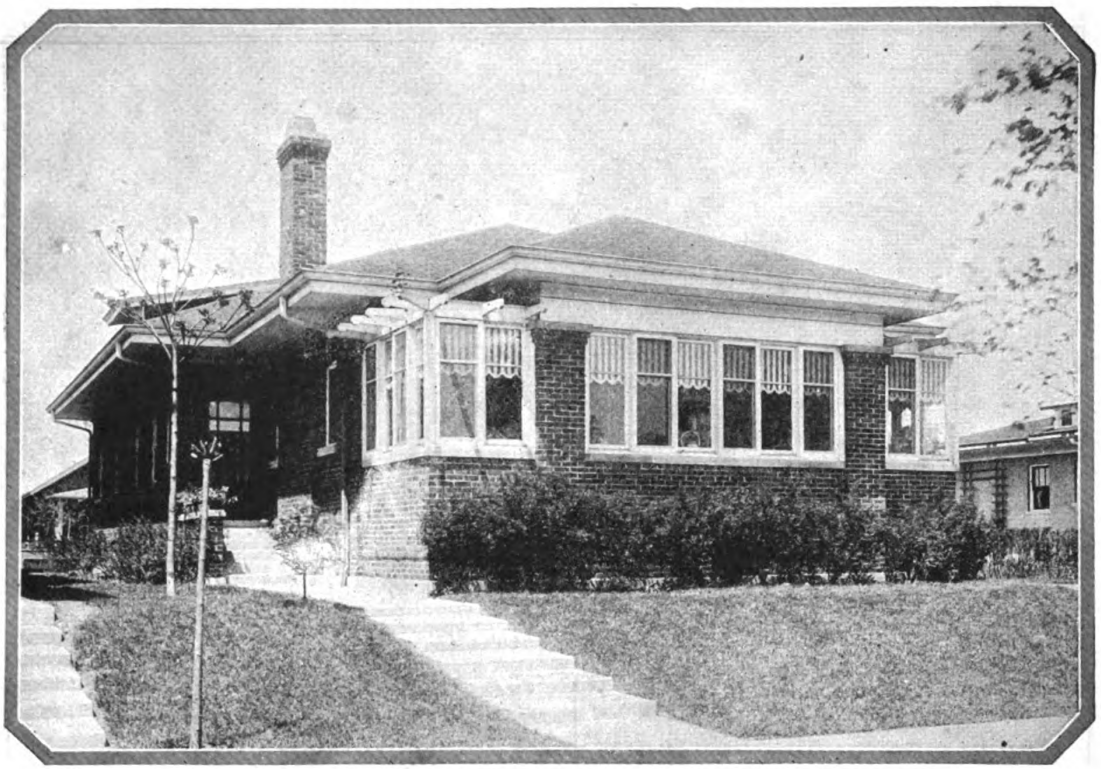

Face Brick Bungalow. South Side, Chicago *John R. Stone, Architect*

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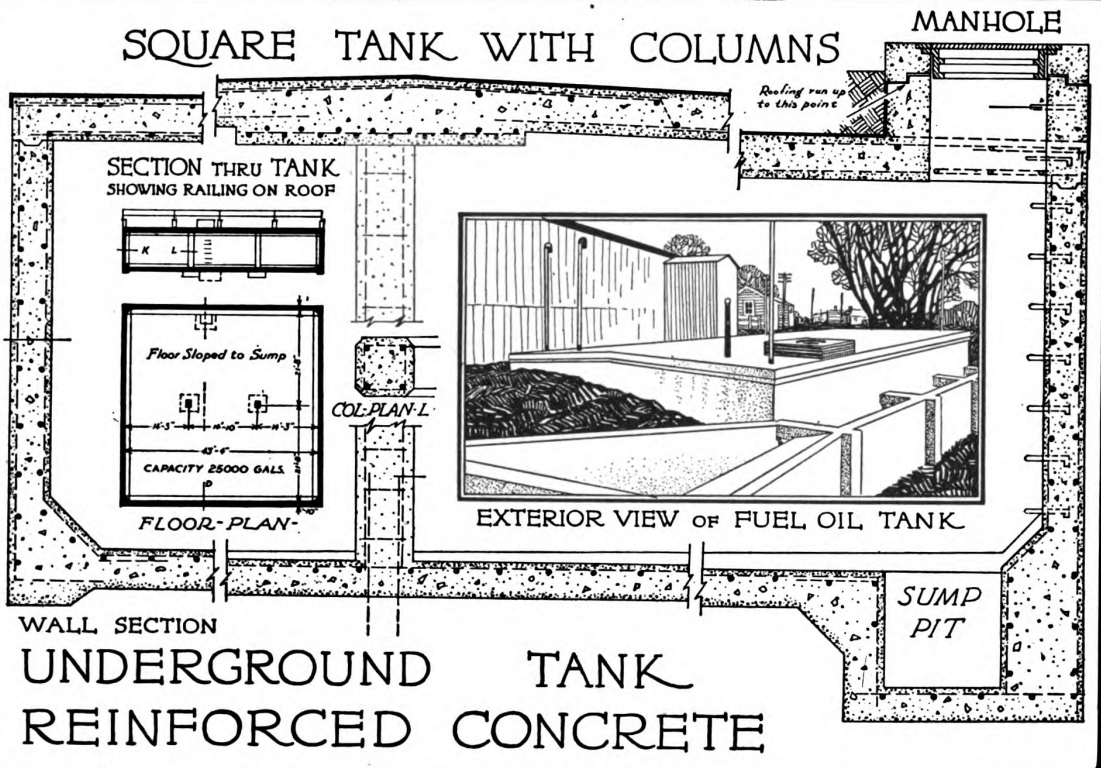

The above illustrations give an idea of the practical suggestions offered by the ALPHA Blueprint Service Sheets and Special Bulletins, which cover the following concrete improvements:

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Storage Cellar	Oil Storage Tank	Poultry House	Walls, Sills and Lintels
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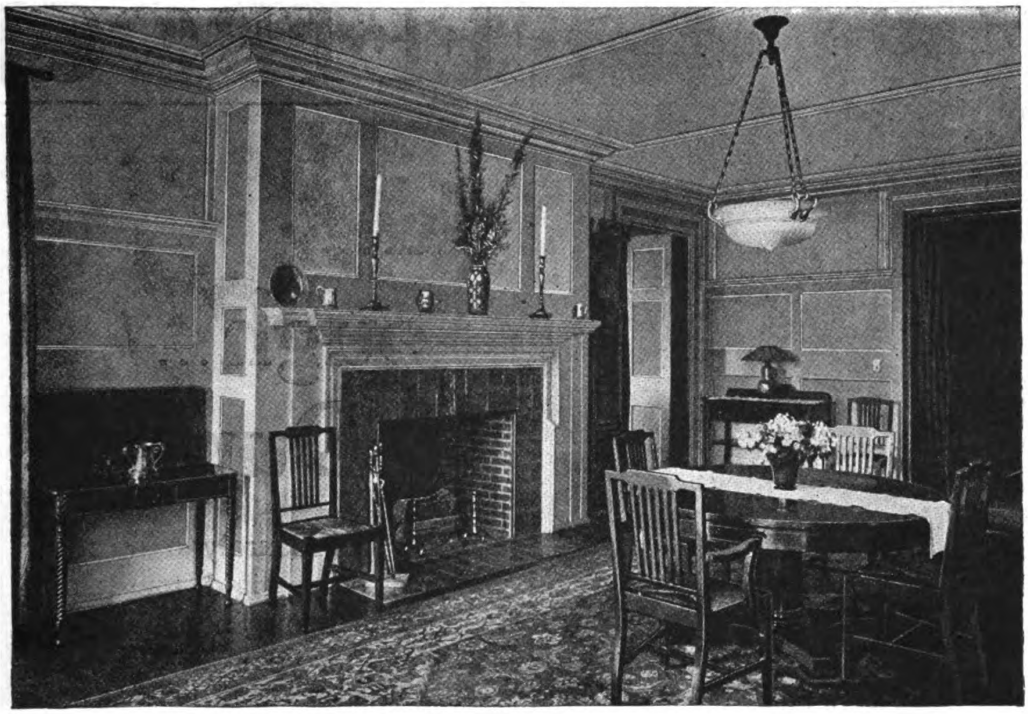

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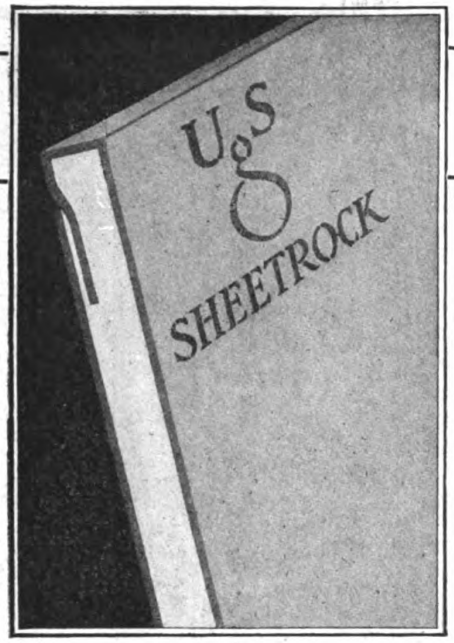

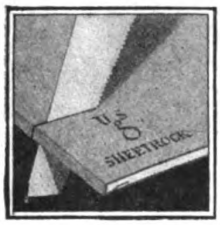

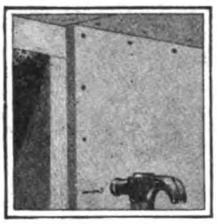

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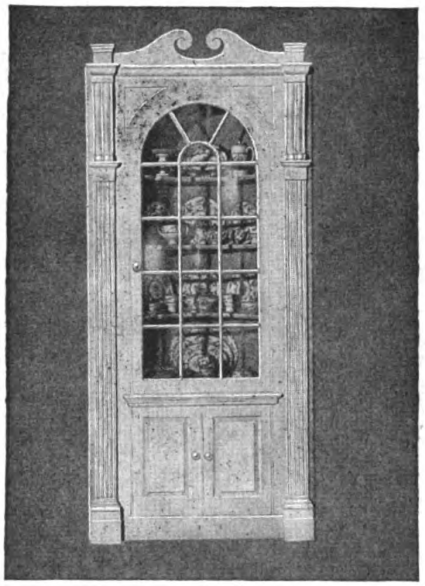

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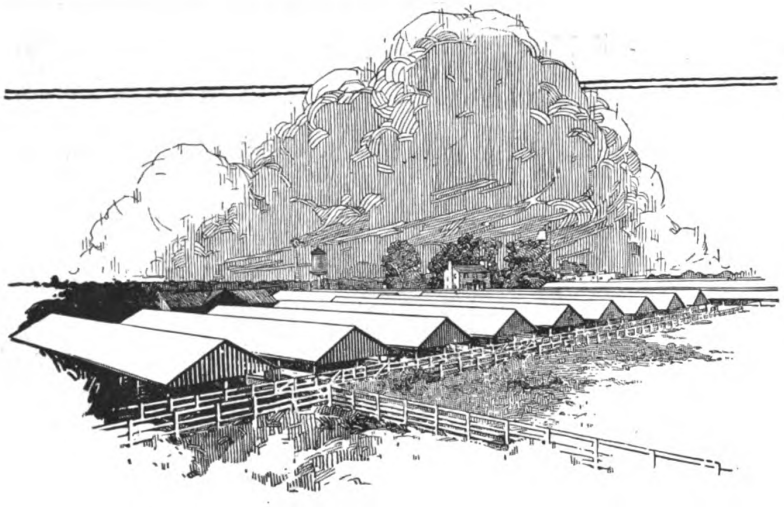

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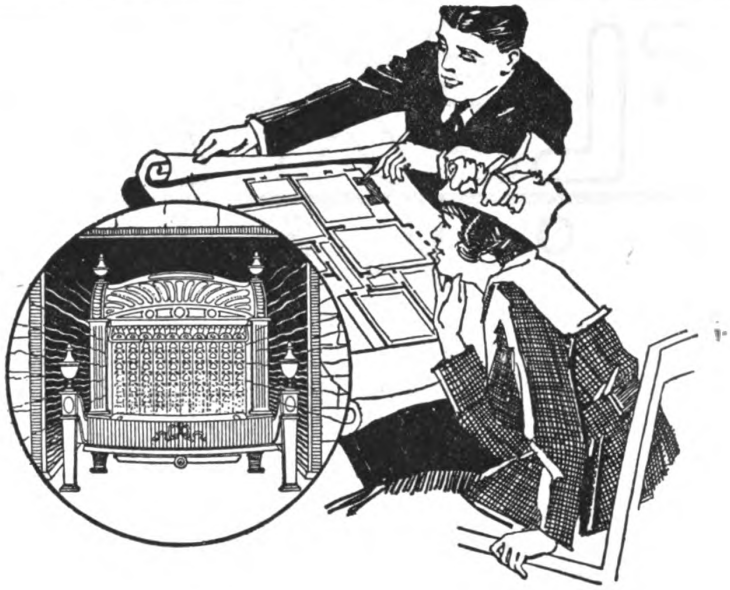

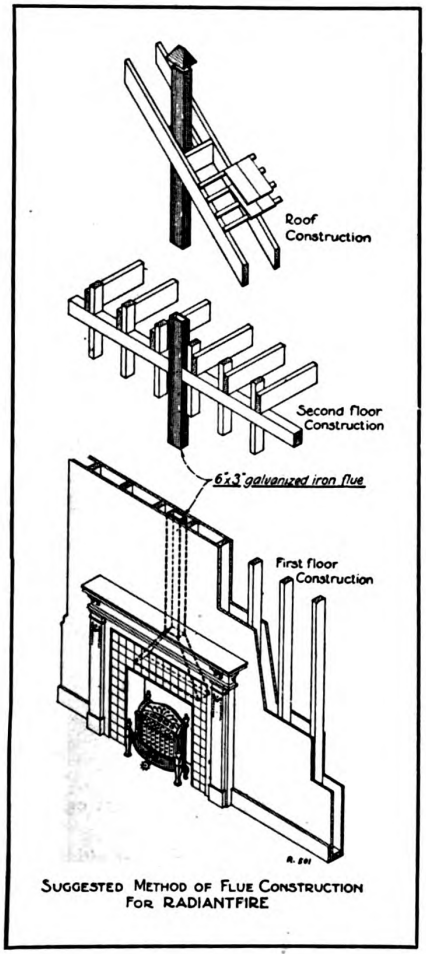

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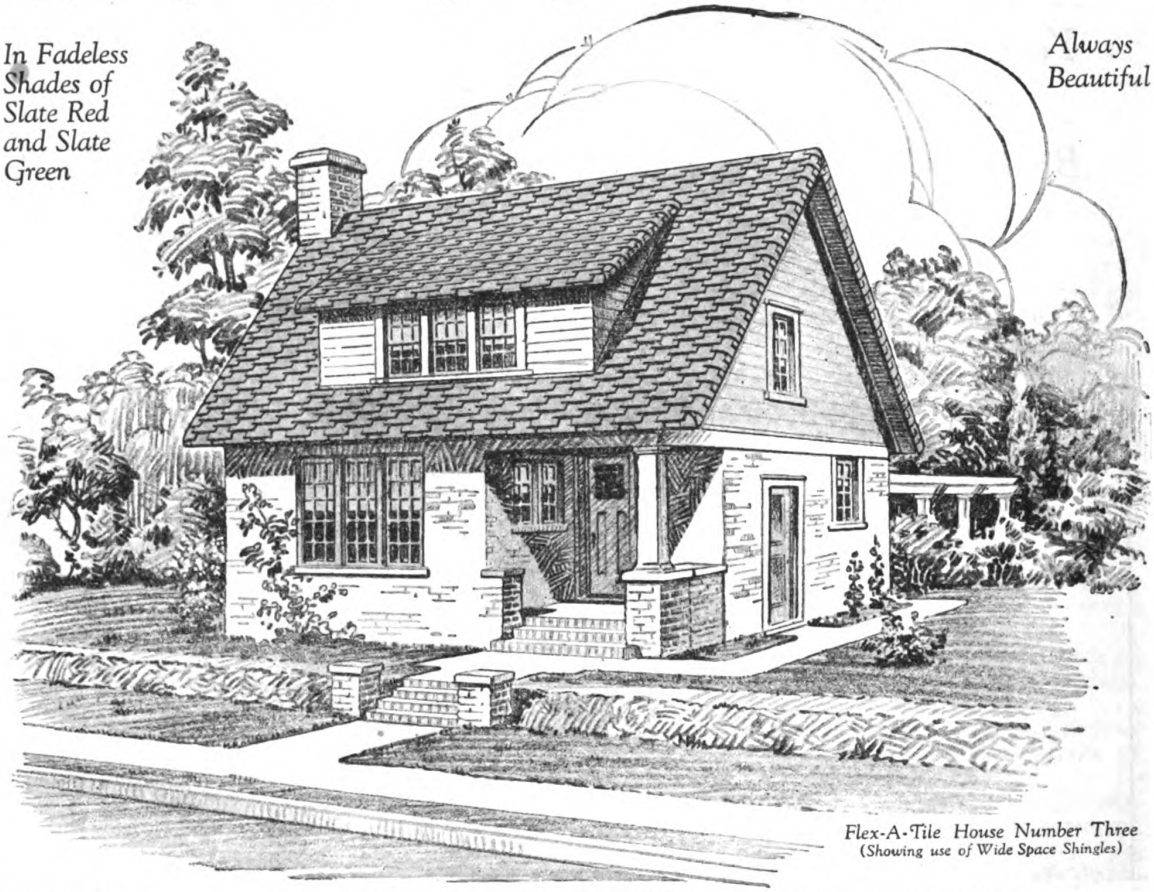

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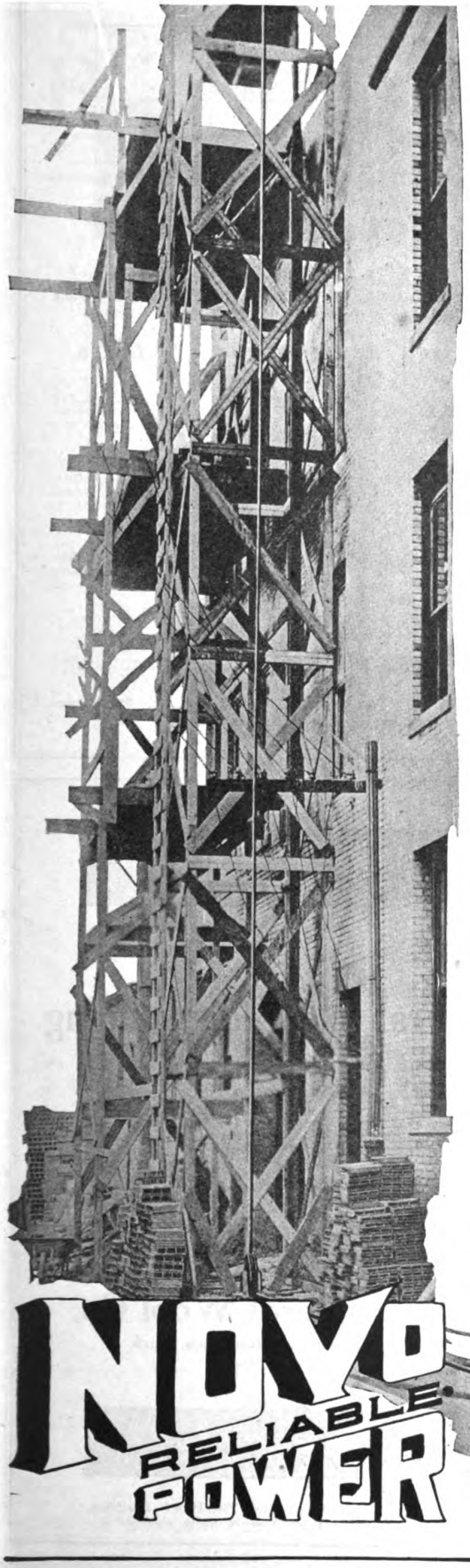

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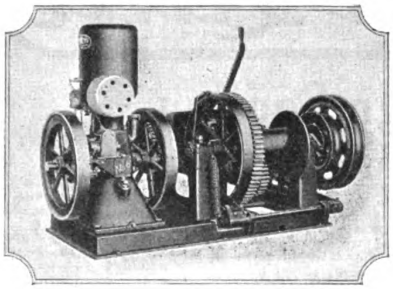

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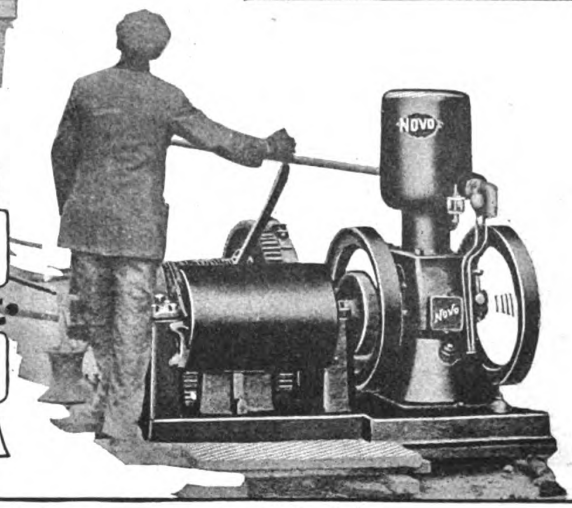

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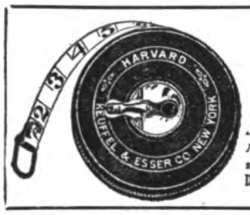

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BUILDING AGE

NEW YORK, SEPTEMBER, 1920



Note the paddle wheels and the lattice treatment under the over-hang

A Summer Cottage That Was Once a House Boat

EXPENSIVE toys do not, as a rule, afford much salvage. Their use deteriorates their value until in the end they are discarded as of no further service.

The Resolute, a perfect racing machine, and but little of the practical in boat building, serves the purpose to retain "the Cup," and now, it is learned, has gone to the shipyard for dismantling, and then, like her progenitors, to the scrap heap—the toy of rich men. But there are exceptions, and when found they are worth noting.

In the case of the house boat, built by the late Edwin F. Brown, of Evanston, Ill., what was a very expensive toy, something on which to lavish money and exhaust every resource for equipment, has become not only a very substantial residence, but it partakes of features that are picturesque and extremely interesting.

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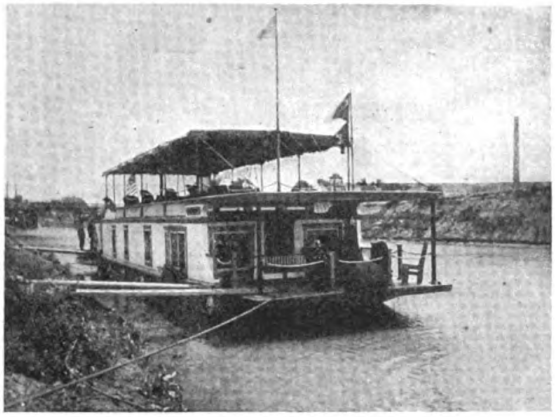
Mr. Brown built himself a house boat which he christened Driftwood. The original cost of this boat was approximately $25,000, to which should be added the cost of those many things that enthusiasm would suggest in developing a hobby.

Driftwood was 75 feet long and 16 feet wide and built to pass through any canal or lock in the United States. It was constructed of Oregon Fir and Tank Pine, and had a ventilating system that kept the hold perfectly dry. The plan of the boat shown herewith gives a comprehensive idea of the spaciousness of the living quarters. This boat was not built solely for Summer use; it was a comfortable all the year round habitation, equipped with steam heat and all the modern appliances of domestic life.



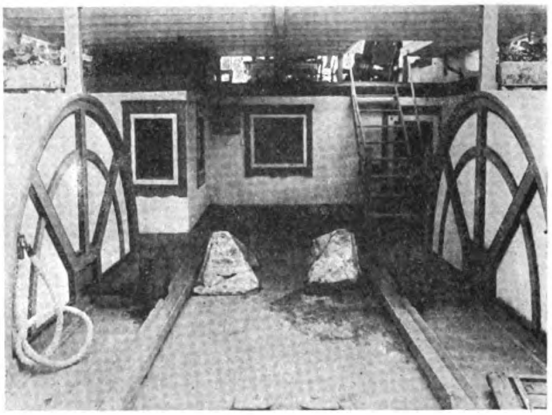
The house boat afloat



The house boat pulled up on the lawn, ready for remodeling

An interesting and ingenious feature of this boat was, what might be called, its "engine room." This room, as is shown in the illustration, was really a floating garage, but there was a novel addition. The skids on which the owner's automobile was run aboard were continued into the garage. Then, by jacking up the rear wheels and attaching the engine of the motor car to the paddle wheels by means of sprockets and chains, an efficient motor was at once attained, which would give a maximum speed of six miles an hour, exceptionally fast for a house boat.

For steering apparatus the boat was provided with two heavy rudders. To supplement these, driftboards counteracted the usual tendency of flat-bottomed boats to drift sideways. In case of accident to the rudders, it was possible to steer the boat by its paddle wheels, in exactly the same way as large two-propeller ocean going steamers. This was accomplished by disconnecting the emergency brake of the motor car from one driving wheel and the foot brake from the other. By this means each wheel was independent and the direction of the boat controlled by the movement of the paddle wheels.



The engine room of the house boat. When the motor car is run in on the skids and its driving mechanism connected the boat is ready to get under way

Up to the time of Mr. Brown's death this interesting craft was always in commission, but in the distribution of his estate, Driftwood became the property of a married daughter, who not sharing the enthusiasm of house boating, sought a means to turn this expensive toy into some practical use. Just how successfully this was accomplished is shown in the illustrations.

It had been the custom each Fall to haul Driftwood up to the lawn on Mr. Brown's estate, where during the Winter it afforded an emergency dwelling where an overflow of guests might find accommodation, or the members of the family seek quiet and seclusion. This custom suggested the transformation of the Driftwood into a permanently lo-

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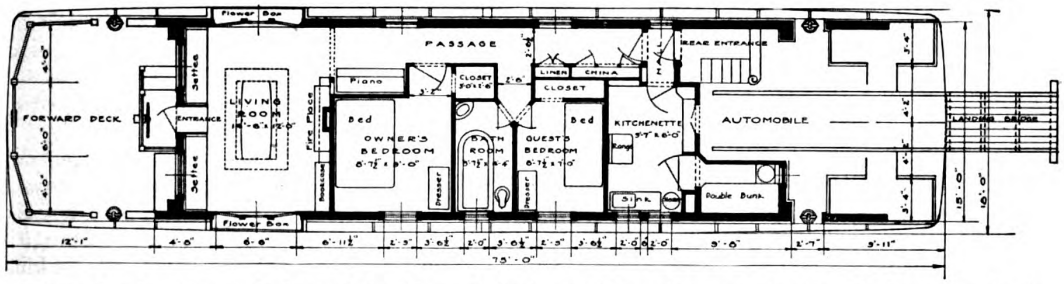
cated cottage. Sewer and lighting connections were made, a small cellar excavated, and the roof or observation deck carried up to form a second story. Stucco was then applied in the usual manner. The boat, or bungalow as it now becomes, was covered with metal lath placed on wood furring strips, after which the stucco was applied.

paddle wheels are frankly expressed. If one were to criticize, it would be to regret the placing of the side porch. That really mars the perfect expression of the house boat lines.

The beauty of this transformation is that it is really such. It is a house boat made over into a Summer cottage—exactly that. To attempt to de-





View showing the enclosing of the forward deck and the original deck plan of the house boat

Fortunately for the artistic success of this transformation no attempt was made to mask the boatlike appearance of the structure. It suggests just what it is, a house boat ashore.

The under spaces formed by the overhang at bow and stern were enclosed with a simple lattice. The

sign a Summer cottage to resemble a house boat would be, we are quite sure, as unsuccessful as are the many attempts on Eastern Long Island to build houses to suggest their having been one of the picturesque old windmills that top the dunes in many localities.

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Early American Colonial Doorways

By M. H. Northend

THE doorway might be termed the key-note of the house. Through it one enters the interior, therefore great care should be taken in its design, that it may present a homelike, cheerful appearance to the casual eye.

In dealing with the problem of doorways one is apt to think of the houses that were built by early ancestors as uninteresting in type and showing little value in architectural detail. In this they are misled, for there is practically no period where interesting points are not shown.

Simple and unassuming, as were these early doorways, there was just reason for their birth. They fitted into a particular motive and were necessary for life at that era. It must be borne in mind that defense entered into the building scheme, therefore, strength of structure to resist Indian attacks, must have had careful thought. This accounts for the thickness of the doorway, during the early seventeenth century. It is in that period that wide boards, consisting of a single plank, often several inches in thickness, were used. Unlike those found in the houses of to-day, they were held in place by wide iron hinges. These were crude in finish and occasionally hammered at end into a circle point, or arrow. The eyes fitted into an iron thumb and the hinges were secured to the door by wrought iron nails whose heads showed many facets. The frame work was simple and put together by wooden pegs.

Vertical boards, held in place by horizontal strips studded with nails for protective purposes, were used later on. They were known as Batten Doors. Good examples of these are found in the Rebecca Nurse house at Danvers, Mass., the Capen house, at Topsfield, Mass., while an exact replica of the original door has been designed for the Paul Revere house at Boston, Mass. In style it is like the Indian doors, made of vertical boards, studded with nails set in diamond forms.

Studying the doors found in seventeenth and eighteenth century houses, we come across occasional copies done in wood representing the Georgian stone doorways. These were designed before the builders had come to a realizing sense of the possibilities of wood as a medium for greater delicacy of expression.

A proper distinction can be made by dividing these doorways into three periods, the earliest of these dates back to 1745, when gambrel roof houses were in style. These are the rarest found in our country, the reason being that so many have fallen into decay or been torn down. A splendid example of this early design is shown in the Cabot-Endicott house, on Essex street, in Salem, Mass. It is of the purest Colonial type and was designed in 1745 from plans of an English architect for Joseph S. Cabot, its original owner.

A somewhat different type belonging to the same era is found on Federal Street in the same city. It is known as the Townes doorway, graceful carving and drapery ornaments are features of this simple entrance where fluted columns on either side give an additional touch of beauty to its old-time portal.

The second type of Colonial doorways were those built commencing in 1785. They adorned the dignified square wooden dwellings that were built in that period. Wealth had flowed into the colonies through commercial prosperity and house owners demanded better and more elaborate treatment. They clung wisely to the simple lines of Colonial architecture and contented themselves with beautifully proportioned doorways of wonderful design and workmanship. Notable specimens are shown in the Hosmer-Waters house on Washington Square, at Salem, Mass. This was designed in 1795 as a side entrance rather than a street door. Vying with this in grace and architectural beauty is the Lord doorway which is situated on the same square. Architects all over the country study this special porch, as they consider it one of the best examples in existence.

Almost Puritanical are some of these entrances, this is especially true of the simple, narrow ones that are used as side doors to the main house, but are equally worthy of study, as they bring out different points in architecture which are lacking in the more elaborate ones used in frontage. The inclosed porch is another phase of those found in the old historic witch city. There are most interesting examples still in existence. If one were to choose the most notable he would possibly pick out that found on Charter Street. This is historical from the fact that Hawthorne's wife resided here, during her maiden days. The porch proper is lighted by small oval windows. These are placed on either

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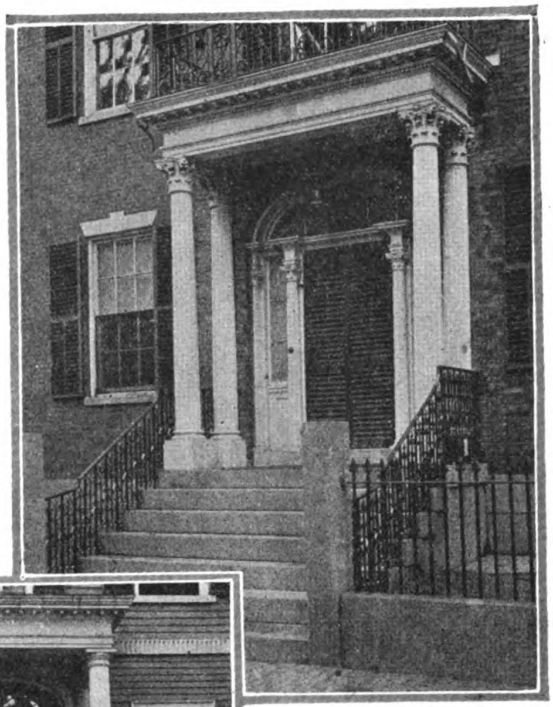
side of the porch and through them one obtains glimpses both up and down the street.

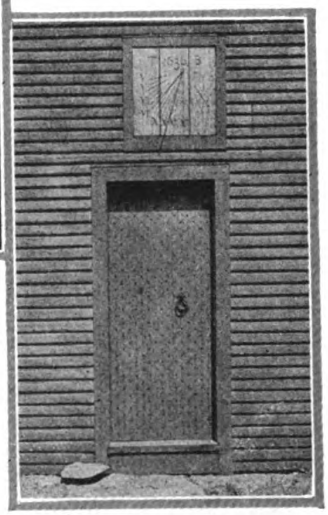
It must be remembered that one reason why Salem ranks foremost among the many New England and Southern cities in considering the treatment of doorways is on account of her wonderful advantages. Samuel McIntyre, an equal of Bullfinch, spent most of his life working out artistic designs that still stand as monuments of his skill. Under him was a small army of experienced wood carvers, who were employed during the busy season by ship owners. They were competent men who were able to execute wonderfully graceful designs in the way of figureheads and ship ornamentation. This made them perfectly able to evolve exquisite tracery in the intricate designs seen to-day in porch treatment.

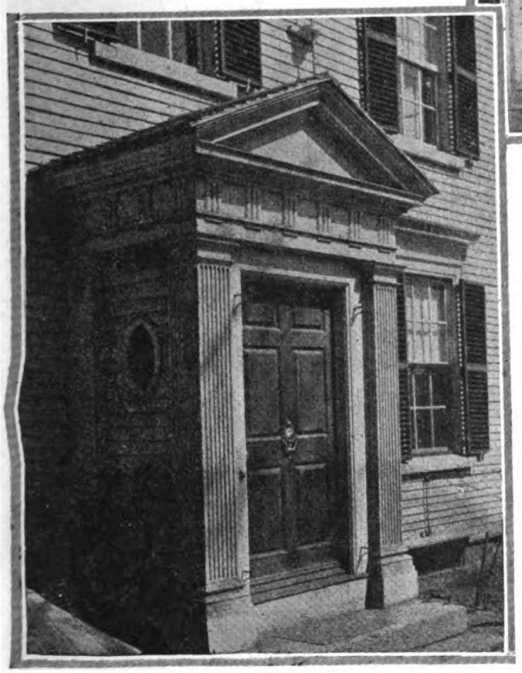
In this, suggestions of Sir Christopher Wren and Inigo Jones were worked out, influencing in all probability the work, more especially that of the earliest nineteenth century. Many of these doorways are among the most noticeable in the city. They show a dignity and pureness of detail that cause them to be ranked among the choicest bits of architecture in the country.

The third type commences about the year 1818 and was more elaborate than the earlier designs. Many of them cannot be called strictly Colonial for they belong rather to the Washingtonian period. Among these is the Andrew Safford house, where the porch is semi-circular in shape, supported by slender columns and topped with a balustrade. The original door has been added within the last few years, rescued from oblivion and resuming its old place guarding the entrance to the home. This is one of three porches built the same year, those of Nathaniel Silsby and John Forrester being the other two.









From step to knocker, from leaded glass to the arched square roof, everywhere is shown a plainness and simplicity that tells. It is not ostentatious but dignified in

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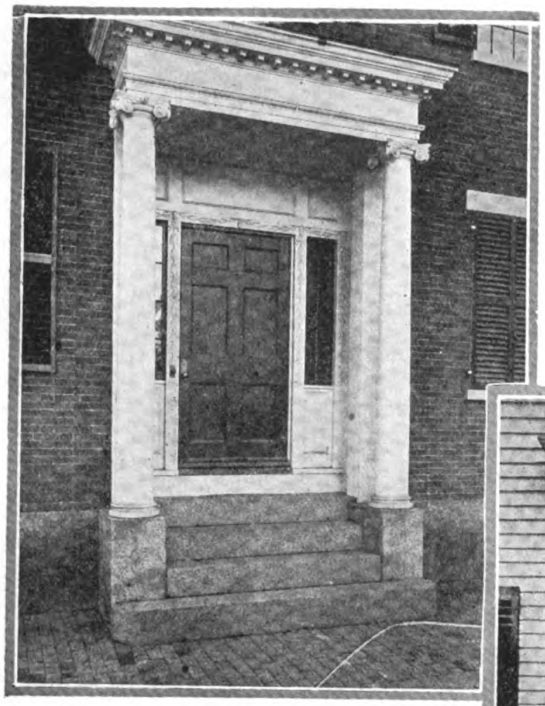
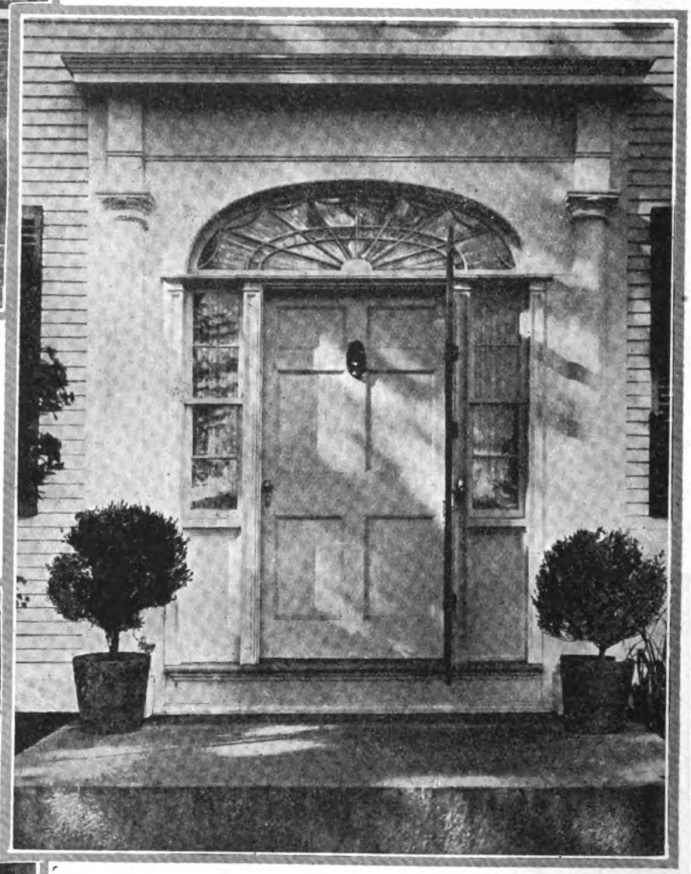


depict a stateliness that savors of Puritanical influence, while, on the other hand, those of the South impress one with an atmosphere of cordiality that is one of the characteristics of those states.

In design they follow many odd ideas. There are the semi-circular, the square, the oblong, and the three-cornered. Each one of these forms a fascinating study in architecture and brings out different points. These are important to embody in modern-day homes, fitting in more especially the modified Colonial scheme as if they were designed for this purpose.

It must be remembered that the highest perfec-



type, lending itself to classic details that are well worth study. It would be an impossibility to enumerate all the different doorways that are found in both Northern and Southern states. Those in New England never fail to



tion was reached about 1811, and visiting houses built at that period we can but note the splendid results shown in capital, architrave and pediments, each one of which is characteristic of the period it represents.

The upper photograph shows the doorway of the Kimball House at Salem, Mass.; the central illustration is of the entrance door of a remodeled early New England Colonial house, while the illustration to the left is a view of some of McIntire's best work—the porch of an old Salem house.

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Lighting the Home

By M. Luckiesh

II. THE LIVING-ROOM

THE modern tendency toward larger living-rooms results in a need for more outlets and controls, but in some respects the lighting problem is simplified. An adequate supply of baseboard receptacles makes it easy for the housewife to rearrange the furniture within the possibilities of various other controlling factors, such as wall-space, without being limited by lighting considerations, as would be the case if only one or two baseboard outlets were available.

In general, portable lamps are the most satisfactory lighting-fixtures for the living-room. They are decorative and their portability makes it easy to obtain variety in the setting. They may be lighted one at a time until the desired effect is obtained for any occasion. Furthermore, if these lamps have been selected judiciously they will serve as satisfactory reading-lamps as well as ornaments.

Utilitarian Portable Lamps

In purchasing a decorative portable lamp it is well to sit in a chair near it if it is a floor-lamp, or close to the table upon which it rests if it is a table-lamp. The larger portables may just as well be useful as ornamental and a simple test will determine whether or not the various dimensions of the shade and the height of the pedestal are satisfactory. The electric lamps used in portables should be all-frosted, enameled or otherwise diffusing, because, even though they are properly concealed, as they should be, the user will be able to see the lamps under some conditions. Furthermore, the shadows cast by such diffusing lamps will be softer and more pleasing than the harsher shadows of clear lamps.

It is also desirable to have the inner surface of the shade of a light color. Usually a cream or other warm tint is highly satisfactory. This light-colored lining efficiently reflects the light and diffuses it, and the lighted lamps when seen against the bright background of inner lining are much less glaring than when viewed against a dark background.

These utilitarian aspects of portable lamps are commonly ignored, notwithstanding a little thought will often result in much greater satisfaction.

The artistic aspects of fixtures are so much a matter of taste that it seems futile to discuss them. The householder should use the same artistic instinct in the selection of portable lamps as he does in choosing other decorative details, but he should bear in mind that utility need not be sacrificed for beauty. Beauty and utility may be found in the same lamp and patient search will reveal a suitable one.

Outlets for Portables

In the average living-room there is a paucity of baseboard outlets to which portable lamps may be attached. One or two such outlets prevail and it is easy to note the curtailment of the pleasure obtainable from portable lamps in such cases. In the smaller living-rooms there should be a baseboard outlet near each corner or on each side of the room. Living-rooms of larger sizes should contain rela-

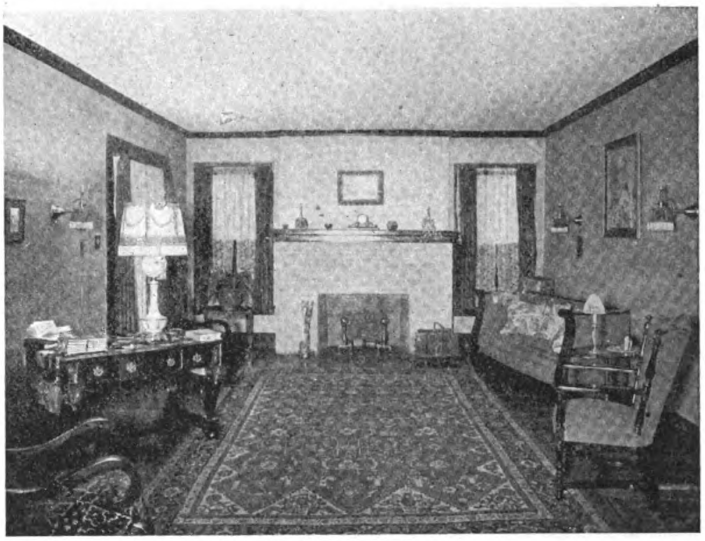

Fig. 1. A living-room flooded with light without the use of ceiling fixtures. The portable lamp on the table gives out a powerful upward component of light besides the usual downward light

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tively more baseboard outlets. In a room 14 x 25 ft. six outlets are not too many.

The reader may find it interesting to look over the wiring diagram in the first installment of this series. A plug over the mantel is convenient for attaching candlesticks and sometimes for attaching a small portable designed especially to illuminate the picture over the fireplace. If there are built-in bookcases, wall-receptacles will be welcomed when decorative or utilitarian lamps are placed upon the cases. If there is only one wall-space especially suited for the piano, a wall-receptacle will be convenient for a piano-lamp. More often, however, a floor-lamp of proper design will be suitable for illuminating the piano as well as being ornamental and serving other useful purposes.

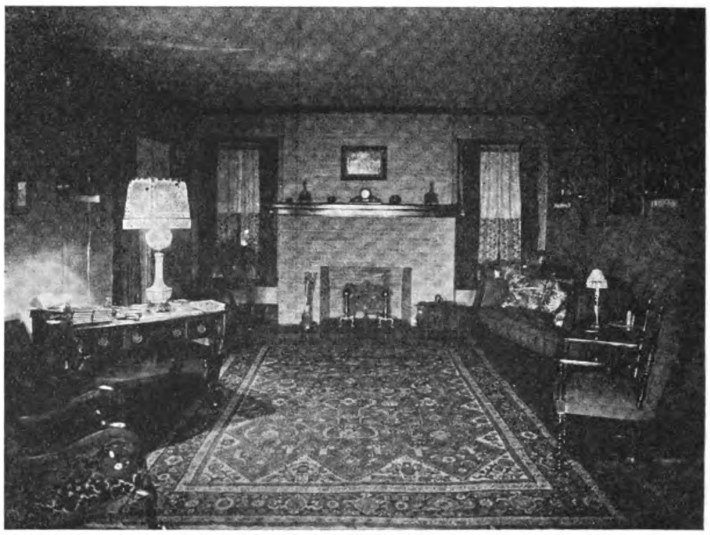

Fig. 2. Illustrating the expressiveness of light. By extinguishing the upward component (Fig. 1) the charm of concentrated light throughout the room is readily obtained. The mobility of lighting makes light a superior medium for adapting the lighting to the need of the occasion

Locating the Outlets

The householder should furnish the living-room in his mind's-eye while studying the architect's drawings. The furniture should be disposed in the various possible ways in the given room. By doing so the best locations for baseboard and wall outlets will become apparent. An insurance against dissatisfaction is an adequate supply of such outlets. In the average living-room it is seldom necessary to use floor-plugs. If these seem necessary it is well to study the matter very carefully before locating them. In the smaller living-room of the middle class home three baseboard outlets at least should be installed. In the larger living-rooms six or eight will be found useful. This is the era of artificial light and the demand for such outlets is continually growing.



Fig. 3. The decorative treatment of the ceiling invites the use of a central fixture but it is always in an annoying position. The brackets over mantel are appropriate but too bright against the dark background

Ceiling Fixtures.—It is well to provide a central outlet of two-circuits for the smaller living-rooms and two such outlets properly disposed for the larger living-rooms. However, the positions of these outlets in new houses may be marked and sealed over because there is a tendency at present not to use ceiling fixtures. Even in old houses the ceiling fixtures may be removed and the outlet covered temporarily with a metal cap. Ceiling bowls, well shaded showers, and semi-indirect bowls of dense glass are the better ceiling fixtures for living-rooms. However, at best, ceiling fixtures are in such a position that occupants of the room when engaged in conversation are

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facing the light-sources more or less directly. When conversation is not being engaged in, local lighting by means of portables is satisfactory.

Ceiling fixtures also interrupt the expanse of the ceiling and should not be used if proper lighting may be obtained by other means. There are many undeveloped possibilities in portable lamps. As much equipment may be concealed beneath the shade of a portable as may be hidden in a fixture suspended from the ceiling. For example, Fig. 1 illustrates a living-room illuminated by an indirect component of light directed upward by an opaque inverted reflector concealed within the silk shade. The ceiling is flooded with light quite satisfactory for occasions requiring general illumination. In Fig. 2 is illustrated the effect when the upward component is extinguished and the downward component from three frosted lamps is operating. Note the change in the mood of the room. Such a portable provided with two circuits, controlling upward and downward components respectively, is the source of a desirable variety in lighting effects. The lamp is at once a reading lamp and a unit for general illumination. The flood of upward light from a position not in the center of the room gives an artistic effect of light and shade. One is conscious of relief from the monotony of the symmetrical lighting effects obtained from ceiling fixtures.

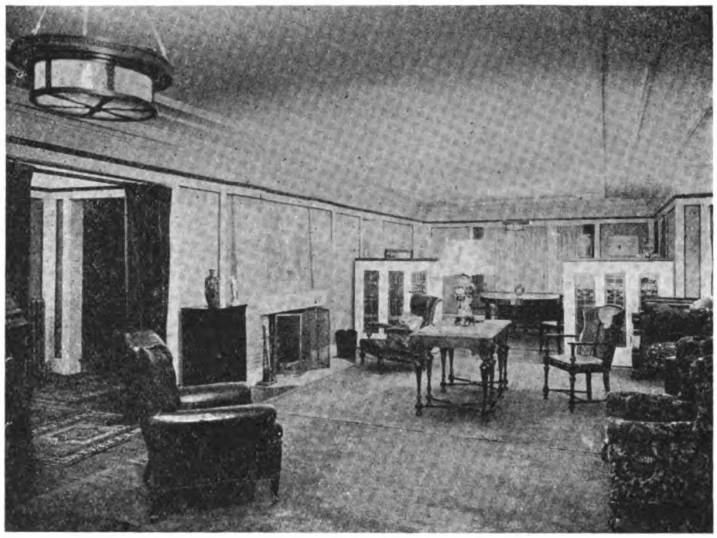

Fig. 4. A large living-room with appropriate ceiling fixtures, but these are unnecessary in living-rooms

Wall-brackets.—Owing to their positions, wall-brackets are sources of discomforting glare unless the lamps are well shaded with dense media. Textile shades are effective in this respect. If dense glass shades are used, lamps of low wattage—10 or 15 watts—should be used. The brightness of a shade containing a given lamp decreases as the diameter of the shade increases, so that large shades and lamps of low wattage should be used whenever possible.

If the shades are turned upward a considerable intensity of illumination upon the ceiling may be obtained from a number of them. If turned downward they may serve as reading-lamps, but for such purposes they are not usually satisfactory. They have some utilitarian value but their chief function is to serve as vital sparks of ornament. There is no reason why a lighting fixture cannot justify its existence purely on an artistic basis.

The locations of wall-brackets may be easily determined in the same manner as baseboard outlets. Brackets are commonly used for ornament over the mantel. Well shaded brackets may be seen in Figs. 1 and 2.

In Fig. 3 is illustrated another type of living-room. The decorative ceiling seems to invite a central ceiling fixture and the one shown is quite satisfactory if the shades of dense opal glass contain lamps of low wattage. A disadvantage of the central fixture is that occupants of the room usually face toward it. Reading cannot be done with comfort except near a portable. The brackets over the mantel are appropriate in design, but the small, bright shades against the dark wall-paper are glaring. One or two floor-lamps would be pleasing additions to the furnishing and lighting of this room.

In Fig. 4 is illustrated a large living-room, with ceiling fixtures well located. The dense opal glass panels which are softly lighted are not bright enough to be glaring. The indirect component is obtained by silvered reflectors concealed in the bowls. The portable on the center-table is provided with two circuits supplying upward and downward components respectively. The room as shown is lighted chiefly by this upward component reinforced at the ends of the room by upward components from the ceiling fixtures.

Numerous fixtures are available in many styles to meet the needs of various types of living-rooms. These may be seen at the fixture-stores. The aim of this and other articles is to present general principles in order that the architect, builder and owner may be guided in their consideration of wiring and in their selection of lighting fixtures.

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SUMMARY.—It is dangerous to present specific rules, but it is safe to indicate the reasons underlying general principles. In general, the living-room should be supplied with adequate baseboard and wall-receptacles for portable lamps.

Ceiling fixtures are not generally as satisfactory in living-rooms as portables. Where ceiling fixtures are not used a baseboard outlet should be connected to a switch near each entrance so that a portable may be lighted upon entering the room.

It is well to wire new houses for ceiling fixtures, but generally these may not be used at the present time. However, the circuits will be available for any future needs.

Portable lamps represent the most mobile lighting system available for the living-room. Where ceiling fixtures are not used, one or two portables should supply upward components for general illumination when the occasion requires it. One of these special portables supplies this requirement for rooms as large as 16 feet by 25 feet.

Wall-brackets should not usually be equipped with lamps larger than 25 watts. Lamps of 10 and 15 watts are more suitable. These lamps should be well shaded with dense media. Wall-brackets are not primarily utilitarian units, but ornamental.

By a careful study of the effective use of illumination, and proper application, a more attractive home is possible.

Trailers Facilitate Building Activity

By Donald McLeod Lay

NO industry has been obliged to meet more difficult and trying problems during the war and the unsettled period following than the building trade. Yet, despite the numerous obstacles to progress—labor troubles, shortage and high prices of material, slowness and high cost of transportation—it is everywhere evident that building operations are being resumed with increasing activity.

When the building boom begins, the contractor and builder will find himself more and more urgently confronted by the problem of cutting down the initial cost of construction without lowering the quality of his work. This end he must accomplish not only to meet competition, but also in order to fit his contract figures to the readjustment in the scale of prices which is bound to take place later on.

One factor in building cost which offers an opportunity of effecting a saving is the item of transportation of materials from the railroad siding or from the yard to the job. Unless the most efficient and up-to-date methods of doing this work are employed, the cost for hauling these large loads soon runs up into formidable figures when considered as merely incidental expense.

For this reason, progressive builders and contractors have devoted a great deal of study to the matter of minimizing this charge. The first step in the direction of economy was, naturally, the substitution of motor trucks for horse-drawn vehicles. The next improvement resulting in a marked reduction of transportation costs was the adoption of trailers and semi-trailers used in connection with motor trucks, automobiles and tractors.

In two articles in recent issues of BUILDING AGE some reasons were given why the use of trailers reduced transportation costs and brief mention was made of several instances, of the use of trailers in the building trade. It will doubtless be worth while to mention other typical examples in more or less detail, with the thought that the methods employed by others may prove helpful to the reader in clearing up his difficulties. Naturally the problem differs in each individual case, and a man should study his own requirements carefully before deciding on just what equipment to purchase, particularly as to size, style and number of trucks and trailers needed, the object being of course to obtain the maximum efficiency at the minimum operating expense and initial investment, and at the same time reduce to lowest figures the time during which the equipment is not being used to full capacity. The selection of trailers is facilitated by the fact that the manufacturers have made and are making a

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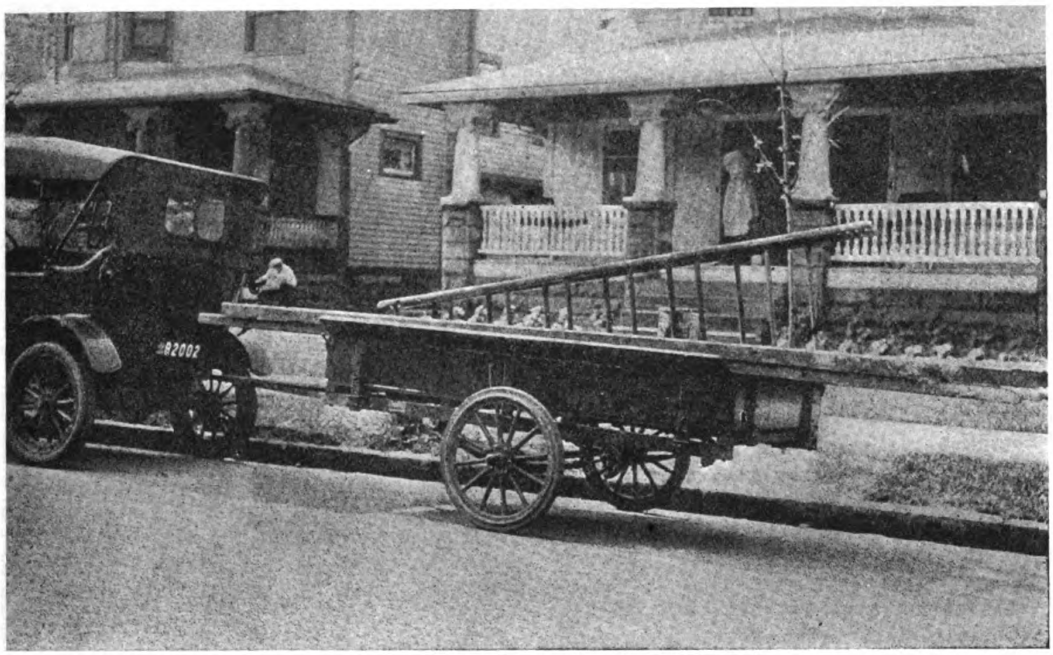
careful study of the needs of individual industries and are adapting their trailers even to the topographic and other peculiarities of particular sections of the country.

A contractor of Salina, Kansas, is using six four-wheel trailers with a one-ton truck for hauling paving brick and other building material. The trailers are of course used in pairs, two being loaded, and two others being unloaded while the third pair is on the road with the truck. The combination unit of two trailers and truck will haul on the average 1,100 paving bricks at each load. The truck with the trailers will make as many as 46 trips in a day, the round trip being a distance of two miles. Therefore, as on each trip a load of 8,250 pounds is carried, the day's work constitutes a haul of about 380,000 pounds, transported a mile. Even in winter weather the maximum amount of gasoline per day required has not exceeded seven and a half gallons and only a pint of oil is needed. Before the truck and trailer equipment was installed three teams and their drivers were employed and these, although required merely to do the hauling back and forth (the bricks being loaded for them), were not able to transport as many as can the truck and trailers.

To show the possibilities of the trailer with the every-day automobile the experience of a contractor in the Middle West is of interest. He is using two trailers with a Ford for handling building material and finds that he can do more with this combination than he could with the two teams which constituted his former equipment. He is thus saving $125 a month on delivery charges. He is able to haul more than two tons with a trailer of one-ton capacity, and handle these in yards where the ground is not even equal to the ordinary dirt road.

These instances of trailer efficiency suffice to indicate the real value of this new type of vehicle to the contractor and builder, as well as to the manufacturer of building material and supplies in keeping down transportation costs. The low cost of the trailers and their general usefulness render them equally valuable to the large organization and to the individual contractor and builder.



A light two-wheel trailer, used with an automobile
Handy and essential to the builder or general contractor

These instances of trailer efficiency suffice to indicate the real value of this new type of vehicle to the contractor and builder, as well as to the manufacturer of building material and supplies in keeping down transportation costs. The low cost of the trailers and their general usefulness render them equally valuable to the large organization and to the individual contractor and builder.

While railroad transportation continues in its present unsettled state, no small relief may be obtained by the use of trailers as herein described.

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Selecting the Color for the House

A discussion of color, its true meaning and its application

COLOR lends zest to life and relieves the world of the monotony of our daily existence. It is present in various forms of intensity in everything, animate and inanimate, and its appreciation in even the lowest sense is born to every seeing person.

In some an appreciation of color and an ability to analyze its relative values is so keenly implanted that there is a temperamental response to color vibrations as acutely experienced as are tone values to the musician. Even the barbarian from the earliest of prehistoric times has shown a very pronounced sense of color, and while this appreciation has been shown principally in the use of primary colors and has been marked by a lack of knowledge of the subtleties of color it nevertheless is true that with the advance of civilization and a better mental development there has been gradually evolved an appreciation of color and color values to a point that marks not only their highest development, but also the best expression of our civilization.

"As the sun colors flowers, so art should color life." And by art it is not entirely meant the presentation of a subject in color, but also its presentation in form. Every acutely educated artistic temperament is able to discover in form the same suggestion of color as if it were actually presented. We might cite the example of the bust of a Nubian in one of our important museums that has been chiseled in the whitest marble and yet the suggestion of the blackamoor could not be more insistently conveyed had the work been done from an ebony block.

Every man who has been fortunate enough to spend time abroad and visit in the cities of Southern Europe knows to what extent color has been used in the decorative treatment of architecture as to make the life out-of-doors as diversified and beautiful, as restful and poetical as the best conceived interior decoration. It is undoubtedly true that in this country there has not been close attention to a general application of color to the exterior of buildings, and so undoubtedly true is this that when we observe one of the few examples of color in exterior treatment that are to be found in our large cities we are lost in admiration of the effect and are given over to wonder why similar results are not more generally attempted. In a certain locality in New York a clever architect has been fortunate in securing an opportunity to remodel the facade of a row of houses originally all of an identical skyline and identical design and identical monotony of color. At an expense so comparatively trifling as to be negligible this block has been transformed through the successful application of stucco, and the roughening of the plaster materials and application of washes of color, so that the effect is one most beautifully artistic; and what will appeal to the shrewd owner, has resulted in a certain pride of tenantry and a very greatly increased rental price over a similar group of houses directly across the street. (This is the work of Mr. Albert Sterner, architect.)

Architects have given their best efforts to the designing of buildings and have very properly sought to encourage the craftsmen who execute these designs to the very highest point of technical ability. The result is apparent everywhere. But it is not believed that they have endeavored equally to stimulate the production of exterior materials to an extent that would enable them to have a chromatic palette, as it were, from which they could create a group of buildings in enduring color with an artistic result. Just at the present time there is available no material that would afford color better than the clay products, such as terra cotta and brick, to which we might add the stucco finish as of a less durable character.

Having however selected a color, the mistake has very often occurred in adhering to that same color throughout the entire facade without a tendency to vary it with such complementary color as would set up those vibrations that may be carried forward without any feeling of crudeness.

JUST what color is, how it originates and what its scientific characteristics are may be very well left to the text books. The ultra-scientific discussion will not be a part of the present article, but it might be well to include some description as to the methods employed in creating colors, the results, and their application with reference to their vibrating quality.

From the primary colors based on the spectrum of red, yellow and blue, there are evolved every

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description of color that can be produced. Just how to produce a wide range of color becomes a necessary part of the knowledge of the trained artist and interior decorator and this knowledge can be acquired so as to give a working basis by anyone who will take the time to give it consideration. Fig. 1 shows a circle on which are placed in equal divisions apart the primary colors of red, yellow and blue and the resulting secondary ones of orange, green and purple that are the result of the proper combinations. In order to arrive at a correct knowledge of complementary colors, or those that more harmoniously relate, one to the other, it is only necessary to carry the eye directly across the circle through its center to the opposite color. For example, it will be noted that the complementary color to red is green, to blue, orange, and to yellow, purple. There is more or less confusion in the mind as to what constitutes a gray color. Gray to the uneducated is merely a mixture of black and white, whereas properly speaking the gray of any color is the addition of its missing primary or secondary. For example, we find on reference to Fig. 1, that the complementary or graying color of blue is orange. Blue being a primary color we must add the missing primaries to gray it, and in this case the missing primaries are red and yellow, or orange. The same will hold true through the entire range of primary and secondary colors. In order to illustrate what is meant by the graying color, let us suppose that a panel two feet square has been painted a vivid red and that over half of this has been laid a board to cover it, and the panel placed where it can receive the direct or bleaching action of the sun. In the course of a few weeks, if the board covering is removed, it will be found that the original vivid red is still there, but where the sun has acted on the uncovered portion it has grayed the red color. Now if it became necessary to produce this gray color the question arises what must be added to the original red. We find upon referring again to Fig. 1 that the complementary or graying color of red is green, or a combination of yellow and blue. So then if the proper proportion of green is added to the original red, the grayed tone of the superimposed piece of board will be exactly duplicated.

Continuing this illustration from the artistic standpoint we will suppose that at one time or another a painter has painted a long fence of pickets a red color. He will, of course, mix sufficient color to complete the entire job and paint every picket from exactly the same mixture. If the artist desires to paint this scene and to reproduce this picket fence in his picture he would not be able to use the same mixture of color on that part of the fence immediately in the foreground as he would that part that was the furthest away. The interposition of the atmosphere would gray the color and the artist would find it necessary to add sufficient of a proportion of green in order to have the fence in its proper plane through its entire length.

This brings us to the question of values, an expression very often misunderstood, and one that the painter and interior decorator should thoroughly understand. Value, simply explained, is the placing

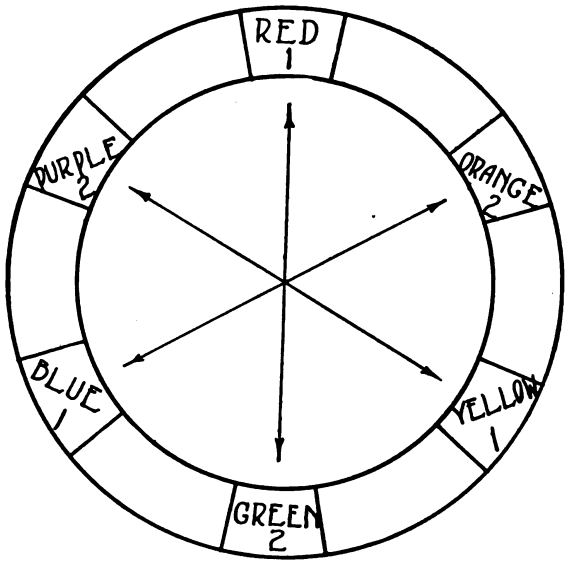

Fig. 1. The primary colors (1) and the secondary colors (2) derived from them. The arrows show the complementary colors, one with another

in a picture or in any group a representation of the various things, each one quietly resting in its proper place. It is in order to conserve this matter of value that the artist painter finds it necessary to change the character of his red when he paints the fence so that it might go back into the distance where it properly belongs. Had he painted this fence all of one color, the part farthest away would have irresistibly moved into the foreground and created a most inartistic result.

THERE are some curiosities of color to be found in the contention of those who claim highly developed color sense and who endeavor to construct a close relation between the tones of color and the various tones of the chromatic scale. Fig. 2 shows a diagram of the three primaries, three secondaries and what may be called the tertiary colors. Opposite each of these there has been placed one of the notes of the chromatic scale forming a

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perfect octave. It is interesting to note that the claim has been made, and with much insistence, that any scheme of color that may be selected and which may be struck as a chord will, if the chord is harmonious, become a harmonious scheme of color, but if this chord produces a discord of music, there will be a discord of color in the picture. It will be interesting to those who are musically inclined to experiment in this matter and it is believed that much entertainment and instruction will result therefrom.

The foregoing has been set down in an introductory way to acquaint the reader with the vital

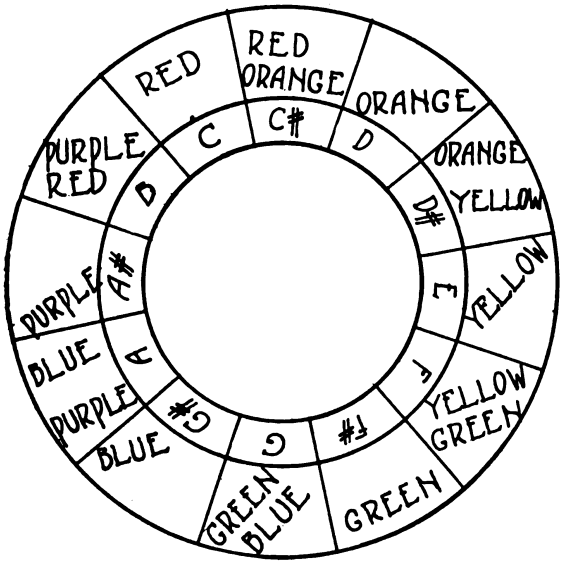

Fig. 2. An arrangement of the primary, secondary and tertiary colors, as relating to the chromatic scale in music

characteristics of color, its derivation and its proper application. The home builder will early learn that if his house is to become in the truest sense a home he will need to give attention to color, both inside and out. One may not selfishly select a color for the house and disregard that of his neighbors, for if he does he will be very apt to create a discord and to make his house stand out so prominently and vulgarly as to ruin its good effect of architecture or its relation to the immediate surroundings.

There should be as careful study of the exterior color of the house as there should be in the selection of color of the clothes that one wears. If the house stands isolated and unshaded it will be necessary to use subdued colors in order that a restful effect and one of domestic refinement may be conveyed. On the other hand, if the house is embowered in trees, a more brilliant color may be employed and the best examples of this are to be found in New England towns, where the pure white house with its green shutters under wide-spreading elm trees is a feature of the village street, or where the red barns harmoniously blend with the green of the land that surrounds them.

Nothing will indicate a more refined taste or a more thoughtful attitude toward the everyday things of life than the color one employs about the house, both outside and in. In the past there has been a tendency to an extravagant use of color in interior decoration. It was at one time usual in many houses to divide the walls into three parts, a dado, ground and frieze, and give each of these a different color. Fortunately, this tendency is now overcome and we have the interior decoration in a monotone with the contracting or supplemental colors furnished by the draperies or the materials used in the upholstery of the furniture or the rugs on the floor.

It must be borne in mind in painting the house that the color of the paint will not be the only color employed and that in its selection due regard must be had to all the accessories that will ultimately find place in the room. Further, in the smaller house there is a tendency to paint each room a distinct color. This is to be avoided, as in the modern house with its large living room and wide openings leading to the hall and dining room, to localize color in each room is to insistently show the limitations of the house as to space, and the mapping out of each room as a separate unit. If, however, the rooms on one floor that communicate are decorated in the same or very similar manner, in the same colors, a sense of largeness is at once set up and the confinement as to space is entirely dissipated.

Finally it must be remembered that in using color outside of and about the house the same attention must be paid to the garden seats and to those various out-of-door accessories, and particularly dependent buildings, as one would give the house. There should not be any violent contrasts of color, but the whole scheme of the house as viewed from the street should be one of quiet, well selected colors so that it may dwell in amity with its neighbors and convey an impression of good breeding and domestic refinement.

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Painting Old Brick Walls

By A. Ashmun Kelly

THE principal difficulty met with in the painting of an old brick wall is the liability of the paint to come off, owing to a bad condition of the bricks. Hence the first thing to do is to make the wall as clean and solid as possible, scraping and brushing off all loose material, finishing with a sweep-down with a broom. This must of course be done when the wall is dry and indeed the entire job, from start to finish, should be done in dry weather. A wire brush is an efficient tool when the bricks are rotten in places. Plaster may be necessary to fill up cracks and holes where the brick has rotted away. If this part of the work is done right the result will be just as good a surface for paint as if the surface were wood instead. And just the same kind of paint is used. The first coat should be thin, raw linseed oil colored with whatever pigment will best suit the finish, ochre or red, for instance. Let the surface take in all it will absorb, use a flat wall brush, one having medium long bristles, but working the paint in criss-cross, with the ends of the bristles. Care should be exercised not to miss some places. After this first coat has become dry, putty all cracks that may remain after the plastering, and of course there will be some, and then it is ready for the second coat, to be followed by the third. Use driers in each coat of paint. There are two finishes, the flat or lusterless, and the gloss. The former is only used on fine jobs, new work mostly, for it does not look well when the bricks are old and uneven. A gloss-finish is simply paint that is made with oil only, no turpentine. Three coats of such paint will give good wear. On new bricks, the fronts of houses, the flat paint, that made with turpentine, will also give excellent wear. This will be described in another place.

The priming coat on the old brick wall may be made upon this formula: dry venetian red, 20 lbs., raw linseed oil, 10 gals., with driers—say a pint. It will be an advantage to allow this coat a week for drying. The second coat may be made with 75 lbs. venetian red in oil, 25 lbs. white lead in oil, and 3 lbs. of Indian red, in oil. Mix stiff and let the mass stand 24 hours before thinning for use. And do not thin it until ready to use. Don't add driers until ready to thin for use. As the next and final coat is to have a full gloss, add a little turpentine to the second coat, to dull the gloss a little; it is a fact in painting that if an oil paint is applied to an oil surface a partly dead effect is obtained and not a full gloss. Hence the rule to have the undercoat somewhat dull if the finish is to be a gloss, and vice versa.

For the better sort of brick painting there are a wide series of colors, ranging from cream, through the buffs, on to the light and dark reds, the latter up to a decided purple-red. These colors are effected by the use of ochre and Indian red, the darkener being Prussian blue. Milwaukee or buff brick color is made from white lead, yellow ochre and a little raw sienna.

Coming back to the old brick wall, if there is green mould or mildew on it, it should be washed with water made sour with hydrochloric (muriatic) acid. Use a stiff fiber scrub brush. In places where much soft coal is used and the walls are black with soot, the soot may be removed with this preparation: To one gallon of good soft soap add two pounds of pulverized pumice stone, about 00 or F, and one pint of liquid ammonia. The soot should first be swept off as much as possible with a stiff broom. The soap preparation should be left on about one-half hour; after which use a scrub brush and scrub the wall, now and then dipping the brush in the clear water, a bucket of which should always be accessible. Finally wash off with a hose, or sponge. Before applying any paint be sure the wall is perfectly dry.

Old paint may be removed in the usual way, with burner or alkali, washing off then with acid water. A 20 per cent acid solution is about right. Finally wash down with clear water. Efflorescence may be removed with muriatic acid water, first removing all loose salts by means of a stiff brush. It is difficult to prevent efflorescence once it appears; the best one can do is to remove it, and lessen the evil by filling the bricks full of oil. On such a wall it would be best to apply straight oil, rather than a thin paint primer. Whether to use boiled or raw oil is debatable; some prefer the one, some the other, while still others add a little turpentine to the oil. The turpentine causes the oil to penetrate better, especially if the boiled oil is used. Boiled oil has a thicker body, hence does not penetrate as well as the raw oil does. Paint or oil stains on the brick work, where the old surface is to be renovated, may be removed by a paste made of whiting two parts, soft soap one part, and potash one part, with some hot water to reduce the mass to a paste. Apply this, let it stand a half hour, then wash off and scrub with soap and water, to remove any part of the stain not taken off in the first place. Finally wash clean with water. To remove white paint, take

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equal parts of sal soda and quicklime; dissolve the soda in a little water and add the lime and let it slack. If this makes too thick a paste reduce a little with water. Brush on freely, let it stand awhile, then try it with a scraper; if the paint is loose enough remove by scraping, and finally wash off with hot water.

In the matter of painting a fine brick front, the paint can be bought ready for use, and with full directions. In cities where such brick fronts are a feature, Philadelphia for instance, there are painting firms that do nothing else but painting of fronts, and master painters usually give such work to these specialists, who have all the necessary staging, tools, paints and experience, and it is economy to have such men do it, rather than try it alone. The paints used are those known as flat, being thinned out with turpentine, quite thin, and it is also lined or penciled, to imitate the white mortar joints. This particularly demands expert knowledge, as the lines must be made true.

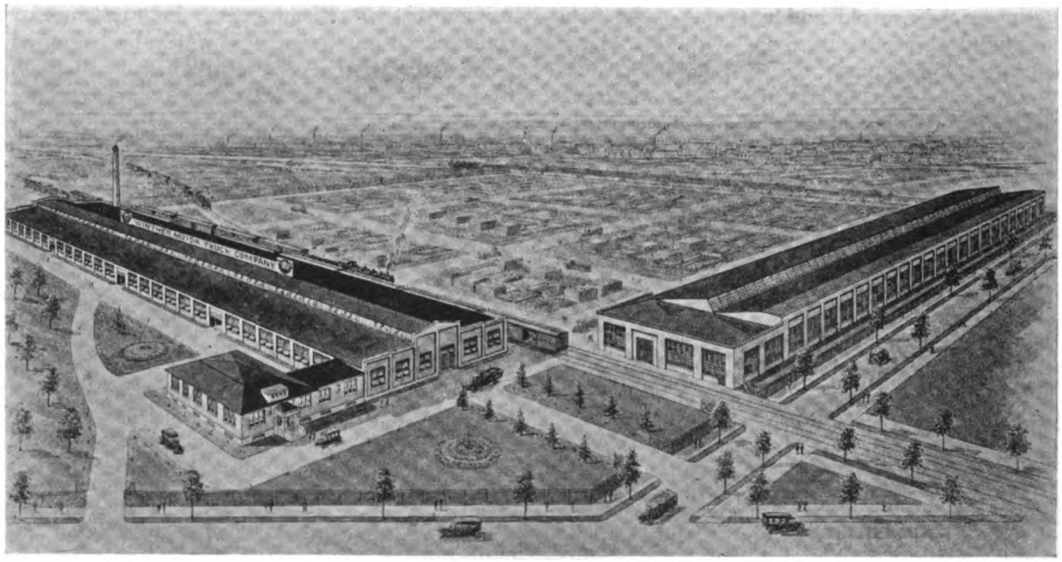
The manner of applying oil paint to brick work is different from painting on wood. In the latter case the strokes of the brush are usually long ones, but on brick work it is necessary to make short strokes owing to the rougher surface. For the first two coats it is not necessary to lay the paint off evenly, but make short strokes, about six inches, and let it go at a criss-cross way. It will look solid when done. A brush with long bristles is best, a flat one, not too wide, but having plenty of bristles. Where two or three coats are to be applied none need be heavy, and better results will be had by applying rather thin coats, owing to the fact that such paint carries more oil than heavy paints do. And it is the oil that is of value in any exterior painting.

Motor Co. Starts New Building

A LARGE addition to the present plant of The Winther Motor Truck Company, of Kenosha, Wis., is now under construction, and it is anticipated that the new building will be completed and ready for occupancy early in September.

The new structure is 60 feet wide by 400 feet long and will be of modern saw-tooth roof construction, with concrete floors, brick walls, and a wide sky-light extending the entire length of the building. No labor-saving device or safety appliances have been overlooked in equipping this new addition, the entire plant being laid out for high-speed production.

A view of the entire plant is shown below.



Plant of the Winther Motor Truck Co. as it will appear when the new addition is completed

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Basement Excavated After Five Stories Were Erected

DIGGING the basement for a building after five stories had been constructed was the unusual work done by a Smith Excavator and Loader for the Walter W. Oeflein Company in connection with the building of the big factories for the Wisconsin Food Products Company at Milwaukee.

This building was started last November in the midst of a prolonged cold snap which left the ground in a solid frozen state, making extensive excavating a physical impossibility. Instead of despot to soften the ground. A hole was dug just big enough to permit pouring of the columns and the rest of the structure was continued in the usual manner.

The fact that the space between the top of the ground and the bottom of the floor of the first story was less than five feet in some places presented an unusual excavating problem. A steam shovel was impossible because of the low clearance and hand shoveling would have been recklessly inefficient and costly.

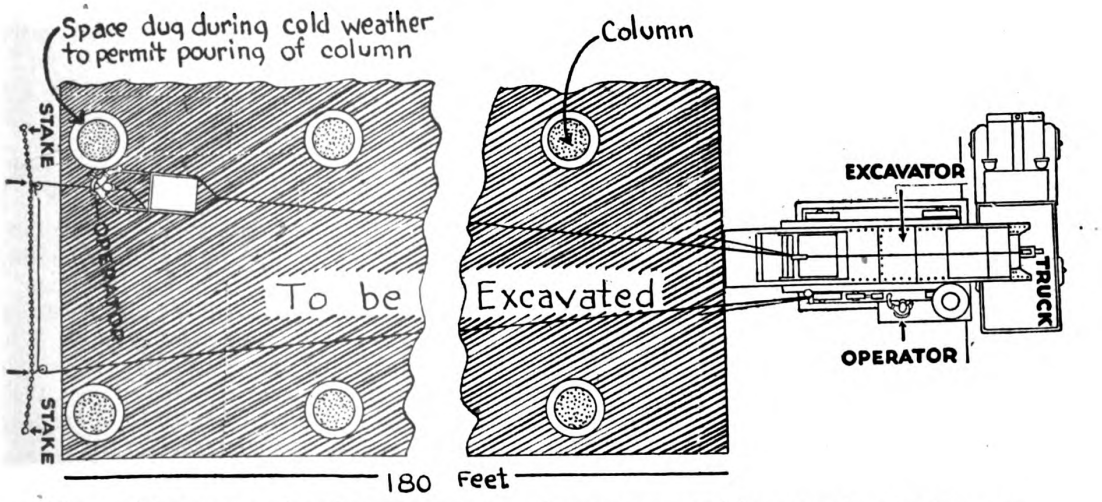

Fig. 1. Diagram showing the arrangement of the apparatus used in excavating the basement

laying the construction until the ground became soft enough to dig, the contractors decided to dig only space enough for the footings and columns and leave the bulk of the excavating until a later date. The entire space to be excavated measured approximately 300 feet by 160 feet and at a depth of about 7 feet.

The location of each column was marked out and a fire built on the

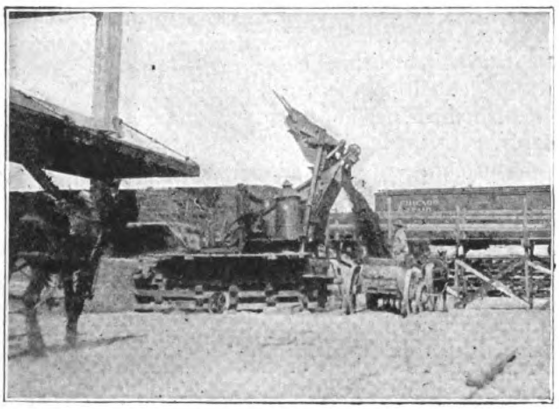

Fig. 2. Dirt being loaded for removal

The Excavator and Loader was found to be adapted to the work because the dragline which brings the dirt up to the machine requires no more clearance than that required by a man guiding the slip.

The excavator was set at the edge of the building in such a position as to give a straight run between two rows of columns. At a point 180 feet

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away from the machine, two stakes, 20 feet apart, were driven. A heavy chain was stretched between these stakes. Upon this chain two sheaves were hooked, either of which could be unhooked and relocated anywhere on the chain to change the path of the excavation. As shown by the diagram a heavy cable passed from the hoist drum on the machine, then to the digging slip, then through both sheaves, and back to the retrieving hoist drum on the machine. (See Fig. 1.)

As the dirt between one row of columns was removed the excavator was moved to the center line of the next row. Only two men were necessary for complete operation—one man at the digging slip and the other operating the machine. Only a limited number of trucks were available which caused the machine to lose considerable time between loads, but in spite of this condition the dirt was moved at the rate of 30 cubic yards per hour or 300 yards in a 10-hour day.



Fig. 3 shows the operator guiding the digging slip, as it is being drawn to the loading machine, shown in Fig. 4. It will be noted that this method of excavation is possible under limited head room conditions

On the side upon which the machine was located was a depression in the ground running the full length of the side of the building and extending about six feet below the basement level of the building. This complicated the digging problem somewhat but it was overcome by removing the wheels of the excavator and building a crib platform upon which the machine was elevated and mounted.

The operation here described and illustrated is somewhat unusual, and indicates that Yankee ingenuity still flourishes.

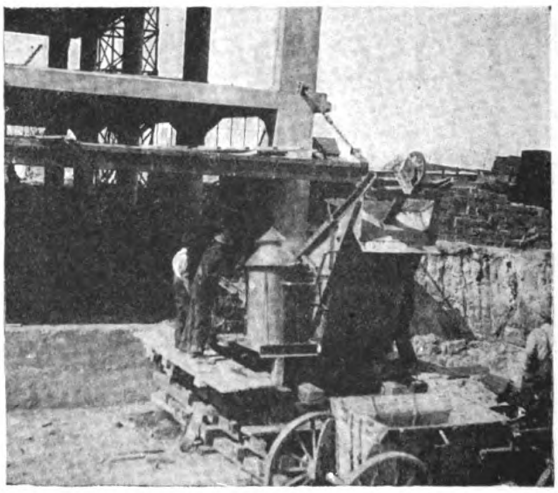

Fig. 4. Method of loading the excavated material for removal. The excavator picks up the dirt brought to it by the digging slip and dumps it in the waiting truck

Book Reviews

ESTIMATING CONCRETE BUILDINGS: BY CLAYTON W. MAYERS. 6X9 STIFF CARDBOARD COVER—PP. 51, ILLUSTRATED. ABERTHAN CONSTRUCTION CO.

This small volume describes briefly and in logical order the succession of steps in estimating the quantities and costs of concrete buildings. The methods described are sufficiently illustrated to clearly demonstrate their application. While a much larger and more comprehensive volume might have been written on this subject, the book will be found to contain much of value to those engaged in concrete construction.

ARCHITECTURAL DRAWING PLATES: BY FRANKLIN G. ELWOOD. PAPER COVER 7¾X8¾—PP. 15. THE MANUAL ARTS PRESS.

This little book is designed for the student and also as a practical handbook for the architectural draftsman. It contains 15 plates in all, illustrating details of doors, windows, mouldings, cornices, porches, etc., as well as several single line sketches showing the method employed in making preliminary plan studies. It should prove a useful addition to the draftsman's library.

Armenian Workmen Stranded

Since the signing of the armistice, Armenian workmen who have emigrated from the United States have been robbed by unscrupulous agents in European ports. A good many of them, penniless and unable to continue to travel to Armenia or to return to the United States, are now stranded in Marseilles, Naples, Liverpool or Paris.

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Contractor Makes Good Record

Special training of men results in increased production

"I THINK I am beating the world when it comes to speed in having concrete block laid," says Austin Crabbs, manager of the Concrete Stone Company, Davenport, Iowa. "Each mason with his helper averages between four hundred and five hundred 8x8x16 inch blocks daily. I doubt if you will find this record beaten anywhere. If it is, I would like to hear about it.



When stone masons are not available, training will help brick masons increase their capacity for laying concrete block

"When our company first went into business," continued Mr. Crabbs, "we noticed that the brick masons working for us were not laying many blocks in a day. They considered 150 blocks a big day's work. In the group was a stone mason who with his helper seemed to have no difficulty in laying 300 blocks a day, or twice as many as the brick masons.



Stone masons in the employ of the Concrete Stone Company, Davenport, Iowa, set a record hard to beat—laying over 400 concrete blocks each day

"This man explained to me that he had been accustomed to handling heavy irregular stone and that when given relatively lighter and more regular blocks he was able to make better time.

"This started me thinking and I made a survey of the stone masons in Davenport. I found only three, but selecting the two best I have kept them with me ever since. These men with their helpers now average between 400 and 500 blocks each per day. One Saturday, working six hours, they put in a complete footing and laid up a foundation requiring 800 blocks. Assuming that 75 blocks replace one thousand brick, these men lay up the equivalent of more than five thousand brick a day each.

"I believe that my men are above the average, and I intend to keep them so. They have been with our organization for several years now, and we have always managed to find work of some kind for them during the slack times. Other block men can profit by my experience, and either train their men or get stone masons to lay up the block."—*The Concrete Builder.*

Is Your Percentage of Profit Calculated Correctly?

MANY builders do not figure their percentage of profit accurately, and so continue to take a lower profit than they are calculating on.

For instance, a builder may figure so much for his estimate and desire to make 10 per cent profit on the contract. In many cases he will take 10 per cent of his estimated cost instead of 10 per cent of the cost quoted to the owner.

Suppose that you have a $100 job for some repair work, and you desire to make a 20 per cent profit. Note that if 20 per cent of the actual cost is added to the estimate the price quoted will be $120, the profit being $20. This, however, is not 20 per cent profit on the selling price. The proper price to quote would be $125, giving the desired profit of 20 per cent, which will be $25.

Such calculations can be figured by means of the following formula, where S = the price quoted the owner, C = the builder's net cost and X = the percentage of profit.

$$S = \frac{C}{1 - X}$$

Using this formula on a $1,000 job where a 10 per cent profit is desired, the contract price after the percentage is added to the actual cost can be found as follows:

C, the builder's cost, is $1,000. Divide this by 1 — .10 (which is the percentage desired to obtain), or 1,000 divided by .90. This will give the price to be quoted as about $1,111, or a profit of $111.

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Well-Planned Kitchen Breakfast Corners

By Charles Alma Byers

KITCHEN breakfast corners, sometimes called Pullman breakfast alcoves, have become quite popular with modern home-builders, and, indeed, they generally prove very practical and desirable features. Used in place of the more exposed regular dining room for the morning meal, a feature of this kind, as will be readily realized, helps materially toward lightening the housewife's work and, more than this, if properly designed and attractively finished, it will constitute a very pleasant dining place. It is an especially desirable convenience where the family's breakfasting is irregular; or, even if it is not to be used by the family, it at least offers interesting possibilities as a dining place for servants.

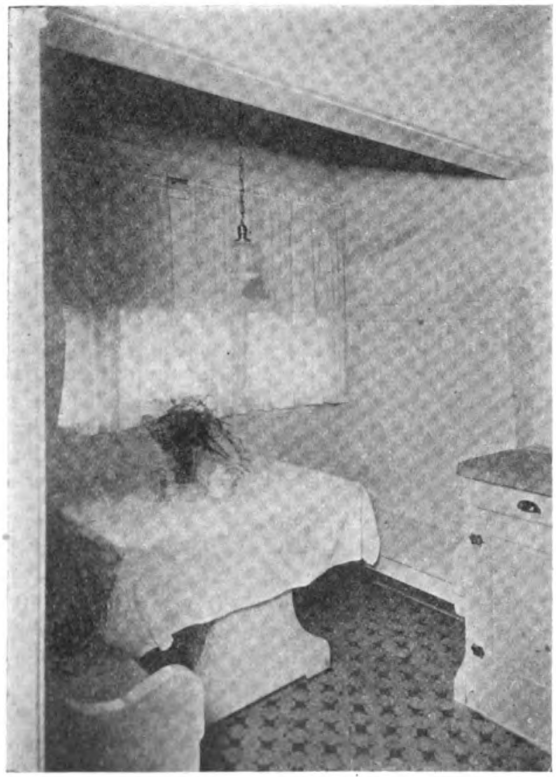

Fig. 1. A well-designed kitchen breakfast alcove

In the accompanying illustrations are shown two particularly well-planned representatives of the kitchen breakfast corner idea. Here, in each instance, as will be observed, the feature is designed as a sort of special alcove immediately adjoining the kitchen; and, as is commonly the case, is provided with windows in an outside wall and the

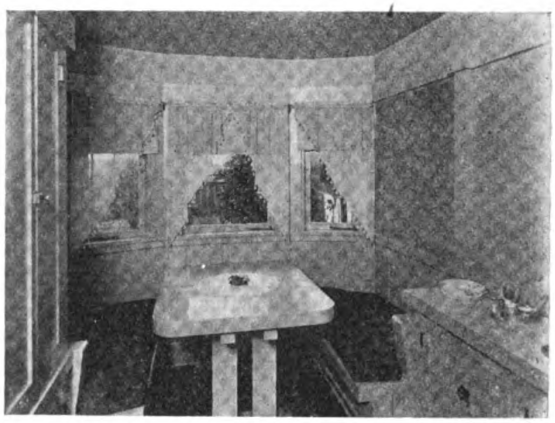

Fig. 2. A "Pullman" breakfast alcove practically designed

necessary seats and table of the stationary kind. Incidentally, however, the table, in some instances, is designed as a removable piece of furniture, which enables it to be used occasionally for other kitchen purposes, although the fixed type of table seems to be the more generally preferred. The seats, it may also be added in this connection, are sometimes of the box design, provided with hinged tops, to constitute convenient receptacles for various articles. In one of the breakfast alcoves shown the seats are so designed, and in the other they are merely of the built-in bench kind.

The Pullman breakfast alcove shown in the first of the illustrations is, in floor dimensions, approximately 5 ft. 6 in. wide by 4 ft. deep, while the top of its table measures about 3 ft. 2 in. by 2 ft. 8 in. The seats are fourteen inches from the floor, and their high backs, forming a sort of wainscot effect,

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are designed with a mild slope. Three casement windows, neatly curtained, occupy the entire width of the outside wall, and a lowered beam effect helps to form a dividing line between the alcove and the kitchen. A small drop fixture over the table constitutes the one electric light, and, as in the kitchen proper, the woodwork of the alcove is enameled white and the plastered walls are painted white.

The breakfast corner or alcove shown in the other illustration is about 6 ft. in width by a little more than 4 ft. in maximum depth. Its outside wall is extended in a sort of bay-window alignment, and the three windows with which it is provided are of the hinged or casement type, the one in the center being somewhat wider than the one on either side of it. The table top here is 3 ft. 8 in. long by 2 ft. 8 in. wide, and the seat tops are 14 in. above the floor. The latter are of the box type, with hinged tops, and are provided with comfortable cushions of dark blue material. The windows have especially attractive curtains, and the woodwork of the alcove, including a low-paneled wainscot, is finished in white enamel, while the walls are neatly papered.

Naturally the breakfasting place of this kind can be considerably varied in the matter of size. They are sometimes made as small as 4x3 ft., and even of such limited dimensions are quite satisfactory.

In planning the breakfast alcove, whatever its size is to be, it should be borne in mind that there should be at least one window, that an electric light is a desirable equipment, that, to carry out a harmonious scheme, the woodwork ought to be finished to correspond with that of the kitchen, and, finally, that the feature should be made and kept neat and attractive.

Laying Slate, Asbestos and Asphalt Shingles

By L. S. Bonbrake

Part I

HAVING rounded out nearly a half century "tackin' 'em down," we feel impelled to give our experience, gained by careful observation, in better methods of laying slate, and in the use of several styles of excellent composition shingles. This, we believe, will be of value to the younger generation, and we trust our effort may also interest the "old timer" and give the small as well as more important details to the contractor and builder.

Slate, asbestos and asphalt shingles when of flat surface, and their length twice their width, may be laid under the same general process. Hence when we refer to shingles or slate shingles we intend it to comprehend all these materials in connection with gutters, valleys, chimneys, decks and flashings.

We will take up all the several shapes as we advance to the description of diamond and tapered shingles.

Slate Shingles

The larger size slate are best adapted for barns, warehouses and factories; hence 12 in. x 24 in. are in general use and a smaller size 10 in. x 20 in. selected for dwellings; yet in order not to have several odd lots scattered over the neighborhood, a few left over from each job, we have found it advisable, especially for the rural contractor to confine himself to one size, with 11 in. x 22 in. very satisfactory

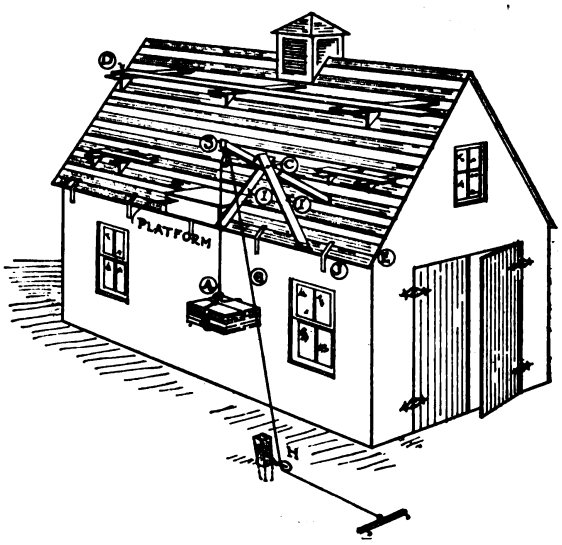

Fig. 1. Apparatus for raising shingles by horse

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for both dwellings, and larger structures. These shingles (slate) come in uniform sizes, the length twice their width, necessitating a uniform size for the whole section to be roofed; and as they cannot be shipped with economy in less than car lots of from 65 to 100 square it is advisable to determine the size and color you intend advocating and invariably order at least a minimum car; odd widths as 24 x 14 in. and 20 x 12 in. are laid at the eave differently. We have found but few colors fade to any appreciable extent, except sea green, which will change in spots over the roof, turning a brown or

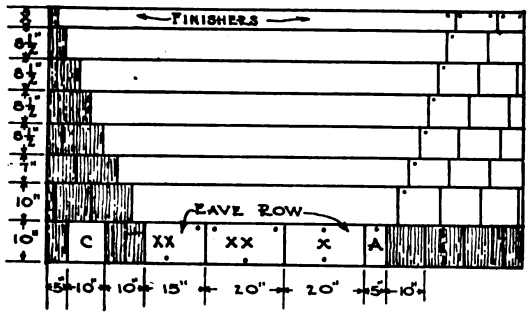

Fig. 2. Spacing of wood strips for 10"x20" shingles

iron rust color. As this is not detrimental to durability or service as a covering, owing to their cheaper cost at the quarry, an enormous amount are used; black will not fade and an "unfading green" is made that will hold its color in any climate.

Foundation for Slate Shingles.—The surface to be covered should be pine sheeting covered with slaters' felt or tarred paper; however, 3 in. pine

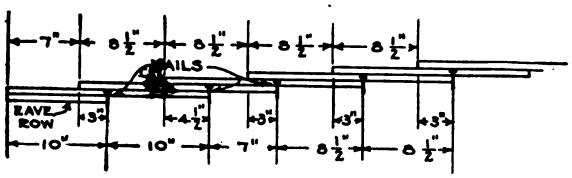

Fig. 3. End view, 10"x20" shingles

strips or a fencing board sawed in two are often used for a cheaper class of work, illustrated in Fig. 1.

They are spaced for nailing to conform with the length of slate to be laid. When used the eave should be laid solid with two fencing boards as shown at E. This will allow a better eave finish and will give solid sheeting for eave trough work. As the outer edge of the eave row of slate must be raised by nailing a plastering lath along the length of the eave, notches may be provided at intervals as desired, where roof straps or bars may be nailed for adjustment to the hanging eave trough fastener, one of which is shown at J.

The first slate or shingles to be used are laid lengthwise with the eave, extending one-half or an inch past the facia, and are generally known as the "eave row," illustrated by Fig. 2 at A, and are nailed at their top corners and bottom center as at xx, or may be nailed at top and bottom center x, as best suits the fancy of the roofer.

The first course of shingles is laid over the eave row with their lower edges flush with same, making a double thickness at the eave; the first slate C, Fig. 2, of this course will center the first slate of the "eave row" and a half slate is used to fill out to the gable, indicated by dark color, after which all the slate will center throughout the roof. Slate should lie straight, lengthwise up and down the

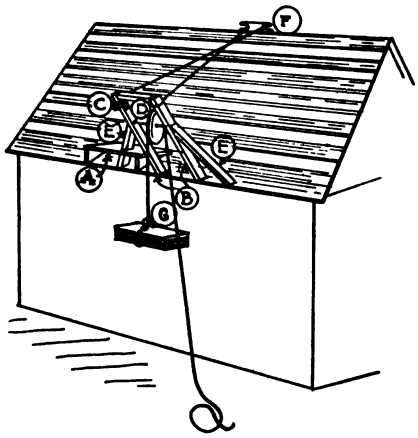

Fig. 4. Apparatus for raising shingles by hand

roof, and, while snug, should not bind at their sides, giving room for free drainage to prevent damage from freezing in severe winter weather.

Spacing Wood Strips.—All slate manufacturers allow 3 in. for the under lap, hence in order to find the length of exposure, if using 10 in. x 20 in. shingles, 3 in. are deducted, 20 in.-3 in.=17 in., the half of which, 8½ in., is the length to the weather, shown by diagram Figs. 2 and 3.

The first course of slate, indicated by the white slate between dark, will be nailed immediately back of the eave row 10 in. up from the eave end. The second course, shaded slate overlapping the eave row 3 in. and nailed at the top of the first course, will be nailed 13 in. from their bottom ends, and extending on up 7 in. where the third course will be nailed; therefore, the second spacing for this size slate between the second and third nailing is only 7 in. followed by center spacing of 8½ in. on up the rafters to the top where a board should be

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used upon which may be nailed the finishers and comb capping. Fig. 3, an end view of slate 10 x 20 in. spaced, shows the length of exposure as being 7 in. for the first course, with the proper surface to the weather, 8½ in. following to completion.

In the extension of the 10 in. wide "eave row" 1½

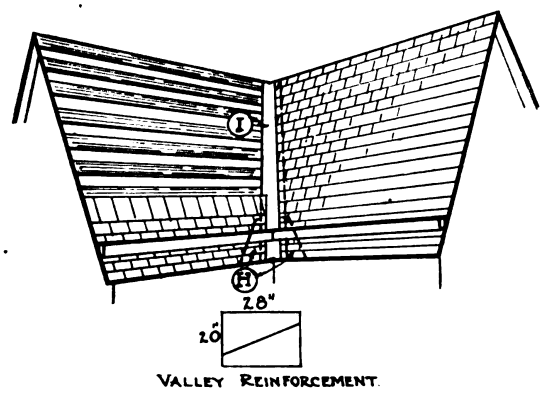

Fig. 5

in. more than the regular space is taken up at the third course under which the top ends of the first course are overlapped 4½ in. instead of 3 in.

As a great deal of confusion has been encountered at this very point, we do not deem it superfluous to state further that here the space being 7 in. and proper lap 3 in., making 10 in., the same length 10 in. would follow for nailing. However, with the under lap increased 1½ in. a deduction is made from the top of the same amount, giving 8½ in., which straightens the irregularity for the remainder of the roof.

While printed tables are easily obtained giving the number of the several sized slate to the square, a rule in the head is always with you, the book probably not. As we have already given the exposed length of 10 x 20 in. at 8½ in., the amount of surface laid for each shingle is 8½ in. x 10 in. or 85 sq. in., or 170 pieces per square. Larger slate, 12 x 24 in.: 24—3=21÷2=10½, giving 10½ x 12 in., 126 sq. in., 115 pieces. Medium slate 11 x 22 in.: 22—3=19÷2=9½, giving 9½x11 in. or 104 sq. in. or 138 pieces and so on down the row by the same process.

In order to gain more profit or do cheaper work, we have met with frequent cases of men who were willing to sacrifice quality for price by giving the third under course a 2 in. lap instead of the established 3 in. This is highly inadvisable, as the one inch lost from the proper lap adds only ½ in. gain, and unless the foundation is solid sheeting covered with felt, and the pitch one-half or nearly so, fine snow and sleet will work its way through to the attic or garret with a driving storm, creating far more dissatisfaction than the value of ½ in. gain to every course.

Hoisting Shingles

SLATE or the heavier composition shingles may be easily and conveniently elevated to the roof by horse power, when a barn or other large structures are to be covered, by means of a derrick constructed for that purpose as illustrated by Fig. 1. This is described as being made with a 2 x 4 in. beam, having ¼ in. holes "c" for adjustment of the side braces I, I, which are bolted to the beam through the hole that will give the proper adjustment for height of the front of the beam. The front of the beam is provided with a double or "S" hook to engage the block and tackle and another tackle, H, located on the ground is secured by a stake, through which the rope passes, and to the end of which is attached a single tree. The hoisting end of the rope is provided with a small chain which may be passed around the slate, A, and secured with a suitable hook. When elevated, the shingles may be equitably distributed over the roof, four or five thicknesses may be pushed endways between the strips and a moderate number laid lengthwise across them or several platforms as shown by D may be used for their distribution when the roof is sheeted.

Elevating by hand as shown by Fig. 4 is a convenient method for getting the shingles on the roof, obviating the tiresome task of carrying them up a

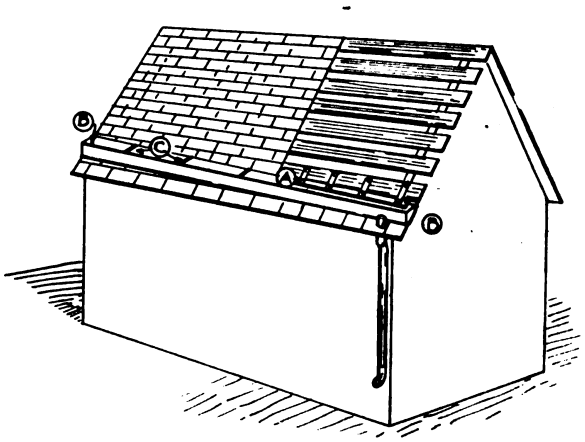

Fig. 6. Method of forming roof gutter

ladder, and the dispatch with which they may be hoisted will far more than offset the time of erection of the necessary derrick. The 2 x 4 in. standards, B, have a top connection of same material with an iron plate screwed flush with and extending down from the ends. This plate is provided with

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holes through which hand bolts may pass, and when in juxtaposition with holes in the standards, the two may be connected quickly for use or as readily disconnected for packing in a small space.

Holes are in the standards at D, through which a rod may pass upon which is centered a large wheel, similar to the wheel of a chain cistern pump; the sides are braced as at E, and the top held forward in position by a rope passing back from each top corner, and fastened around a cleat nailed up at the roof, or on the comb as at F.

A platform upon which the operator on roof may stand is indicated by "A," while "G" represents chain and shingles heretofore described.

Laying the Valley

Care must be taken in laying valleys to have the sheet metal used of sufficient width to allow an open trough "I" of from 4 in. to 6 in., according to location and size of the building. The valley must have a lap under the shingles of ample width from their edges to prevent seepage from back water, or capillary attraction. A free passage for the flow of water is especially needful in the winter months when freezing and thawing has a tendency to clog up the course with danger of leakage under the shingles at the outer edge of the metal when too narrow.

Twenty-inch material is none too wide for most buildings; fourteen as narrow as should ever be used.

It is also advisable to keep the valley free from nails; punch special holes through the back of the shingles and nail as far from the valley center as possible.

Chalk line the metal in the valley on both sides of center at a distance you may determine upon, giving the bottom a slight advantage in width, and where box, eave, or roof gutter, H, Fig. 5, is used, or any other obstruction that may catch and hold snow, usually forming into ice after a slight thaw, it is advisable to provide reinforcement at the bottom of the valley, by cutting diagonally through a sheet of 20 x 28 in. metal, seaming and soldering the pieces to each side, giving an additional width of 15½ in. at bottom and 3½ in. at the top.

Taking all possible care to have the metal of valley wide enough and properly laid will avail nothing if nails are indiscriminately driven through the material under the shingles. As plastering lath is used under the shingles at the edges or valley line the same as starting a roof at the eave, thus giving them the proper pitch to prevent their rocking and compelling the bottom ends to lie smooth and tight, it is suggested not to nail through the lath into the metal, but preferably to use metal strips nailed onto the lath as shown by "A," Fig. 6, and nail strips back of the outer edge of the metal.

(To be continued)

The Proper Way to Hang a Door

Growing Tendency Is Evidenced Among Architects and Builders to Use Three Butts to the Door Instead of Two

THE efficiency of an extra butt is no longer a much-mooted question. Throughout the country there is a general trend on the part of architects and builders to hang a door on three butts. In fact, to serve this growing demand manufacturers are now packing butts three to a box, constituting a set.

To say that doors are one of the hardest working parts of any building, especially public buildings such as schools, hospitals, theatres, railroad stations, is to repeat a fact everyone knows. After all, it is the butts that make or mar the door. On them the stress and strain, the wear and tear, are bound to center. Even the best butts are tested beyond capacity at times. The weight or load of the door is excessive. Green lumber which often has to be used on the door results in warping.

Careful analysis of the subject shows that there are many logical and practical reasons why the use of three butts to a door is true economy in the long run. It has been demonstrated that the third or extra butt will hold the butt edge of the door in alignment and, to a great extent, will prevent the door from warping. Also, it prevents the door from striking or interfering with the door stop, if used, or the edge of the rabbet, if the door jamb is rabbeted when the door has a tendency to bow or warp toward the door stop or the center of the door jamb.

While it may take more time to put on the extra butt and while the cost is slightly increased, the saving of the carpenter's time and expense later on to correct door faults more than offsets the initial investment.

If a door is hung on two butts only, each butt carries one-half of the load or weight of the door. When a door is hung on three butts, each butt carries only about one-third of the weight, thereby decreasing the strain and wear. More screws are driven into the door jamb and the door, thus relieving the strain on screws, the wood in the door jamb and in the door, which is an important factor.

When three butts are used the top butt can be set nearer the top of the door, thereby lessening the leverage of the door pulling away from the jamb. The lower butt can be set lower, thereby preventing the door hugging the door jamb near the bottom of the door. The top edge of the door remains in line with the head jamb, and the bottom edge of the door is parallel with edges of threshold.

The binding and sagging of doors are expensive troubles to correct. Do it right at first.

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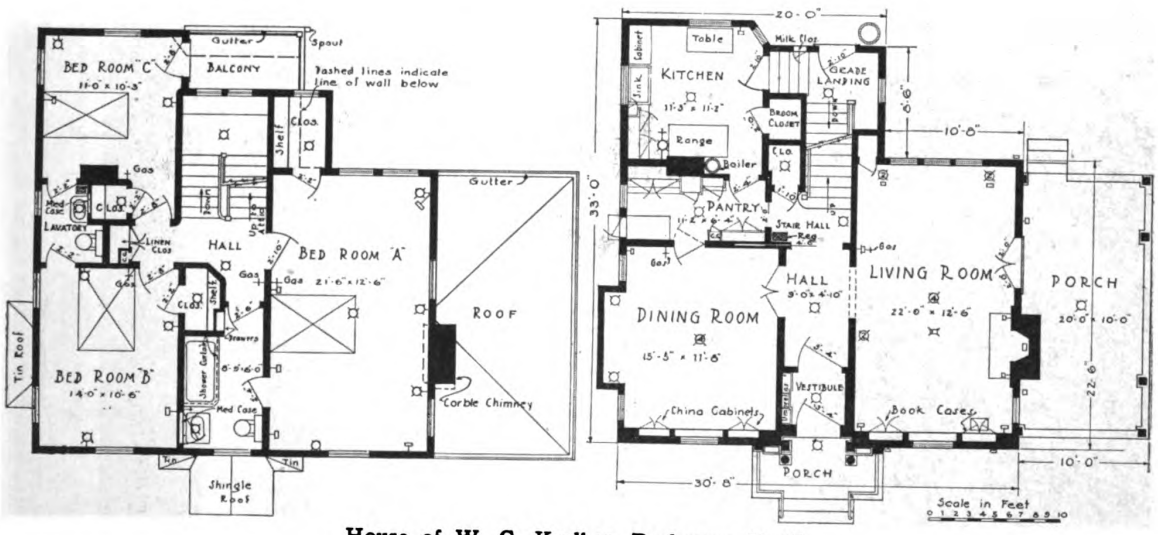

House of W. G. Kaelber, Rochester, N. Y.
W. G. Kaelber, *Architect*

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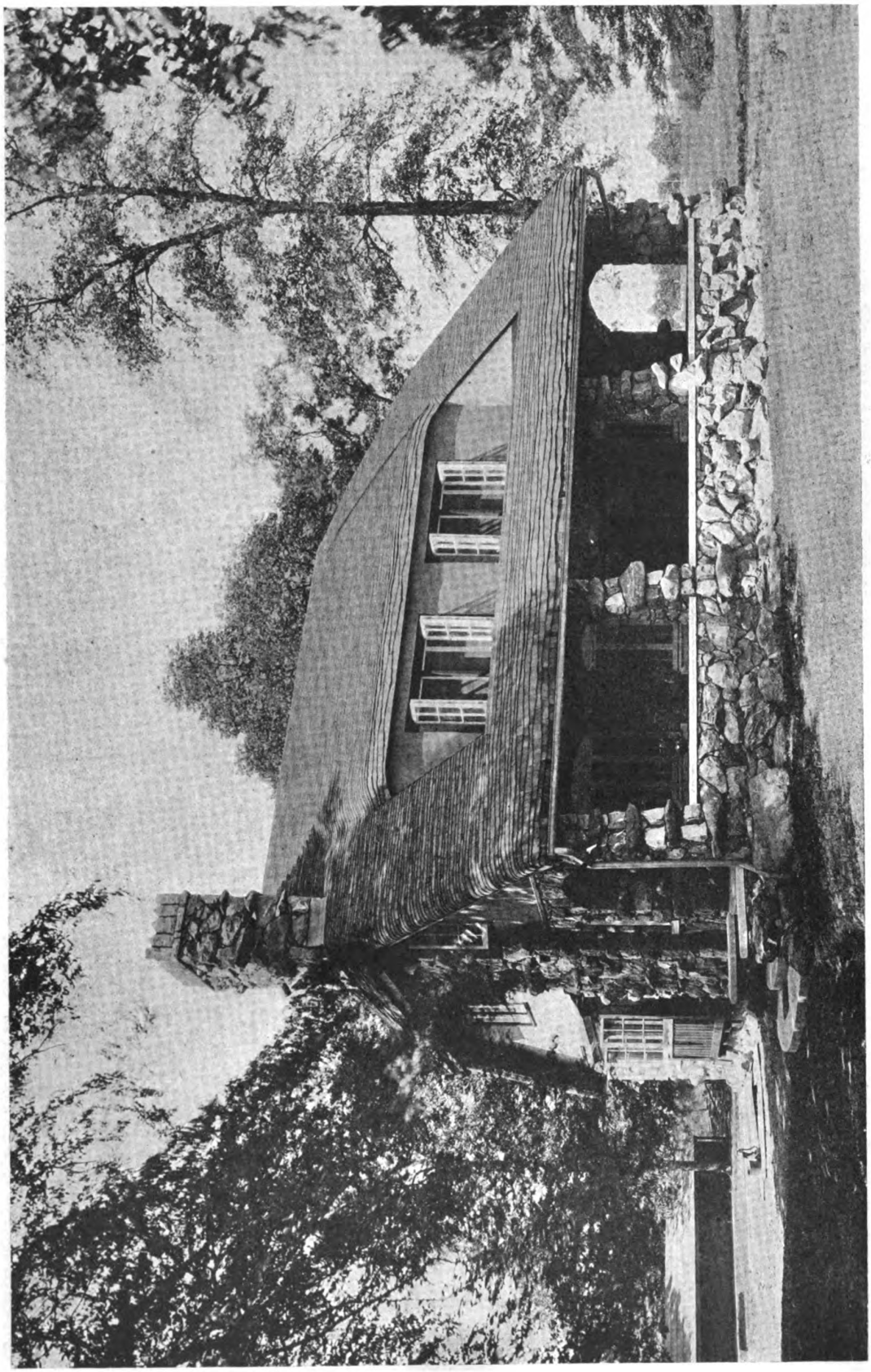

House near Dayton, Ohio
Harry Conway Griffith, *Architect*

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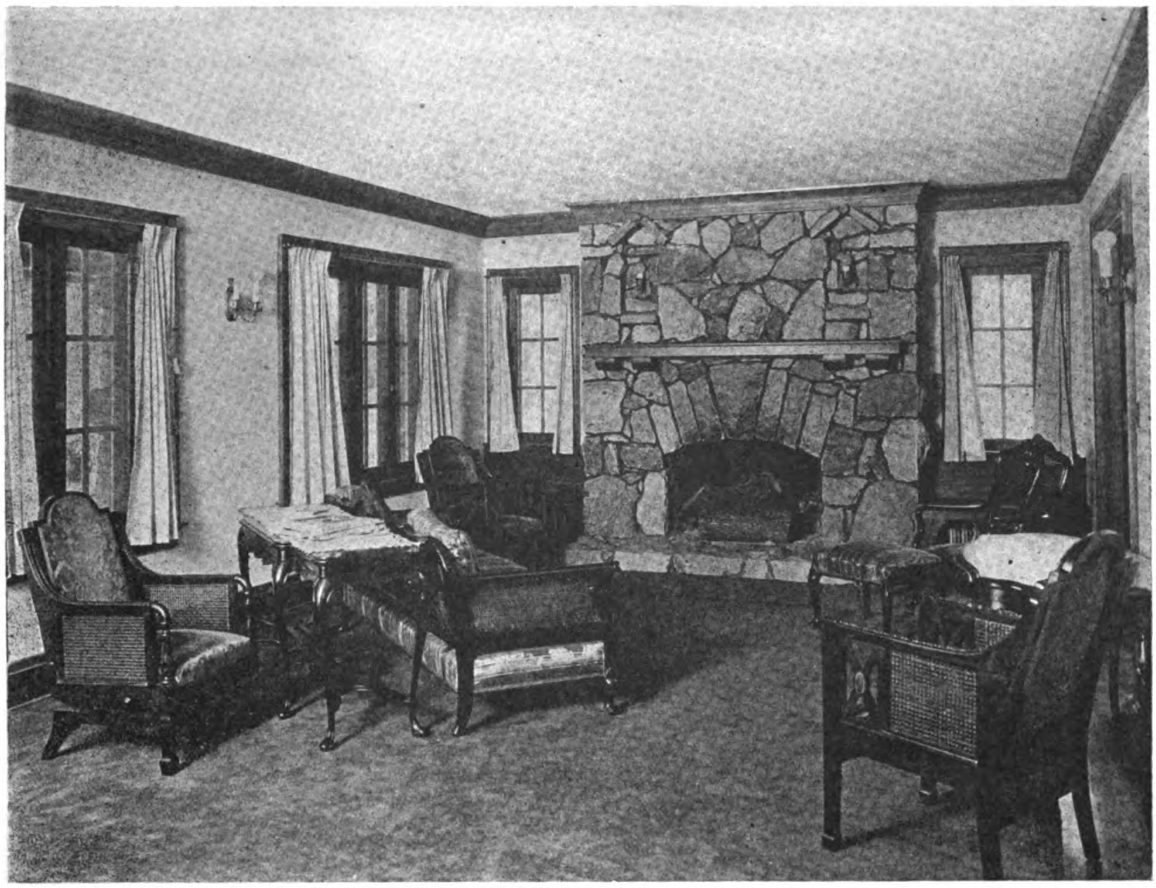

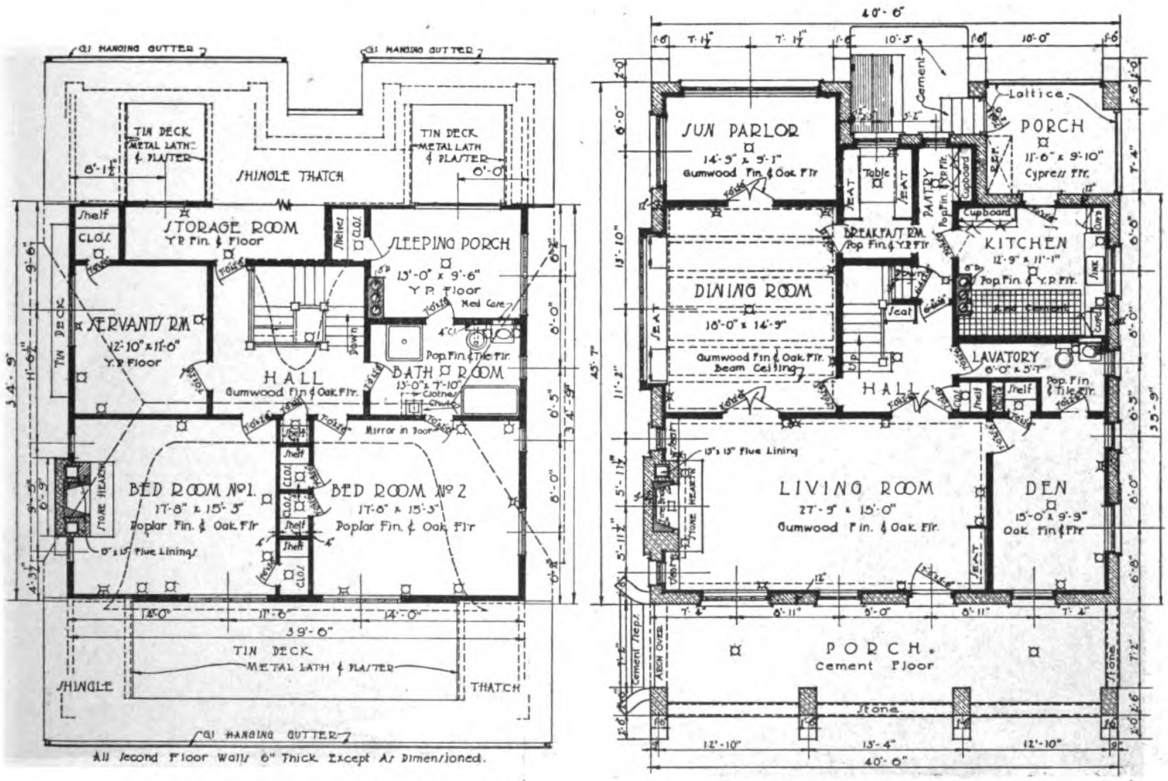

·SECOND·FLOOR·AND·ROOF·PLAN· ·FIRST·FLOOR·PLAN·

Living-room and floor plans, house near Dayton, Ohio—Harry Conway Griffith, *Architect*

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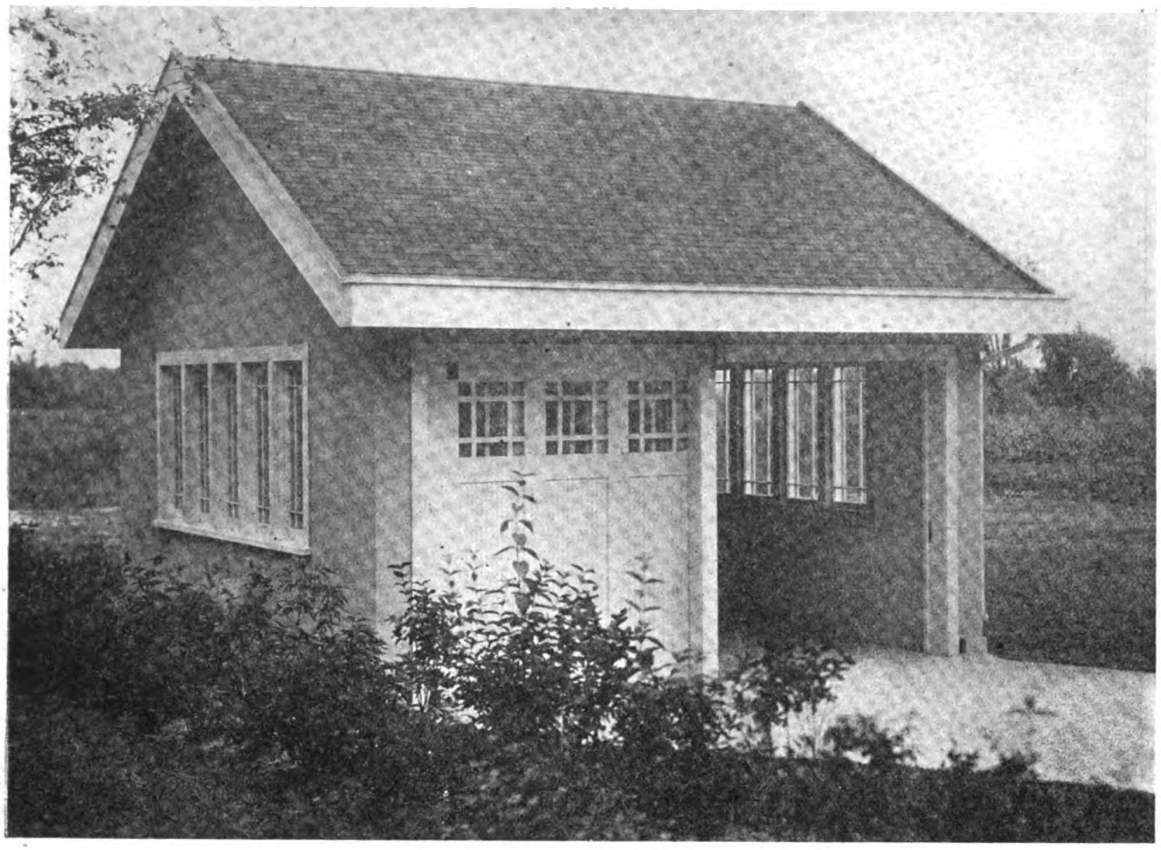
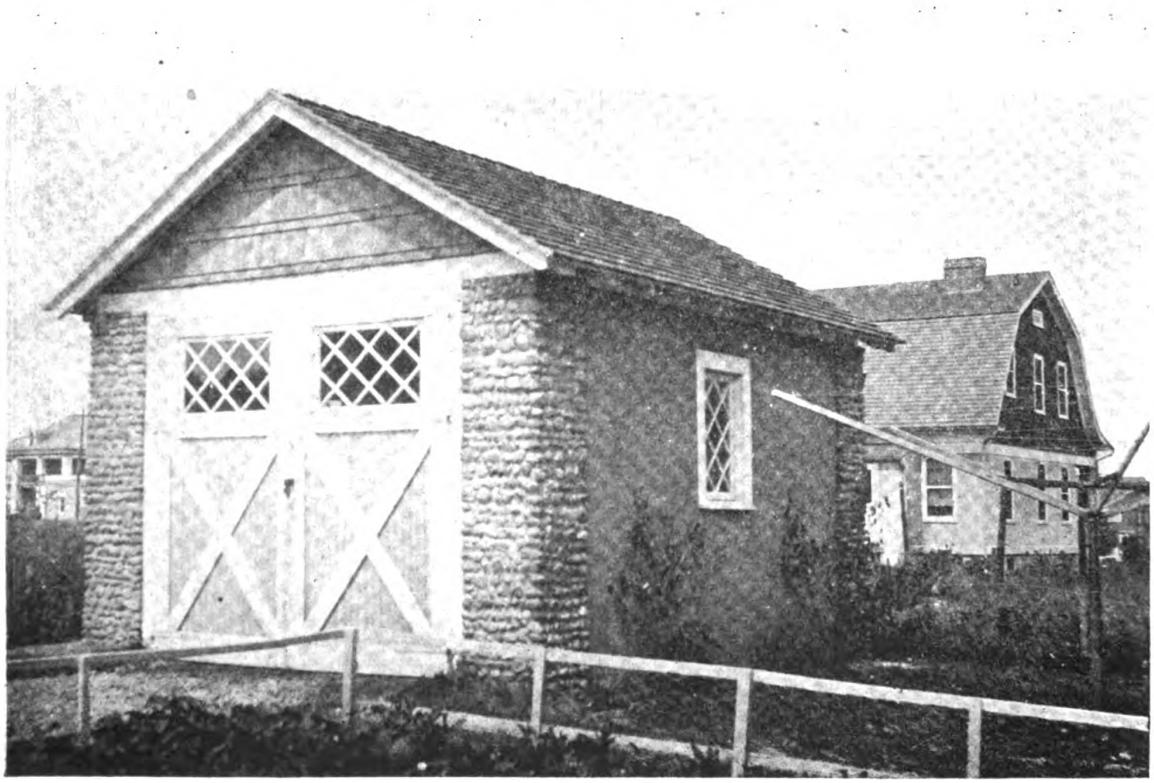


Two-car Garage at Grand Rapids, Mich.



Stone, stucco and shingle artistically combined in this one-car garage

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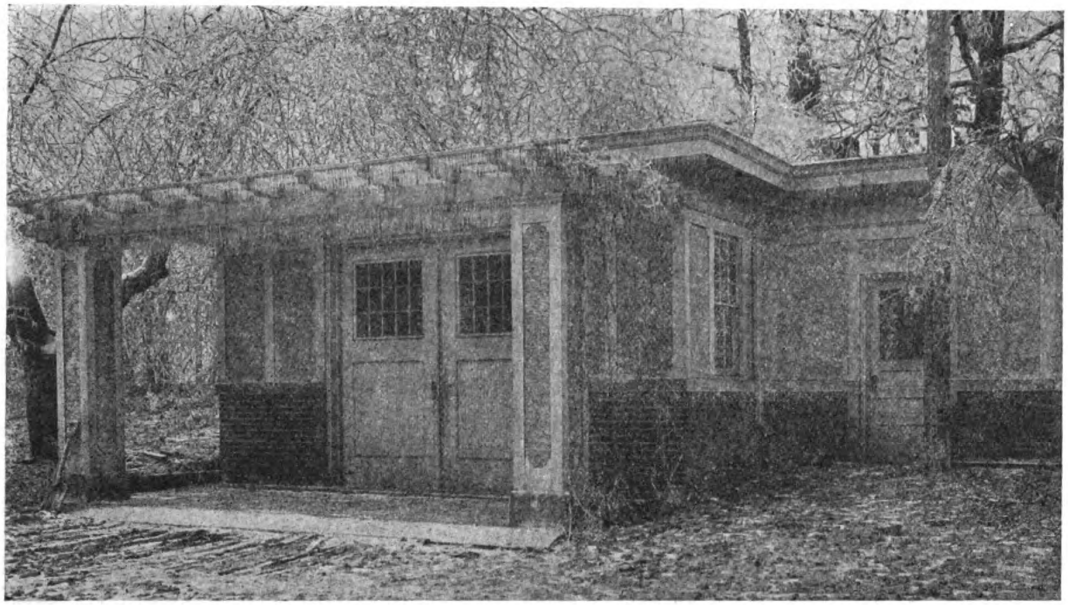

A private garage at Decatur, Ill.



Garage with connecting pergola, at Oak Park, Ill.

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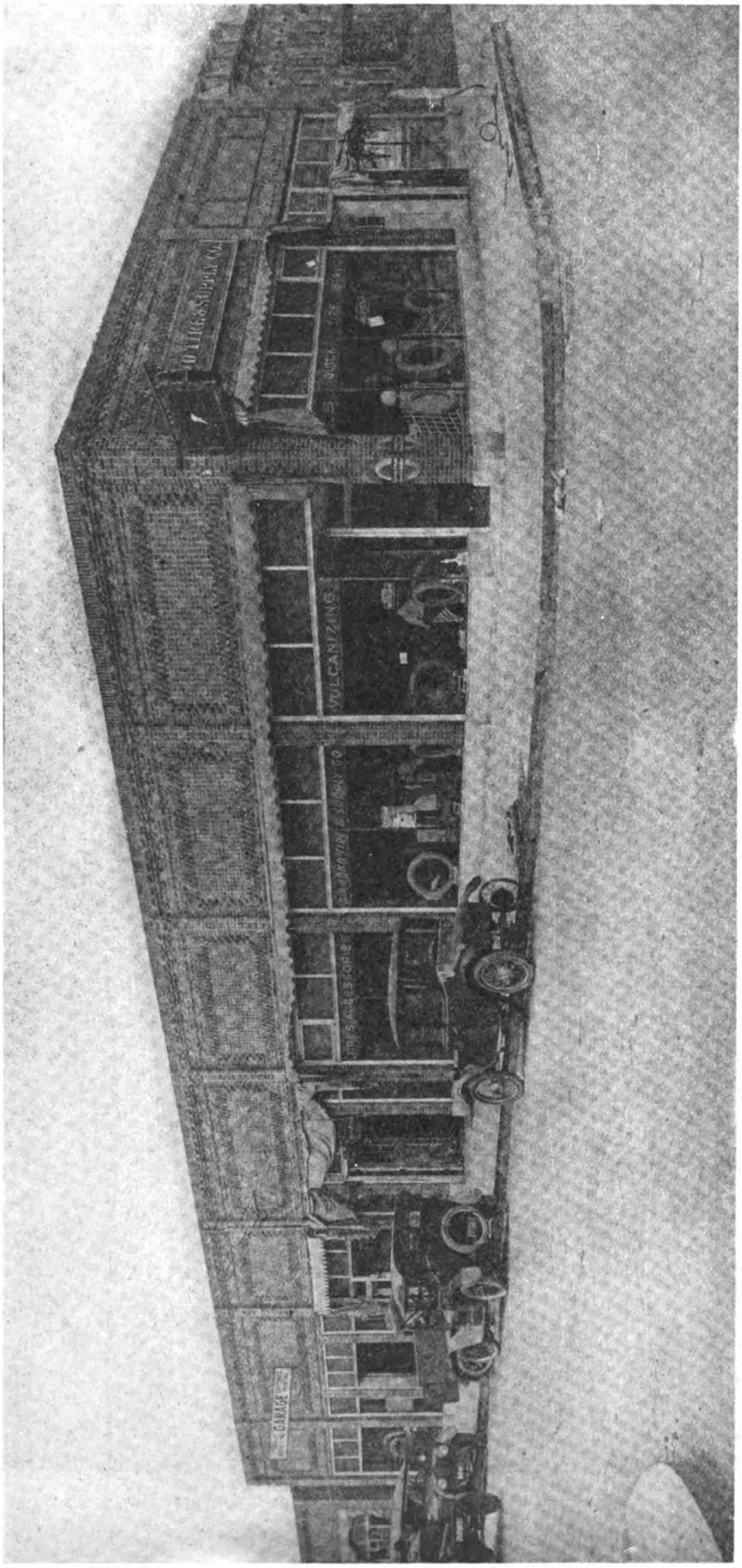

Automobile show room and repair shop at Des Moines, Iowa

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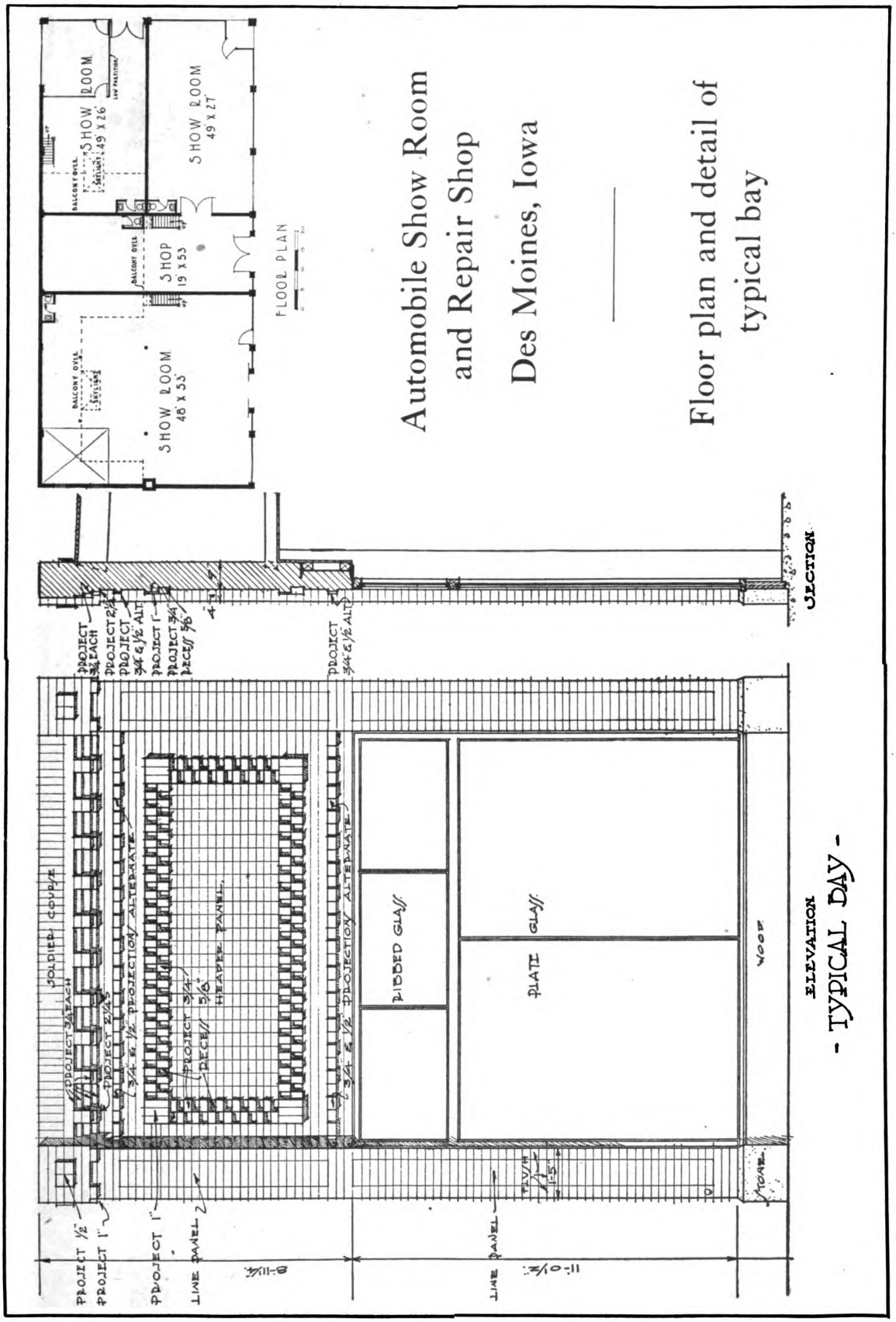

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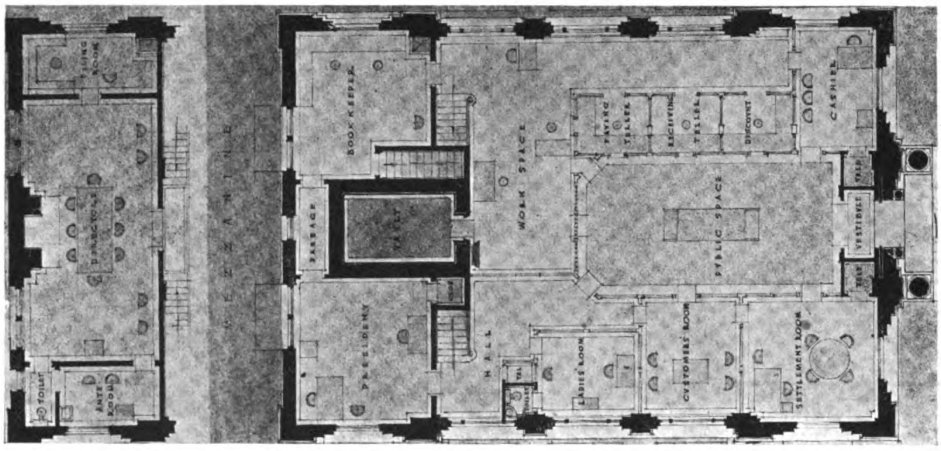

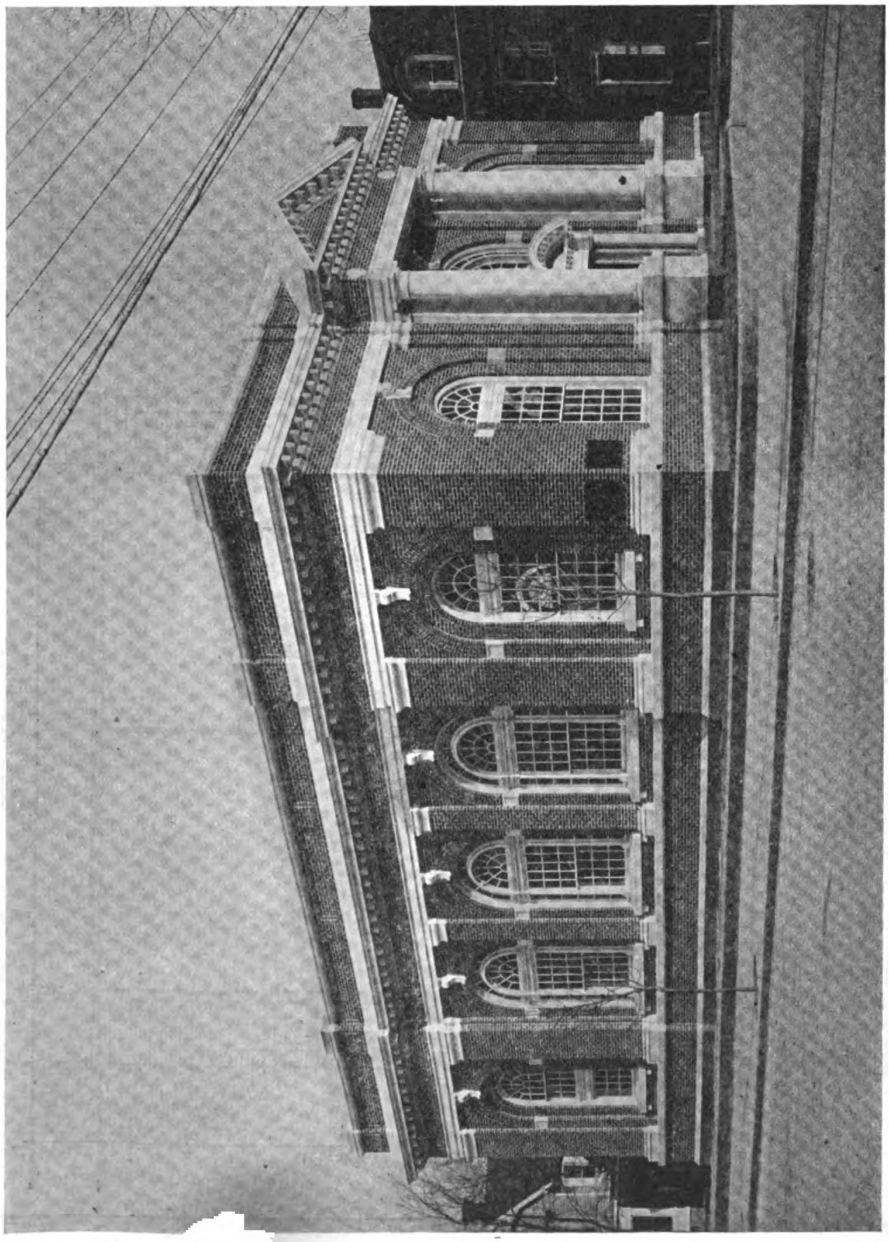

Swedesboro, N. J., National Bank
Charles R. Peddle, *Architect*

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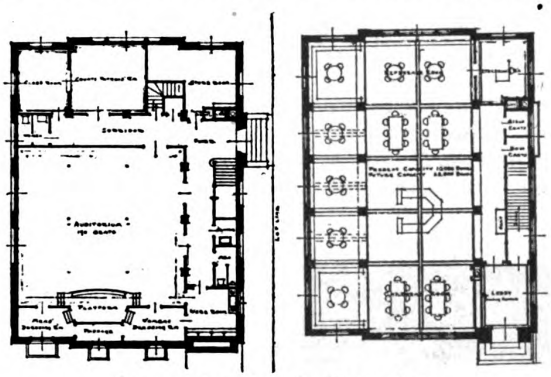
The Public Library of Hood River, Oregon

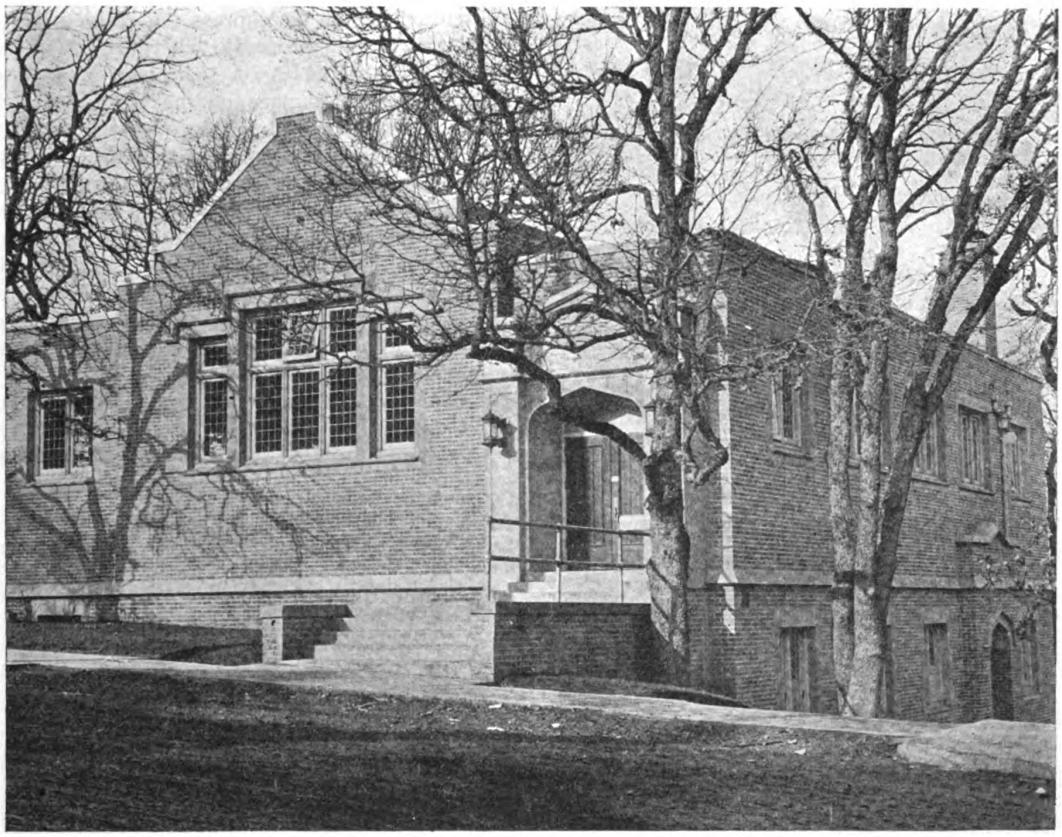
Sutton & Whitney, Architects

THE builder who contracts to erect a library in a small community has a problem in hand to which he is very closely connected not only as the builder, but for himself and his family, a close interest after completion. He will try to put something into it more than the exact fulfillment of his contract, for he will desire that there shall not be brought home to him any reproach for indifference every time he enters its doors.

The Public Library at Hood River, Oregon, designed by Sutton & Whitney, architects, is interesting, not only on account of its good design and plan, but from the further fact that having been erected on a sloping site, it has been possible to place a well lighted, spacious auditorium in the basement and thus permit of a high ceiling space on the main library floor. The basement plan has



Basement and main floor plans



Public Library, Hood River, Ore. Sutton & Whitney, *Architects*

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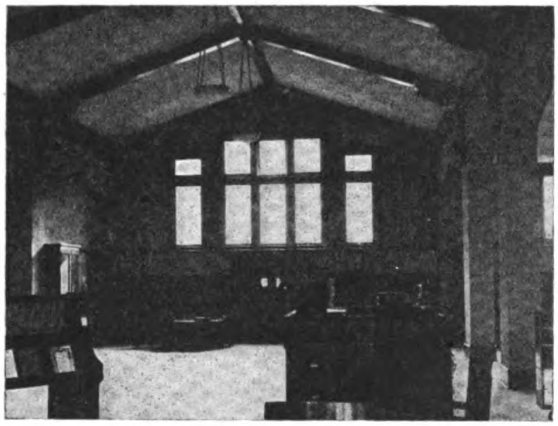
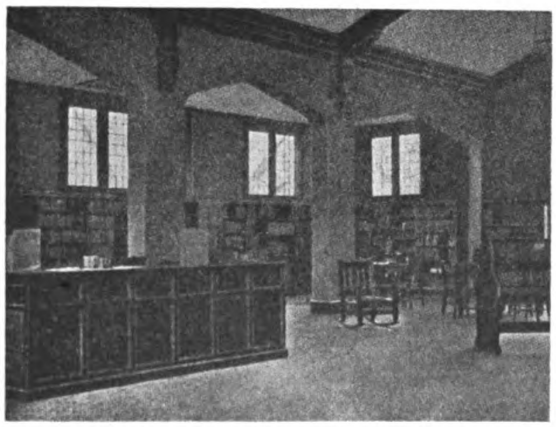
been well worked out. The seating capacity is unusually large for a building of this type, as is also the space set apart for the stage, and its necessary rooms. Ample storage space is provided, while the corridors and stairways are well lighted by daylight.

The main or library floor is laid out on approved lines. The librarian's desk stands, as it should in these small libraries, occupying a central position, facing the entrance from the hall and affording a good view of the various reading and reference rooms or niches. The high windows are well placed, amply lighting the interior, and at the same time affording no view of the street out of doors and the usual distractions that go with such an outlook. Further there is an unbroken wall space for



the placing of supplementary bookcases or the display of prints and pictures.

Brick and terra cotta have been artistically employed in the exterior design, which frankly and honestly declares exactly what the structure is—a library. Libraries are today an essential feature



in every small community. They serve not only to encourage the habit of good reading, but they have many other useful purposes. They may become communal or town halls, a place where the neighborly attitude may be developed to its best proportions. Further they afford a fine place for local exhibitions of pictures or art work of any kind.

The American Federation of Art in its efforts to increase among the dwellers of small communities a better appreciation of art has gathered and sent on their way well-selected lots of pictures and small casts. It has been found that the small town library affords the best place to hold these important educational art exhibitions, and it is, therefore, necessary that designers of libraries should keep these many different and exceedingly valuable purposes in mind.

Building Operations in July

Generally speaking, the building contracts let in July showed a decided falling off from the figures of June and they are far below those of July last year. While this fact has been given a great deal of attention by the daily press the builders are relieved rather than alarmed. They are much more interested in the shift of sentiment in favor of building material tonnage on the part of the railroad executives; in the argument of the Senate Committee on Reconstruction placed before the Interstate Commerce Commission, which urges that the advance in railroad rates shall not be made to apply on building materials; and in the public effort to stimulate building through legislative channels. The proportion of residential building is still low—about 18 per cent. About 17 per cent goes for industrial buildings and about 22 per cent for other business buildings.

The contracts let in July, as compared with June, are as follows:

	Contracts let in July, 1920	Contracts let in June, 1920
Minnesota, North and South Dakota	$9,400 000	$7,200 000
Middle West	70,000,000	84,600,000
Ohio, West Virginia and Western Pennsylvania	36,000,000	42,489,000
Eastern Pennsylvania, Southern New Jersey, District of Columbia, Delaware and Maryland	23,420,000	22,489,000
New York and Northern New Jersey	35,430,000	69,502 000
New England	29,300,000	32,833,000

Footprints, Instead of Blueprints

"Why did Lusher want his driveway laid zigzag?"

"He didn't but the contractor put it where he showed him."

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Stone Used Effectively in a Small House

Harmonious Combination of Materials Makes This Small House at Yonkers, N. Y., Exceptionally Attractive

SMALL houses are generally most effectively handled by confining the number of materials to one, or two at most. Whereas in a large house there are extensive surfaces which can be interestingly treated by a harmonious combination of contrasting materials, the smaller house, as a rule, must obtain its effect from proper proportioning. When several materials are used the effect is apt to be disturbing unless the design is especially suitable to the materials chosen.

This selection of materials has been well made in the house illustrated. The front porch columns and the chimney are of local field stone attractively laid up. One naturally expects to see porch columns of some fairly substantial material, especially in cases where the second story overhangs the porch, as in this house. One also expects the chimney to present a safe and fireproof appearance, one naturally associating this with stone. For this reason, choice of field stone for the chimney and porch columns, together with the carrying of the stone under the living-room window in the front, is especially effective as making proper use of the material.

The other portions of the house are covered with clapboards laid 10 inches to the weather, as is the popular tendency of to-day.



House at Yonkers, N. Y.—Philip Resnyk, *Architect*

An interesting touch is lent to the gable on the front of the house by making the triangular portion over the second-story windows of stucco with a half-timber effect.

As the house is located on a corner lot, the left façade is made very attractive, the second story having a well proportioned dormer, part of which is used as a sleeping porch and the rear portion to furnish stair space.

One enters the house directly into the living room, the porch entrance being so placed as to be sheltered from the elements, besides facing opposite to the direction of prevailing winds. The living room has a beamed ceiling. A brick fireplace laid up with rough brick in attractive design is at one corner of the room. The windows are grouped in triplets, giving plenty of light and air to the room.

To the left of the living room is the dining room, which is paneled up to the plate rail. A window seat renders the dining room especially cozy.

The trim in these rooms is effective, although very simple. The strong grain of the wood, which was finished natural, shows up most interestingly and forms one of the most striking features of the interior, as can be seen from the detail photograph

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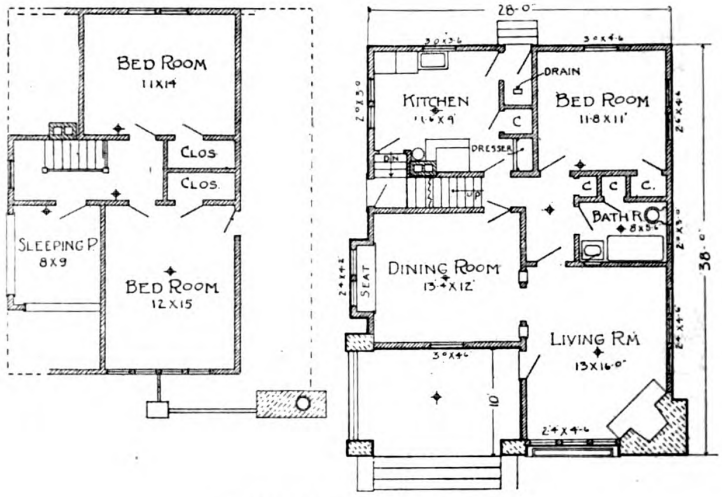
of the front door and cased opening dividing the living room from the dining room.

At the rear of the living room is a small hall, from which opens the bathroom, bedrooms, kitchen and stairway. There is ample closet space in these rooms, there also being a closet in the hall.

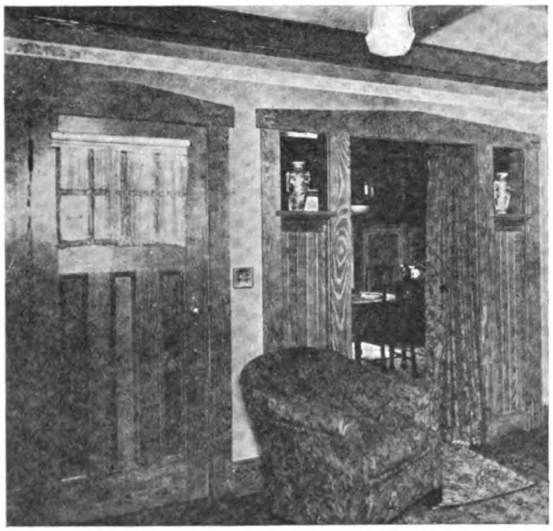
The relation of kitchen and dining room is interesting, showing a good treatment where the two rooms are separated by a hall, no pantry being provided. Dressers are placed in the kitchen in the relative position where they would be if a pantry were provided, and the two doors between the rooms keep cooking odors from the dining room in a very effective manner. The tendency is for any odors to go upstairs and out through the second story window, which lights the landing, rather than to disperse through the rest of the house. A refrigerator space opens on the kitchen entry. The drain board is placed underneath the window, thus having plenty of light.



First and second floor plans

Upstairs two bedrooms are provided, each having a large closet sufficiently deep for clothes to be hung from a pole running lengthwise of the closet, which is the proper arrangement. A sleeping porch opens from the hall.

This house is located in Nepperhan Heights, Yonkers, N. Y., and was designed for the Robert E. Farley Organization, 12 East Forty-fourth Street, New York City, by Philip Resnyk, architect, 40 East Thirty-second Street, New York City. The contractors and builders were Watson & Bremer, 38 Douglas Avenue, Yonkers, N. Y.



Living room, looking towards the dining room

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Present street scene in Asiago, showing temporary barracks and the reconstructed houses. New municipal offices in the distance

Asiago Recovers from War's Devastation

Work of reconstruction now fully resumed

ONE year ago Asiago was a pile of charred ruins: today it is humming with new life, and the sound of the hammer and saw. For this ancient Italian city is recovering from its war-time destruction and is being rapidly rebuilt. In Asiago, and its six neighboring cities on the plateau of Vicenza, many new buildings have been erected, saw mills have been started by the Government, and herds of cattle have been sent in.

Miss Mildred Chadsey, engaged in American Red Cross relief work in Florence, following a recent visit to the "Seven Cities," said she was amazed at seeing the progress that had been made in reconstruction in this part of Italy. These cities, according to Miss Chadsey, are beginning to present a semblance of their former prosperity, and, except for the ceaseless noise of building, one could scarcely realize that only last year they stood like gaunt spectres of ruin and desolation.

Asiago has a long and glorious history, and before its martyrdom in the Great War it was one of the fairest and most prosperous of modern Italian towns. In medieval days these seven cities of the hills constituted a little republic with laws and government of such excellence that the present Italian Government respects certain of their institutions and rulings and grants them special concessions. For example, the inhabitants of these towns paid no taxes (prior to the war) and received an annual bonus as profits on the wooded territory belonging to the seven towns. Asiago is situated on a rolling plateau 1,000 meters above the sea. The green fields of this surrounding plateau form the finest pasture land in Italy, and the wooded hillsides contain an unlimited supply of high-grade pine lumber.

In 1916 the Austrians made their first assault on this part of the Italian line. The natives were driven back to the edge of this plateau, and the towns, pastures and forests were riddled by shell fire. It is estimated that three-fourths of the forests have been destroyed by fire or shrapnel and

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that the pasture lands have been ruined for a generation to come, because the top soil has been torn up. Soon after the Austrian onslaught, the Italians drove them back several kilometers. Then, after Caporetto, the Austrians advanced again. Finally, just before the armistice in 1918, the English drove the Austrians back toward the north.

During each new attack, by the armies of either



Asiago in 1915, before the Austrian invasion. (Photo by courtesy "Illustrazione Italiana")

side, these towns of the Vicenzan plateau were the sufferers. At last, after the smoke of battle had cleared, it was seen that very little remained of Asiago and her once prosperous neighbors.

For two years the 50,000 inhabitants of this plateau were scattered as refugees all over Italy, dependent upon the charity of their country-men and the assistance of foreign relief organizations. It was during this critical period in national life that the American Red Cross endeared itself to the hearts of many Italians. For many women and children were sustained in life and health through these dark days. Now the Italian Red Cross is carrying on the welfare work which the Americans began.

And now the day has come for the men to join their families and return to their old homes in the north. They went back in the spring of 1919, and found a sight that almost wiped out their courage. Their homes were ruins of brick and stone; the forests had been burned; and the pastures had been literally rooted up. But they set to work with plucky though sad hearts. For the last year they have worked constantly—clearing the ruins, and at the same time building anew, and living, meanwhile, in the barracks erected by the Military Engineering Corps, on the edge of the destroyed towns. Their labors of the last twelve months are beginning to take the shape of new homes, new farm buildings and new stores. The debris of war is being eradicated; an era of peace and prosperity is being ushered in.



Temporary barracks for returned refugees built of brick, to resist the cold in this mountain climate, more than 3,000 feet above the sea



Asiago in November, 1918, after the Armistice. (Photo by courtesy "Illustrazione Italiana")

The Ten-foot Pole a Useful Measure

By John Upton

As a workman is known by his tools, so he may be judged by his instruments for measuring. If he has an old loose-jointed rule and a rusty square, one may not look for good work, and if he has much use for a ten-foot pole he should have a good one worth carrying from one job to the next and not try to get along with any makeshift that he may find.

Some may object and say that this is the most troublesome thing that a man can have to carry about and that they much prefer to use a steel tape, giving as one reason that this cannot be tampered with.

But this latter may be prevented by driving a long slim nail in each end, so that no one will want to saw it off.

One man cannot use a tape handily, and it cannot be used to measure up to points that one cannot reach as a pole can. The pole is handy for either house or barn building and especially so for laying out timbers.

It is useful for squaring corners by the 6, 8, 10 rule and this is one reason for its being made ten feet long. For getting the length of studding or boards and to find what length is needed to fill out a sill or plate, the distance between openings and many other uses, the pole will be found the handiest thing to use. If one uses a rule or square it means

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more measurements, takes more time and there is more chance for errors.

The pole may be square or flat. A piece of clap board two inches wide makes a good one. At one time there was a pole on the market made like a rule, yellow with black markings. This was divided into quarter inches and was a fine thing, but it cost a good price and was easily broken.

In making the pole, measure the two foot spaces with the square and mark them with a knife rather than a pencil, next measure one foot and then the alternate two foot spaces, and before cutting off measure with a long rule, 4, 6 and 8 feet.

To make the marks permanent, take a fine saw and cut them down just a little. Mark six inch divisions and three if you wish. On one end mark the first foot into inches; the other end may be marked for two inches. Number the marks for feet like this, 1—9, 2—8, 3—7. If you want a sliding or adjustable pole, make it from two pieces of wood an inch square and about six feet long. Put a band of galvanized iron around one end of each stick so that the other one can be put into this band and the sticks slid out or shortened as needed. Put a set screw in one stick to hold them. This may be used to measure the length of posts and in other places where the regular pole will not work.

Besides the square and common two-foot rule one should have the zigzag or folding rules, 4, 6 and 8 feet long, and also the sliding rule for measuring the inside of openings, which when used shows the inside measure as readily as the outside.

Constructing a Winding Stairway

V—Laying out the posts*

By Richard M. Van Gaasbeek

School of Science and Technology, Pratt Institute, Brooklyn, N. Y.

TO LAY OUT ANGLE POST NO. 4.—Lay out two parallel lines on a layout board or detail paper, the width of the post or 2¼" apart as previously described for the other posts. Referring again to the plan, Fig. 7, it will be seen that tread 14 and the landing are the only treads entering post No. 4. Step off these heights as shown on the layout, Fig. 22, and number with the corresponding numbers. Begin by laying out side M. Referring to the string E, Fig. 11, notice that the top of the string is 2⅜" above the face of tread 13 and 2" below the face of tread 14. Transfer these same distances on the side of the layout, Fig. 22. Apply the pitch board, Fig. 4, and line in the top and bottom edge of string E. Lay in a parallel line to the top edge of the string ⅜" distant, the thickness of the shoe. Lay in a parallel line to the bottom edge of the string 1¼" distant, the thickness of the carriage timbers. The handrail on side M is the same distance above string T as the handrail on side L is above string E, since the handrail must be parallel to the rake of the string. Measure the distance on the side of the layout, Fig. 21, from the top of the string E to the top of the handrail over it, or 8⅞". Transfer this height to the corresponding position on the side of the layout, Fig. 22. Apply the pitch board as before and line in the top of the handrail. Produce another parallel line to it 1" apart, the thickness of the handrail. Experience has proven that a convenient height for the average person to grip the handrail on the level is about 2' 10" from the floor or 11 5/16" as our problem is 1/3 full size. Measure up on the layout, Fig. 22, from the level of the landing, 11 5/16" and line in the top of the handrail. Produce another parallel line to the top edge 1" therefrom, the thickness of the handrail.

Having determined where the handrail and string meet the face of the post, the paneling can very readily be laid out. The drop should be below the ceiling and the post long enough to reach below the floor beams, carriage timbers and ceiling to receive the drop, or ¾" below the carriage timbers, Fig. 22. The top of the post should project beyond the top

* [EDITOR'S NOTE: In reference to drawings published in previous installments of this article, it should be noted that Part I, including Figs. 1 to 6, appeared in the April issue; Part II, Figs. 7 to 12, in the June issue; Part III, Figs. 13 to 17, in the July issue, and Part IV, Figs. 18 to 22, in the August issue. All drawings are for a problem one-third full size.]

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of the handrail on side P, ¾" which will give the required length of the post or 18½".

To determine the position of the fillets begin by laying out side M. Stop the fillet ¾" above the shoe on string E. Measure ¼" above and ¼" below where the handrail touches the post and stop the fillet at the top in line with the top of the handrail on side P. In other words glue a fillet in flush with the bottom 7⅞", a fillet 1⅝" long to receive the handrail over string E and a fillet ¾" long flush with the top of the post making two panels as shown. Side N and O parallel with the landing height laying in another line ⅜" apart, the thickness of the shoe. Stop the fillet ¾" above this height and glue in a fillet flush with the bottom or 4¼" long. Glue in a fillet on either side ¾" long making only one panel as shown. For side P stop the panel at the same height at the bottom. Measure ¼" below the bottom of the handrail and glue a fillet in 2" long flush with the top to receive the handrail on the landing.

To BUILD THE POSTS mill the stock as shown in the cross section, Fig. 23, making the main post 2" square, groove out the corners ¼" square and glue in ⅜" square pieces to form the sinkage for the paneling. Before gluing in the corners, dress all four sides of the stock and sandpaper. Care in gluing the corners will save considerable labor in cleaning the glue out of the corners and refinishing the panels. After the glue has set, glue in 3/16" fillets as shown to receive the base, handrail and molding at the top. As soon as the fillets are dry, dress the entire side of the newel and posts flush and sandpaper. They are then ready to lay out for the housing. Notice that all four posts are different lengths and that the fillets are in different positions. These locations are all taken from the developments, Figs. 19, 20, 21 and 22.

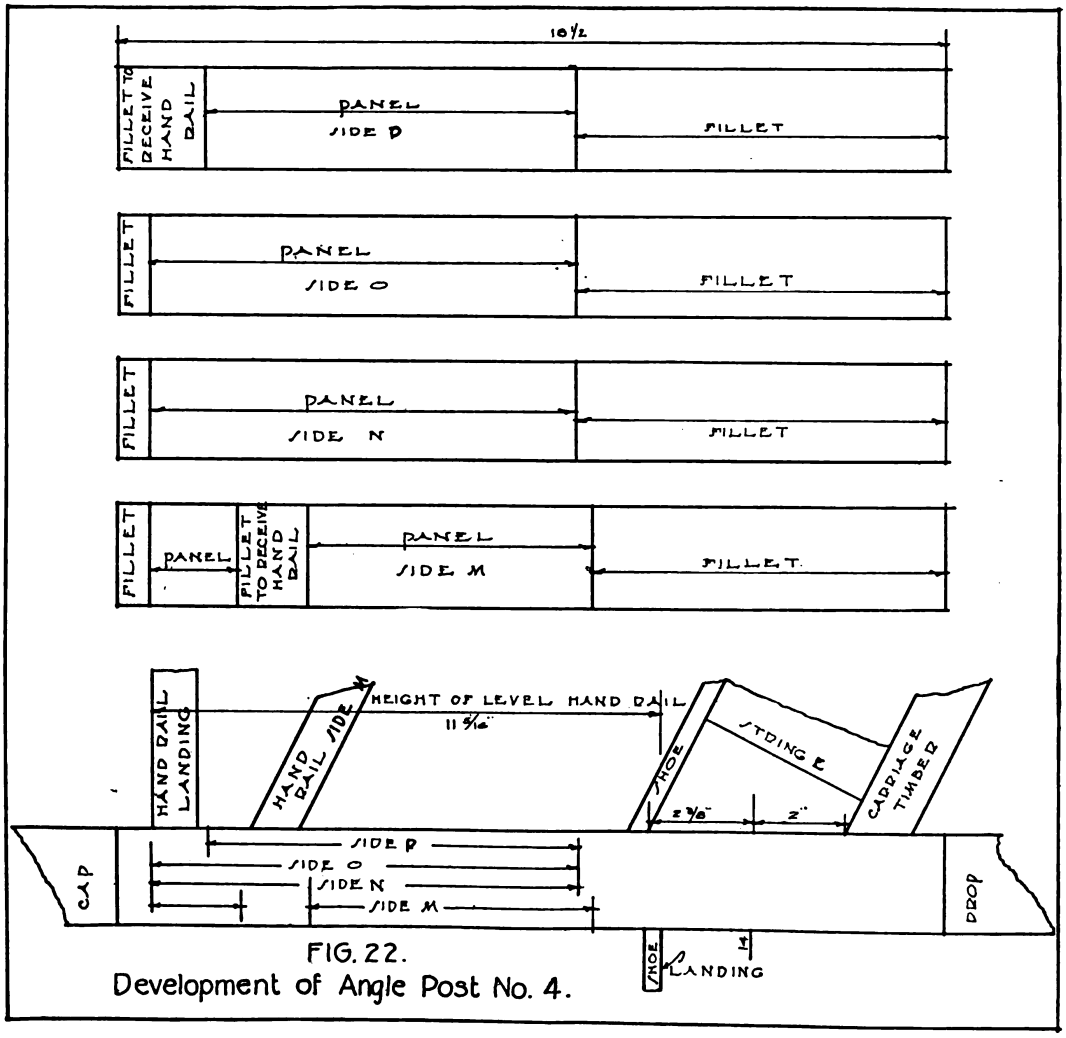

FIG. 22.
Development of Angle Post No. 4.

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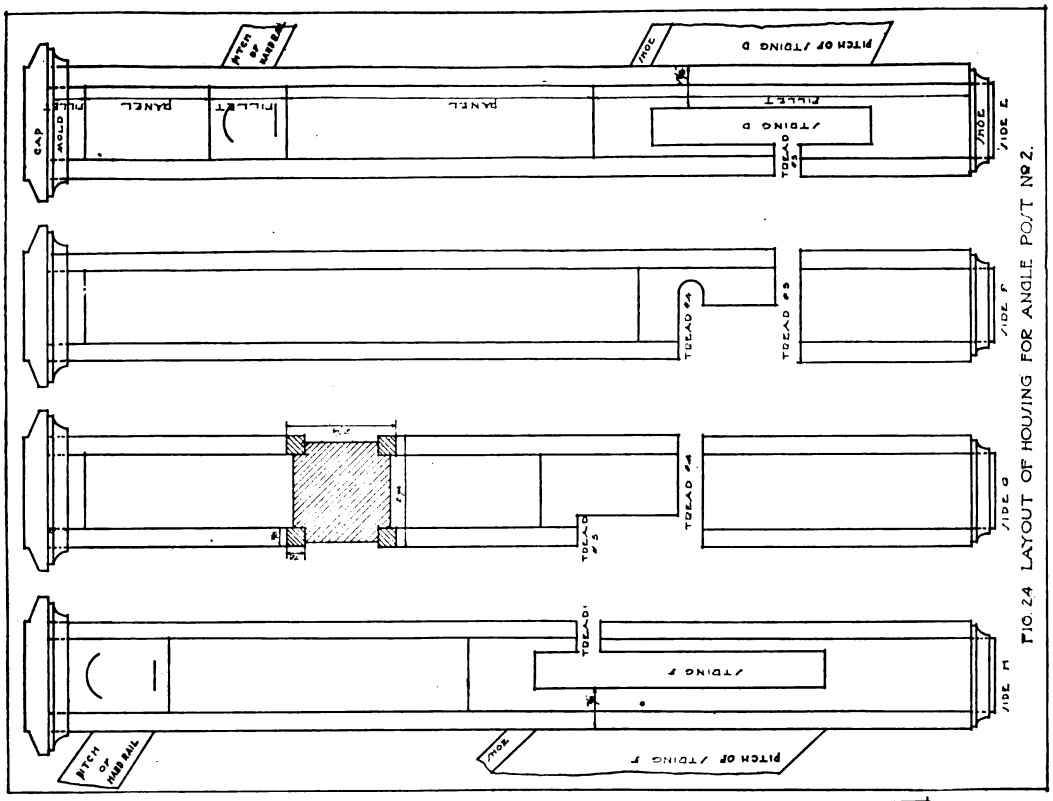

FIG 24 LAYOUT OF HOUSING FOR ANGLE POST Nº 2.

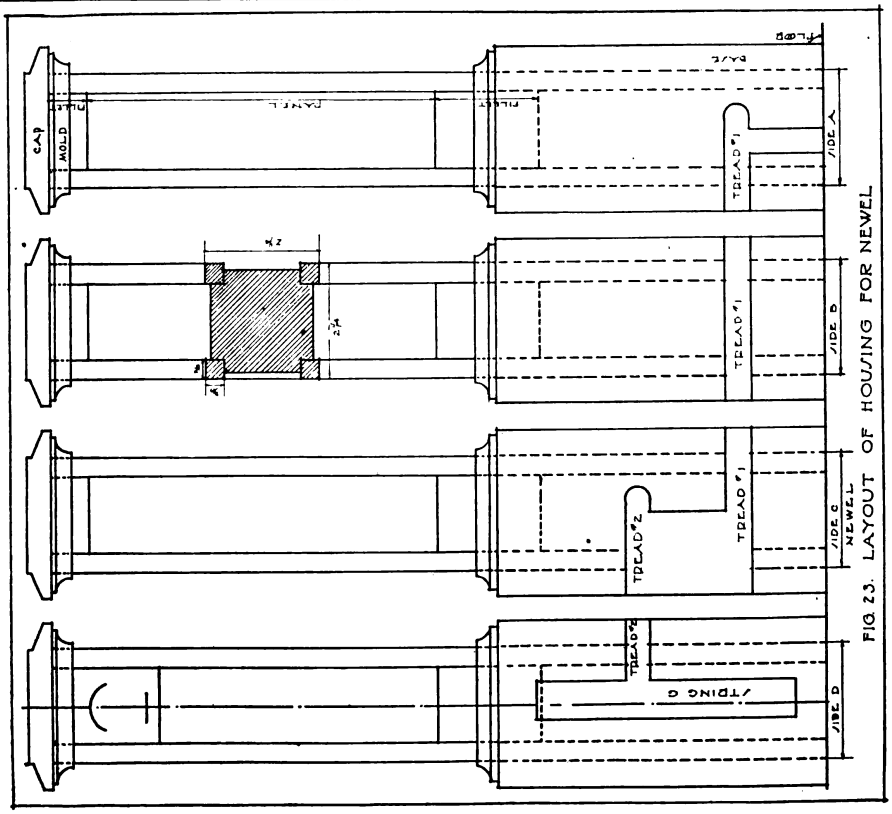

FIG 23. LAYOUT OF HOUSING FOR NEWEL

CONSTRUCTING A WINDING STAIRWAY

The successive stages in laying out the posts

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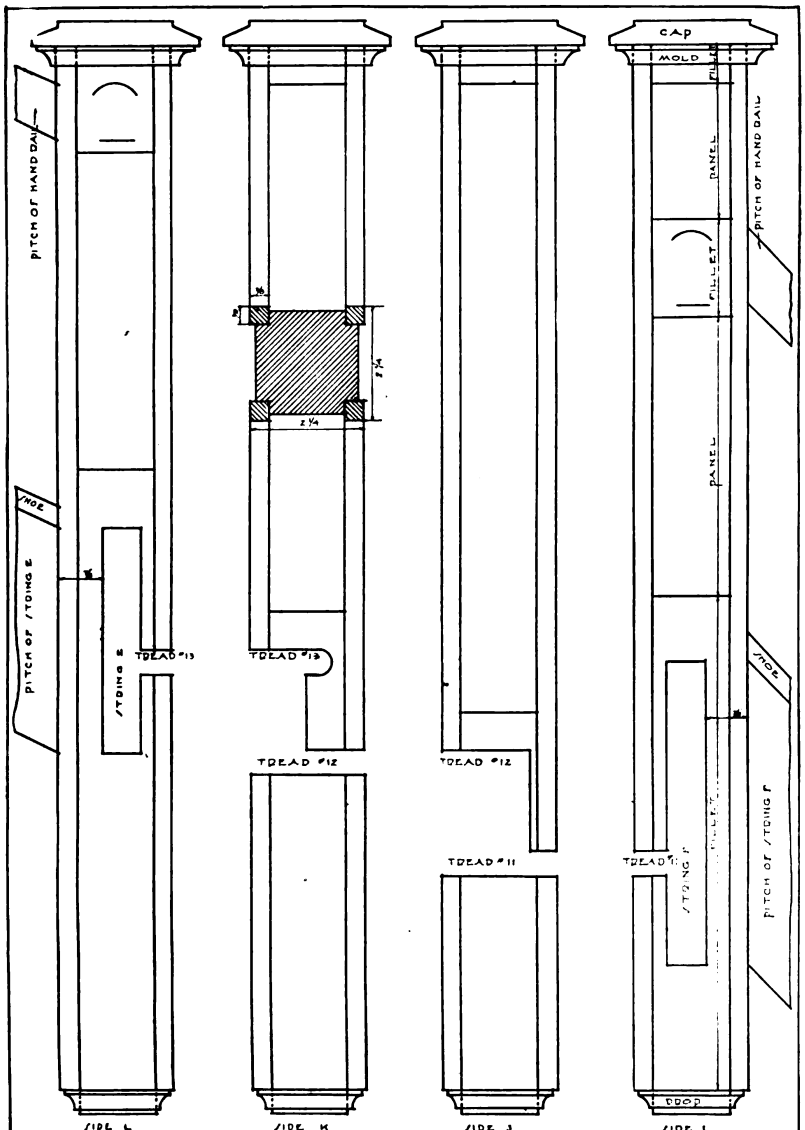

FIG 23. LAYOUT OF HOUSING FOR ANGLE POST No 3.

To Lay Out the Housing for Newel No. 1 lay out riser No. 1 with the face of the riser in the center of the newel on side A. Rise up 2", the height of the riser as shown in Fig. 23, and lay out tread 1. Continue tread 1 across side B; continue tread 1 across side C also, rising up on the center line 2" to tread 2. Lay out the position of the string on side D, 7/8" from the face of the newel as shown on the plan, Fig. 7, and continue tread 2 into the string. The exact vertical position of the string is taken from the development, Fig. 19. Lay out the thickness of the treads and risers from the face, except side C, house the width of the riser completely out so that the riser can be inserted from the back.

To Lay Out the Housing for Post No. 2 lay out the position of string D, 7/8" from the face of the post, taking the exact vertical height from Fig. 20. Also get the height of tread 3 from the same development, on side E. Continue tread 3 across side F, rising up on the center line 2" to the height of tread 4. Continue tread 4 across side G, rising up 2" to the level of tread 5 the same distance from the face of side F to where the riser intersects side G at 16, Fig. 7, or 1 5/8" from the face of side F. Continue tread 5 across side H until it intersects string F. Lay out the string 7/8" from the face of the post as shown, taking the exact vertical height from the development, Fig. 20. Lay out the thickness of the treads from the face lines and house the risers completely out so that the risers can be inserted from the back. See Fig. 24.

To Lay Out the Housing for Post No. 3, lay out the position of string F, 7/8" from the face of the post, taking the exact vertical height from the development Fig. 21. Also get the height of tread 11 from the same development, on side I; continue tread 11 across side J, rising up 2" to the level of tread 12, the same distance from the face of side I to where the riser intersects side J as at 17, Fig. 7, or 1/2" from the face of side I. Continue tread 12 across side K, rising up 2" on the center line to the level of tread 13. Lay out string E, 7/8" from the face of the post, taking the exact vertical height from the development, and continue tread 13 across side L until it intersects the string. Lay out the thickness of the treads from the face lines and house the risers completely out so that they can be inserted from the back. See Fig. 25.

To Lay Out the Housing for Post No. 4, lay

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out the position of string E, ⅞" from the face of the post, taking the exact vertical height from the development, Fig. 22. Also take the height of tread 14 from the same development on side M. Continue tread 14 across side N, rising on the center line 2" to the height of the landing and continue this height across side N and O. Lay out the thickness of the treads from the face lines and house the risers out completely so that they can be inserted from the back.

To FINISH THE POSTS after housing for the treads and risers, nail the cap on the top and miter the molding around the top rail to complete the construction. Finish the drop in a similar manner when the posts are ready for assembling.

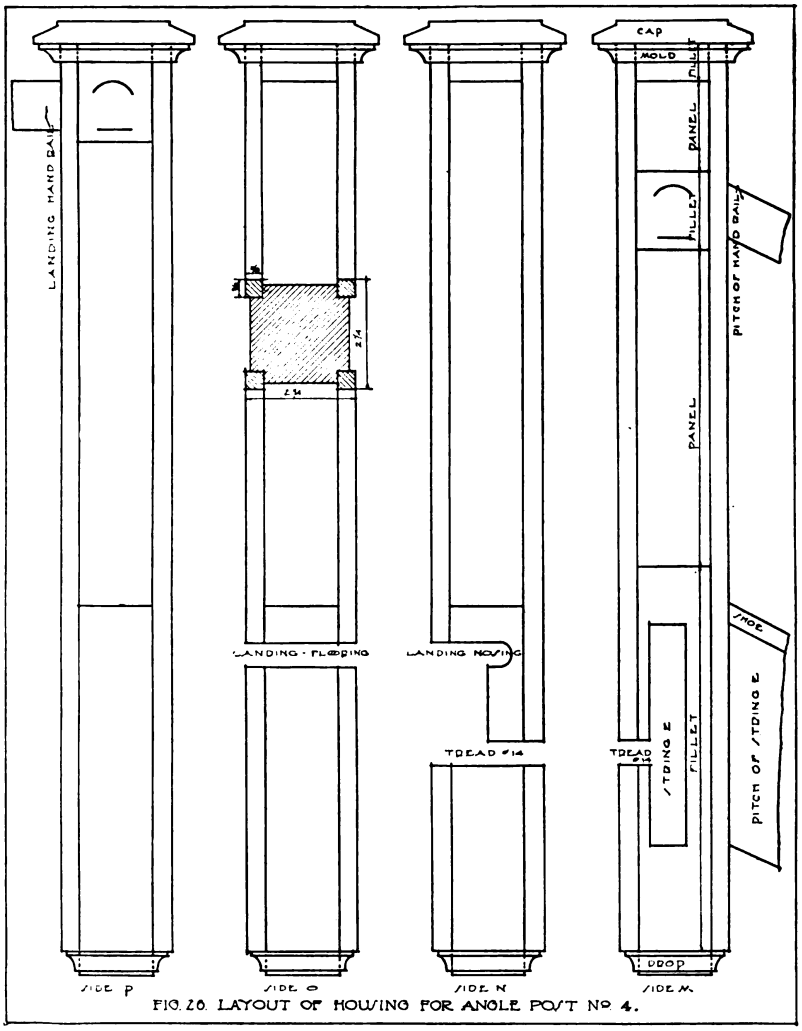

FIG. 26. LAYOUT OF HOUSING FOR ANGLE POST No. 4.

Pratt Courses

Courses of instruction for the study of roof framing, stairbuilding and steel square problems will be conducted by Pratt Institute, beginning September 23rd. Circulars of information and application blanks will be mailed upon request by addressing. Pratt Institute, B'klyn, N. Y.

A New Type of Door Opening

A "doorless door" is a novel development of a Boston mechanical engineer, Henry H. Cummings.

This "doorless door" consists of a motor-driven fan installed below or behind a grill in the entrance of a store or other building and arranged to draw air downward from the upper portion of the doorway, whence it is carried by a duct to a hood at the top of the entrance and then discharged downward, completing the cycle. A quarter-horsepower motor driving a 16-inch fan and connected with a 9 to 12-inch diameter duct provides a current of air under about 3-inch water pressure, which is unnoticed by persons standing in the doorway, but which is most effective in keeping out insects, rain, snow and cold air, as shown by actual test.

The use of the equipment enables close regulation to be made of the interior temperature of the room, and the absence of a closed door, Winter and Summer, in a trial installation actually increased trade by one-third. The cost of operation is about 2 cents per hour, 24 cents for twelve hours.

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Suggestions for Increasing the Builders' Business

By Robert F. Salade

IT is encouraging to note that in these days of general progress in all lines of business, master builders are in spirit with the times, and are giving closer attention to sales promotion work, office management, service, advertising and standard cost systems. Until a few years ago, builders did not as a rule think a great deal about these subjects. They usually had enough contracts to keep them busy; prices of materials were modest, and the cost of labor was not so heavy as at present.

The time has arrived when it is essential for every business man to watch the costs of production minutely, and it has now become necessary for every business concern, if it wants to be successful, to follow the best means of giving service to patrons. The quality idea must take the place of the low-price argument, and new plans must be thought out for promoting business. Old-fashioned methods will not serve for this period. Creative salesmanship is the need of the hour.

Located in a medium-sized town of Pennsylvania is a certain builder who is following modern business methods with excellent results. His office and shop occupy a two-story brick building which was erected especially for the purposes of a builder. The building is situated on the main street of the city. It has a handsome front with a plate-glass bulk window. Advantage is being taken of the advertising and selling value of this window. For example, the builder has been making a sort of specialty of house-building. Recently, a small but complete model of a house was exhibited in the show-window, along with a placard which described the plans and construction, and which stated the price of the complete work. It was surprising to note the large number of people who stopped in front of the window for the purpose of studying the model. The exhibit led up to several orders for houses of the same design.

Some months ago this builder remodeled the interior and exterior of a church in his town. It was an old building which had been sadly in need of repairs. At first, when the builder interviewed the trustees they were in favor only of some necessary repairs to the edifice. Here is where the builder's ability as a salesman came into play. He politely argued with the trustees and explained how the church could be easily remodeled into a handsome structure. He truthfully asserted that a beautiful church would attract more worshippers. That was the "punch" in his argument. The trustees became interested in the proposed changes. Rough plans and an estimate of cost were submitted. Three days later the builder received the order to proceed with the work in accordance with his suggestions.

Now had this builder been merely an "order-taker," with no quality as a creative salesman, he would have received only a contract for a few repairs. But he is a man with ideas, and never hesitates in expressing his ideas when the occasion arises. Of course, there are many other builders who follow this same selling plan, but on the other hand there are some who do not. All builders should be creative salesmen.

Before going ahead with the work just referred to, the builder had photographs taken of the interior and exterior of the church. After all of the improvements had been completed, a second series of photographs were taken, showing the changes which had been made. The two sets of pictures were then placed in the show-window of the builder's establishment, along with small, hand-lettered cards which gave the name of the church and explained the improvements. This proved to be excellent advertising.

PRACTICALLY all of the larger building concerns have consultation rooms and some are expensively furnished. Every builder, no matter how modest his business may be, should have some kind of a "consultation room" for the convenience of customers, even if one of the living-rooms of the builder's home is taken over for the purpose.

Builders should give closer attention to this feature of service, and when they are not in their offices they should leave someone there who knows how to talk politely and intelligently to customers. The "I-don't-know" office attendant is a serious drawback to any business.

Money spent for good office furnishings is like money spent for good dress—it pays big dividends. No builder, in these days, can afford to have a

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mean, untidy business office any more than he can afford to wear mean clothing when calling upon patrons. A business house is often judged by appearances just as a business man is often judged by the clothes he wears. Years ago these things did not matter much in business, but they certainly count today.

In the rear of the builder's place referred to—in back of the consultation room—is a good-size workshop. On the second floor of the main building is another workshop, also a large stockroom where hardware and expensive hardwood are kept. The builder has found by experience that it pays to keep a stock of certain kinds of material on hand. It is not a large stock, consisting mainly of material that is very useful for small "hurry-up" jobs. Often valuable time is saved by having the necessary material ready to send right out.

This builder belongs to several business, social and improvement associations of the town, and he makes it a practice to take part in any public movement which is aimed to benefit the community. He is a director of one of the banks, and is a director of the two building and loan associations. All of this activity is, of course, a considerable help to his business.

The writer will go so far as to declare that any efficient business man could follow the example of our friend, the builder. Some business men, however, claim that they "haven't time to spare for this or that public affair;" they shut themselves up in their offices and try to keep far out of the "limelight." In so doing they are making a big mistake. The builder, of all business men, should be a good "mixer." The more that he goes in for public activities, the better for his business.

We should have mentioned the fact that our friend, the builder, is also a strong believer in advertising. A display advertisement concerning his business appears in the two local newspapers as well as in several of the church and fraternal papers. At intervals of the year he sends out direct-by-mail advertising, such as booklets, folders, cards and circular-letters, to a long list of the town's property-owners. In many instances this advertising has won profitable business.

Recently the builder distributed a booklet which was devoted to the subject of farm buildings. The size of the booklet was 3½x6 inches, eight pages and cover. On several of the pages half-tone pictures appeared representing a barn, concrete hog-house, brick garage, and a large frame house, all of which had been erected for farmers in nearby sections. A few words of descriptive matter were incorporated with each illustration. Mention was made of the size of each building shown, also the kinds of materials which had been used.

These booklets were mailed to farmers who lived within a radius of about fifty miles of the builder's place. As a direct result of this advertising, several orders were received, and numerous inquiries also came which may eventually develop into business.

ONE builder who is making a specialty of remodeling work of all kinds recently remarked:

"Think of the wonderful success of the Woolworth chain of ten-cent stores. That whole success has been due to the plan of making a great number of small sales and quick 'turn-overs' of the money invested. In other words, the Woolworth people 'turn over' their money invested in merchandise many times during the year. With every 'turn-over' there is a fair percentage of profit.

"To a certain extent, I have been following the Woolworth idea in my business. Instead of handling big contracts, which would necessitate the employment of large forces of labor and the investment of thousands of dollars in materials, we are making a specialty of smaller contracts for repairs and remodeling. During the year we handle a large number of small jobs instead of handling only a few big orders. In this way the work is completed rapidly; there are frequent 'turn-overs' of our capital; we make a good percentage of profit on each job; we employ only a limited number of workmen, and we do not find it necessary to tie up large sums of money in material.

"Certainly, the larger class of construction work has to be done, but we leave that work to the big building concerns which are capable of producing it without 'straining' their capacity. I think it a mistake for the builder with a small amount of capital to accept unusually large commissions for new work. I know by experience that big jobs do not always pay the builder, while small repair and remodeling jobs can always be made to yield substantial profits. Another advantage of my specialty is in there being plenty of small work during all seasons, while, on the other hand, large contracts are often scarce."

Within the last two months the writer has noticed a great deal of repair and remodeling work being done to old property in the city of Philadelphia. A certain number of builders are keeping busy in this "line," and are making money, while some builders have been waiting for big contracts to come along. A brief description of some of the work being done at the present time should be of interest to the reader:

In one section of the city a large, old-time dwelling, which for years had been in poor condition, has been remodeled into a handsome home of the Colonial style. It is a corner-house, and the main

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doorway had formerly been at the side. A bay window, with sash containing small panes of glass, has been placed where the doorway had been, and a new doorway, with stone steps, railings, and columns supporting a decorative arch, has been constructed at the front of the building. All of the wood-work has been repaired, the old brick front and side have been coated with concrete, and a new roof has been put on. The outside wood-work has been painted white; this, with the other changes and improvements, has made the house beautiful.

In the same neighborhood of the residence just mentioned stands another old house which has also been remodeled. After all of the improvements had been made, the owner had no difficulty in renting the house at a good figure.

This is the kind of business that any builder may have whenever he wants it. By calling upon owners of property and explaining how desirable improvements can be made in the property at comparatively small expense, the builder can "create" orders on every side. There is no end to the number of repair and remodeling jobs which may be had in every town and city of the United States. Don't wait for this business. Go after it! Progressive builders should never lack profitable work.

Editorial

Transportation Versus Construction

THAT there is a crying need for more homes, as well as numerous other classes of buildings, throughout the country is so patent that it needs no argument. That transportation facilities have been inadequate is also true. The difficulty of relieving the former condition has been largely credited to the transportation muddle. The defense of the railroads—lack of adequate equipment and insufficient rates—was not entirely without justification, but somehow a feeling prevailed that the roads were not using their existing equipment to the greatest possible advantage. This condition was attributed to two main causes, unrest among the employes, and the practical assurance to the railroads that an increase in rates would be permitted. This latter fact, consciously or unconsciously, tended towards procrastination in the movement of freight. But now these two deterring factors have been eliminated. The employes have been granted a very substantial increase in their rate of wages and the roads have been permitted to charge increased rates. A distinct improvement in the movement of freight may be confidently expected within the next month, and this should increase as additional equipment is supplied.

In addition to this the United States Senate Special Committee on Reconstruction and Production, of which Senator William M. Calder of New York is chairman, is doing much to improve conditions in the building industry. Mr. Calder is a practical builder and also has a thorough knowledge of economical conditions affecting the industry, as well as of the national problems with which the industry must take recognition. Builders having difficulty in obtaining materials are invited to present the complete facts to this committee. Unlike many other committees appointed by legislative bodies, whose chief function has been to present a "report," this committee is actually accomplishing beneficial results during its lifetime. Its report will be of much interest, and the recommendations it presents should be carefully considered by the appointing body, but it is gratifying to note that at least some of the problems now being faced by the construction industry will undoubtedly be solved by the time the Senate convenes.

The main cause of our lack of an adequate building program has been the high cost of the completed building. Here again a careful analysis will show that these high costs have not been entirely due to the high prices of labor and materials, but to the inability to get the materials at all. This has resulted in one of two things. Either the builder has been compelled to obtain the materials *at any price,* or else the job has stood idle for weeks, while the overhead and other items have caused a constantly increasing amount to be added to the cost of the completed structure. When it becomes possible to obtain materials when needed and at quoted marked prices, the high cost of building will be lowered, despite the fact that these very market prices may be higher due to increased freight rates. An adequate available supply is essential.

There is one thing that is important. The freight rates on building materials must not be unfairly increased. Attention has been called to the fact that in 1918, when an average increase on all commodities of 25 per cent went into effect, the increase on many important building materials was as high as 50 per cent. It was generally understood at that time that this was done to discourage private building, in other words to act as an embargo. Again to increase rates on building materials without making allowance for the previous unequal increase would be unfair and would act contrary to public necessity.

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Lumber Market Review

Increased freight rates add to cost of lumber but not held responsible for light buying

THE preceding month was an exceptionally dull one in the lumber industry, and every builder and material dealer knows that August is always a poor business month. The inactive buying is attributed to two factors, the extreme scarcity of freight cars and the difficulty of securing credit accommodations. Because of these two conditions, a very peculiar situation has arisen. There has been a marked indifference on the part of both buyers and sellers. The former are not inclined to purchase new stocks when deliveries are so uncertain and when the demand from the building trade shows little signs of improving, while the sellers, including the producers themselves, are not anxious for new business when they cannot get sufficient cars to deliver orders already on their files.

Production is still being curtailed in the Southern pine and North Carolina pine belts and also on the Pacific coast, but even with the curtailed output stocks are accumulating at the mills because of the fact that the car supply ranges from 20 to 30 per cent of normal. Records of the national and sectional lumber associations show that shipments during the month of August did not begin to keep pace with new orders or production, and yet, as stated, August was a dull month for business and production was held down to a minimum.

It is interesting to note that the increased freight tariffs, which went into effect the latter part of August, have had no bearing on the market, although the advance has added from $2.00 to $8.00 per thousand feet to the cost of lumber. For instance, under the new rates, Southern pine is costing material dealers (who pay the freight) from $3.00 to $6 50 per thousand feet more; Douglas fir, California red wood and other Pacific coast lumber is costing from $4.00 to $8 00 more; Western red cedar shingles are costing about 58 cents per thousand more; North Carolina pine, from points north of Norfolk, are costing from $2.00 to $4.00 more; Eastern spruces, hemlock, white pine and hardwoods are costing from $1.50 to $4.00 more. These calculations are based on the rate to New York City. Dealers and users of lumber in other localities can figure their lumber bills accordingly.

With the exception of hardwoods, the lumber market continues to show more signs of stabilization. In some instances, where certain items are scarce, as with 2½-inch yellow pine flooring, there has been slight stiffening of prices, but as a rule construction lumber generally is selling about on the same level as it did a month ago. Timbers and dimension stock are very strong just now because of the heavy railroad buying. Cedar shingles are also strong, because of the marked curtailment of production. Spruce and yellow pine lath are a trifle weaker, and the former will doubtless continue to decline until it reaches a more reasonable level. At present spruce lath is wholesaling at around $11.00, delivered. The hardwood market throughout the past month has been weakening, due to the very light demand.

Oak flooring is cheaper today than oak lumber of the same grade. This is a condition which has never before existed in the hardwood market. Incidentally, hardwoods are selling on a wider range of prices than ever before in the memory of lumbermen. This applies to both northern and southern hardwoods, in some instances the prices quoted having a range of $30.00 to $60.00 on identical items.

Freight cars are getting scarcer and there is no indication of relief before Winter; sawmills are well stocked with orders and production is being curtailed; retail yard stocks are light and badly broken as to assortment; the nation needs houses more than ever before in its history; tremendous crops are being harvested throughout the agricultural areas and extensive building operations are planned in those localities; the railroads will continue to buy heavily of car material, timbers, ties and dimension during the remainder of this year; consuming industrials are badly in need of lumber, because they have been buying on a "hand-to-mouth" basis; the export demand for American lumber, which was expected to boost overseas shipments immediately after the close of the war, has not been supplied, and this demand must be taken care of as soon as the rate of exchange has been adjusted. All of this leads to the conclusion that construction lumber is about as cheap now as it will be for some months.

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Decisions Rendered to Date

by the National Board for Jurisdictional Awards in the Building Industry

It is important that every builder keep informed as to these awards

1. Low Pressure Heat

[Subject of dispute between the United Association of Plumbers and Steamfitters and the International Union of Steam Engineers in the matter of maintaining temporary heat while structure is in course of construction.]

Decision—In the matter of the controversy between the engineer and steamfitter on the question of low pressure heat during completion of the heating system, jurisdiction shall rest with the steamfitters until the initial test is completed, immediately after which time, whenever necessary to maintain heat, a stationary engineer shall be employed either by the contractor or the owner.

2. Pipe Railing or Guards for Enclosures, Stairways, Hatches, Etc.

[Subject of dispute between the Bridge and Structural Iron Workers' International Association and the United Association of Plumbers and Steamfitters. Claimed by the Iron Workers entirely except when not used as a conduit for fluids or vapors; claimed by Plumbers and Steamfitters when of standard sized cut and threaded pipe.]

Decision—Pipe railing consisting of standard-sized cut and threaded pipe, not used in connection with structural or ornamental iron work is awarded to the United Association of Plumbers and Steamfitters.

3. Metallic Corner Beads When Set in Plastic Material

[Subject of dispute between the Operative Plasterers and Cement Finishers' International Association and the Wood, Wire and Metal Lathers' International Union.]

Decision—In the matter of the controversy between the Plasterers and Lathers on the question of the adherence of corner beads by plastic material, it is the opinion of the Board that deserved consideration was not given the subject when the previous decision was reached. It is, therefore, agreed that the plasterers are awarded jurisdiction over sticking with plastic material metallic corner beads.

4. Re-enforced Concrete, Cement and Floor Construction

[Subject of dispute between the Bridge and Structural Iron Workers' International Association and the Wood, Wire and Metal Lathers' International Union.]

Decision—In the matter of controversy between the Iron Workers and Lathers over re-enforced concrete construction, it is decided that all iron and steel used for re-enforcement in re-enforced concrete, cement and floor contsruction be awarded to the Iron Workers.

In such cities or localities as are covered by existing agreements with employers awarding Lathers control over re-enforced concrete construction, these arguments are to be maintained inviolate until the date of their expiration, after which this decision shall prevail.

5. Electrical Work on Elevators

[Subject of dispute between the International Brotherhood of Electrical Workers and the Elevator Constructors' International Union.]

Decision—In the matters of the dispute between the Elevator Constructors and the Electrical Workers on the question of all electrical work on elevators, it is agreed that the electric work on flashlights, electrical annunciators and lamps and feed wires to the controller is awarded to the Electric Workers. All other electrical work is awarded to the Elevator Constructors in accordance with the conditions under which the charter was issued to the Elevator Constructors' International Union by the American Federation of Labor.

6. Vitrolite and Other Opaque Glass

[Subject of dispute between the Bricklayers, Masons and Plasterers' International Union and the Brotherhood of Painters' Decorators and Paperhangers.]

Decision—That in the matter of the controversy between the Painters and Bricklayers on the subject herewith referred to, jurisdiction over the setting of vitrolite and similar opaque glass is awarded to the Bricklayers, Masons and Plasterers' International Union.

7. Cutting Chases or Channels in Brick, Tile, Masonry, Etc.

[Subject of dispute between the Bricklayers, Masons and Plasterers' International Union and the International Brotherhood of Electrical Workers.]

Decision—That in the matter of the controversy between the Bricklayers and Electrical Workers concerning the question of cutting grooves, channels, chases, etc., the Bricklayers are awarded jurisdiction over the work, except when channels do not exceed two inches by two inches in size or require labor not to exceed eight hours continuous time, in which case the award is in favor of the Electrical Workers.

Note: This decision does not contemplate the channelling or cutting of granite or hard stone.

8. Erection of Scaffolds as Applied to Building Construction

[Subject of dispute between the International Hod Carriers, Building and Common Laborers' Union, United Brotherhood of Carpenters and Joiners, Operative Plasterers and Cement Finishers' International Association and Bricklayers, Masons and Plasterers' International Union.]

Decision—In the matter of the dispute between the Laborers, Bricklayers, Plasterers and Carpenters over the erection of scaffolds as applied to building construction, it is agreed that the erection and removal of all scaffolds including trestles and horses used primarily by Lathers, Plasterers, Bricklayers and Masons shall be done by the Mechanics and Laborers in these trades as directed by the employer.

Self-supporting scaffolds over fourteen feet in height or any special designed scaffold or those built for special purposes shall be built by the Carpenters.

The making of horses and trestles other than temporary is the work of the Carpenter.

(*Continued on page 70*)

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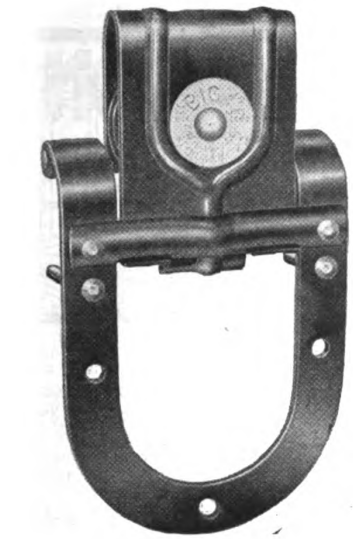



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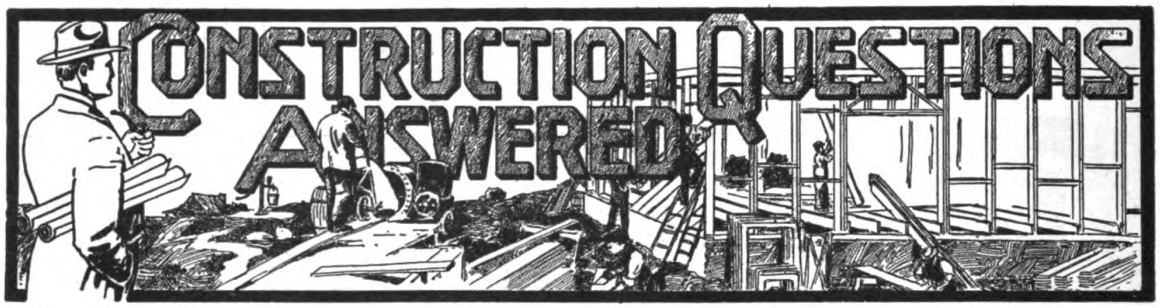
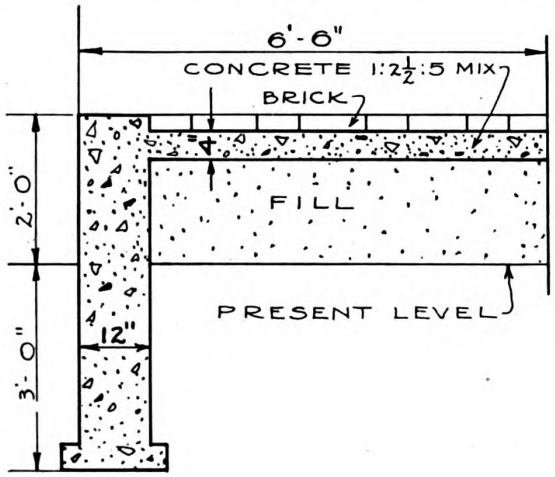


Porch Reconstruction

From Dr. W. S. H., North Wales, Pa.—The floor of my porch is of wood and is about done for. I want to have a floor of brick laid in cement. The dimensions are as follows: 25 feet long on each side, that is, a run of about 50 feet; about 6½ feet wide and about 2 feet above the surface of the ground. Would it make a good job to put in a retaining wall of concrete going 3 feet below the surface and about 2 feet above to the present level of the floor and then fill in behind this wall with ashes, stones, etc.? How thick should the concrete on top of the fill be before the bricks are laid? Is there danger of frost getting to the ground behind this wall? It was my intention to have the retaining wall one foot thick. Is that sufficient? Can you suggest a better way of doing the work? Would a stone foundation up to grade level with a brick retaining wall be as cheap as the concrete wall? What proportion of concrete would be best?

Answer.—While the construction you contemplate is somewhat unusual there is no reason why it should not be satisfactory. So far as the retaining wall is concerned, a depth of 3 feet below the grade should be adequate,



and as the wall will only be 2 feet above the ground surface, a thickness of 12 inches is sufficient. In the matter of the cost, I doubt if there will be much difference between stone and concrete. The brick will probably be somewhat more expensive. Either material will make a satisfactory job if properly constructed.

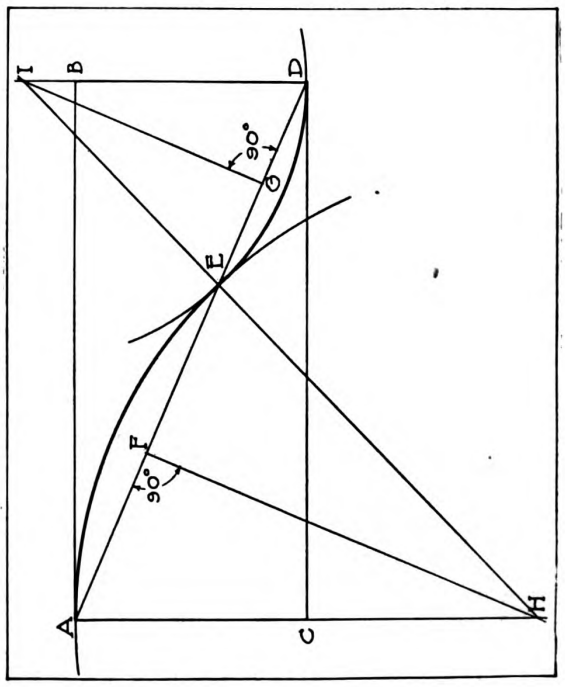
The main point to guard against is settlement in the fill. I would suggest that in filling back of the wall, the earth or cinders be wetted and well tamped and after the fill has been completed it should be left to stand for some little time as it is quite sure to settle. If you place your concrete directly on top of the new fill, it will undoubtedly crack. After one or two heavy rainstorms, any settlement occurring should be made good by placing additional material on top and tamping.

The concrete base for the brick surface paving should be at least 4 inches thick, mixed in the proportions of 1:2½:5. Cinders, if available, can be used as the coarse aggregate. It would not be a bad idea to reinforce this concrete slab with a light wire mesh.

If a concrete wall is used, the concrete for this wall should be mixed in the proportion of 1 part cement, 2 parts sand and 4 parts broken stone or gravel.

Drawing a Reverse Curve

From C. J. M., St. John's, N. F.—I send the following little geometrical problem thinking that it may be useful to some of the many readers of BUILDING AGE. It is a problem I have not seen in any of the current technical



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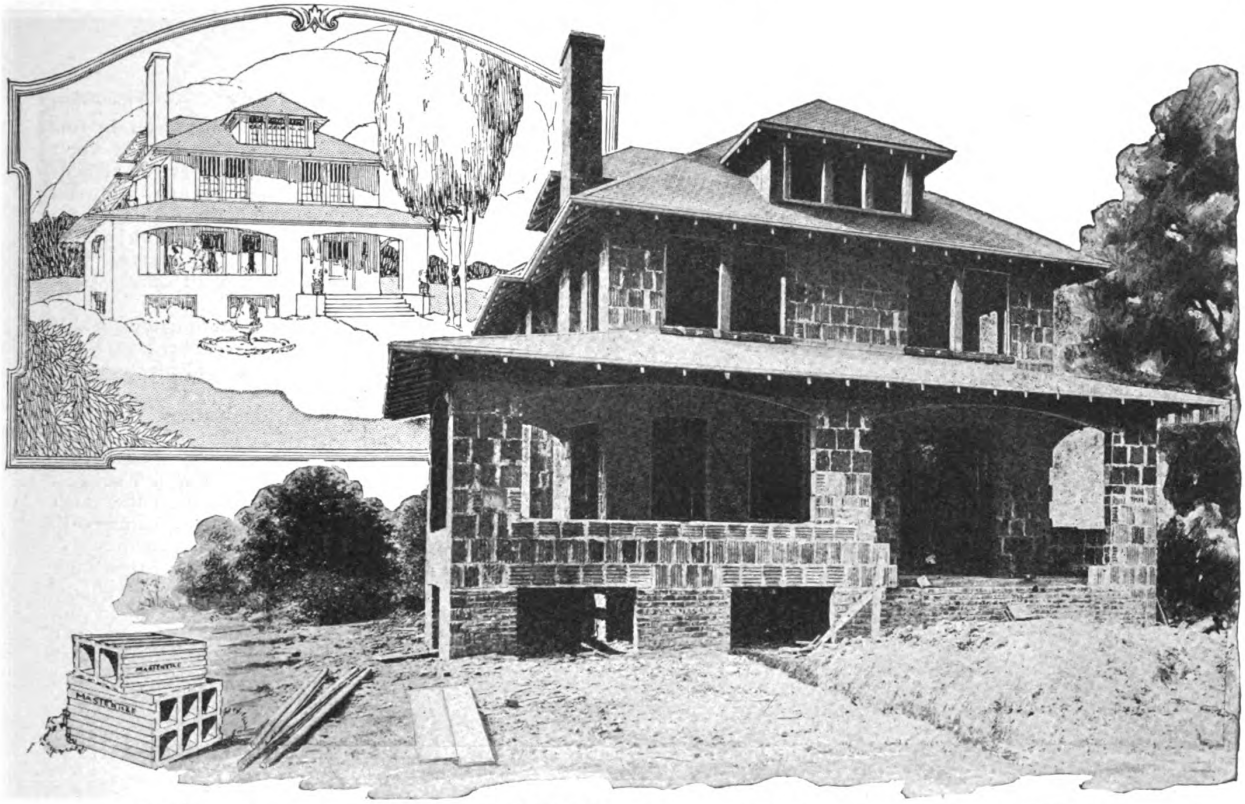

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books, nor for that matter in any book, and as far as I know, it is an idea of my own. Its application will be readily recognized by the practical mechanic as there are numerous instances where lines of contrary curvature are required within a limited space.

The problem and its solution are as follows:

To describe two circles so as to be tangent to each other at any point on the diagonal line of a given rectangle, and forming a reverse curve on the diagonal through that point.

Let A, B, C, D be the given parallelogram and AD the diagonal line. Point off, at random, any point, E, on the diagonal line. Bisect A-E and E-D in F and G and through F and G, at right angles to A-D, draw the lines F-H and G-I cutting the lines A-C and D-B produced, in H and I. Then, with H and I as centres and H-A and I-D as radii, describe two circles coming tangent to each other in the point E as shown by the line H-I forming a common radius of both circles. The arcs A-E and E-D forming a line of contrary curvature in the limited space of the parallelogram.

Making Partitions Sound Proof

From W. F. S., Pittsburgh, Pa.—Kindly give me some information as to the best way out of my trouble. We have a brick house in which two families live. I think the wall is only one course thick. You can hear the least sound and can hear anyone talking in the other part of the house. What would you recommend to have done to the partition so that these sounds cannot be heard so plainly?

Answer.—The trouble you mention is experienced in many homes. There is no absolute cure-all for such a condition, but there are many things which can be done to improve it.

Some years ago a large number of tests were conducted to determine the sound-proof qualities of various types of partitions, and since that time additional tests have been carried out. I was recently in receipt of some results of such tests, which seemed to indicate that partitions constructed of wood studs, wire lath and plaster gave as good results as any.

I would suggest that you fur out the partition in question with either 1x2 in. furring strips, or 2x4 in. studs (the latter, while more expensive and reducing the space to a greater extent, will prove the more satisfactory) covering the face of these with wire lath weighing about 3.7 lbs. per sq. yd., and plastering this with three coats of plaster.

Another type of construction which would aid would be to lay up 3 in. hollow gypsum blocks on one side of the partition and plaster this with two-coat work.

It has been frequently recommended that where a hollow partition was used, such as that which would be produced by placing 2x4 studding against the existing partition, that the space between the studs should be filled in with some incombustible deafening material such as mineral wool. This increases the cost, but seems to decrease the sound-conducting properties of the partition.

Lining a Cistern With Masonry Walls

From G. F. B., Neb.—Will you please try and help out an old subscriber? Water here is hard to get. We have to go 300 ft. for it. We build cisterns and plaster the earth with a 1 to 1½ in. cement mixture. The grain of the earth is vertical here, so we can plaster in this way. It is hard to make the cement so that it won't crack. What is there that we can put over the cement that will prevent this leaking? We usually whitewash with clear cement and water. Sometimes this works and sometimes not. It usually fails to work at the wrong time when it is hot and water is scarce. Our cisterns are about 16 ft. deep and hold from 5,000 to 10,000 gallons each.

Answer.—The best method of eliminating the trouble you speak of would be to line the cisterns with masonry walls, properly laid in cement mortar and plastered on the inside with a liberal coat of cement. This, of course, is more expensive than the method you have employed.

In order to provide a more satisfactory construction without materially increasing the cost, I would suggest that before plastering the cement mixture on the earth walls of the cistern, you first cover the same with light wire lath or expanded metal. In placing this material, it should be kept a slight distance from the face of the earth to permit the cement plaster to obtain a good key, and should then be well covered on the inside face with an additional coat after the first coat has set. You will find that the incorporation of metal lath will materially reduce if not entirely eliminate the cracking.

Decisions, National Board for Jurisdictional Awards

(*Continued from page* 66)

9. Asbestos Plaster for Boiler Rooms, Etc.

[Subject of dispute between the Operative Plasterers and Cement Finishers' International Association and the International Association of Heat & Power Insulators & Asbestos Workers.]

Decision—In the dispute between the Asbestos Workers and Plasterers on the matter of plastering boiler rooms, etc., it is decided that the insulation and finishing coat on ceilings with asbestos and other insulating material, where the ground work has been prepared and installed by the asbestor worker, shall, including the application of insulating material on boilers, tanks, vats, etc., be awarded to the asbestos worker.

10. Bestwall, When Applied as a Substitute for Lath and Plaster

[Subject of dispute between the United Brotherhood of Carpenters and Joiners, Operative Plasterers and Cement Finishers' International Association and International Union of Wood, Wire and Metal Lathers.]

Decision—In the matter of material known as Bestwall, forming a contention between the Carpenters, Plasterers and Lathers, jurisdiction shall rest with the Carpenters where material is paneled or used as sheathing; when cut, fitted and pointed, the Plasterers are recognized to have jurisdiction.

11. Asbestos Shingles, Prepared Paper Roofing, Asphalt Roll Roofing, Shingles and Strip Shingles

[Subject of dispute between the United Brotherhood of Carpenters and Joiners and the United Slate, Tile and Composition Roofers, Damp and Waterproof Workers' Association.]

Decision—On the question in controversy between the Roofers and Carpenters on the subjects contained in the title, it is decided as follows:

Asbestos Shingles, Prepared Paper Roofing, Asphalt Roll Roofing—Awarded to the United Slate, Tile and Composition Roofers, Damp and Waterproof Workers' Association.

Asphalt Shingles, Strip Shingles—Awarded to the United Brotherhood of Carpenters and Joiners.

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Everlastic Multi-Shingles
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The newest thing in roofing. Tough, elastic and durable. Made of high-grade waterproofing materials and surfaced with crushed slate in art-shades of red or green. When laid they look exactly like individual shingles and make a roof worthy of the finest buildings. Weather and fire-resisting. Need no painting.

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The most beautiful and enduring roll roofing made. Surfaced with crushed slate in art-shades of red or green. Very durable; requires no painting. Nails and cement in each roll.

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Same material and art-finish (red or green) as the Multi-Shingles, but made in individual shingles; size, 8 x 12¾ inches. A finished roof of Single Shingles is far more beautiful than an ordinary shingle roof, and costs less per year of service.

Everlastic
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An Investment for the Owner An Advertisement for You

You never have to make excuses for an Everlastic Roof. It satisfies the owner when it's new and it continues to satisfy him through many years of service.

One of the big features of Everlastic Roofings is that they are made in both shingles and roll form—two styles of each. And three of the four styles are surfaced with real crushed slate in the permanent natural art-tones of red or green.

This means that no matter what the building—if it has a steep roof—you can get a style of Everlastic exactly suited to the job, and so be sure of a moderate-priced roof that will be a splendid investment for the owner and a mighty good advertisement for you.

Barrett Everlastic Roofings are carried by enterprising dealers everywhere.

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If you are bothered by any point of building law, write to our Legal Adviser, A. L. H. Street, LL. B., who is retained for the benefit of subscribers to Building Age, and is at your service.

Is This Architect Entitled to Compensation?

From L. K., Pa.—Having approved pencil sketches, an owner directed me to prepare plans and specifications for four houses. This I did, delivering three copies of each to him. I have witnesses whom he told that he had authorized me to do the work. I agreed to furnish these plans if I were to do the construction work; otherwise, he was to pay me for them. Now he tells me that conditions are unsettled and that he does not intend to erect the buildings. I have told him that he might use the plans in the future. I went to considerable expense and trouble and he has the plans and specifications in his possession. He refuses to recompense me for my services. Have I a valid claim against him?

Answer.—Your letter shows a valid right to recover the fair value of your services. When you prove that you did the work at his instance, that he accepted the same, and what the fair value of your service was, you have established a right to recover.

Trying to evade liability to an architect for the reasonable value of his services in a case of this kind is like trying to avoid liability for the price of a suit of clothing taken home from the tailor's, on the ground that the purchaser has decided not to wear the garments. Numerous decisions of courts of last resort in this country, Canada and England support the following statements of law laid down in a standard legal authority:

"Where a person employed as an architect to furnish a plan performs such service, he is entitled to remuneration therefor, if the plan is made in accordance with the directions of the owner. But the right of the architect to compensation depends on the existence of a contract between him and the owner for the services in preparing the plans, and he cannot recover for services voluntarily rendered unless they are accepted; nor can he recover for specifications prepared in violation of law, unless directed by the owner to prepare them; nor can he recover if, through negligence, the plans furnished are grossly defective, or of no value to the owner. An architect's right to compensation is not affected by the fact that he subsequently becomes the contractor; but, in the absence of an agreement to that effect, a builder is not entitled to charge for a plan which he prepares and attaches to specifications as explanatory thereof. * * *

"If an architect prepares plans and specifications for a building pursuant to an unconditional order or direction of the owner, but without any express agreement as to compensation, he is entitled to recover the reasonable value of the services rendered, whether the plans are used or not, as where the owner abandons his intention to build, or stops work on the plans before they are completed.

"Where the contract so provides, the architect's right to compensation may be dependent upon the plans and specifications submitted by him being saisfactory to the employer or approved by him, or upon the acquisition by the employer of the property designed to be improved, or upon the ultimate determination of the employer to build in accordance with the plans submitted; or it may be dependent upon some other condition or contingency." 5 Corpus Juris, 260, 261.

In passing, it is interesting to note the decision of a New York court in the case of Fuller vs. Craig, 10 New York State Reports, 108, wherein it was held that where architects who had drawn preliminary studies and sketches were thereafter directed to proceed with detailed plans and specifications, and two days later, before they had entered upon the work, the owner discharged them, there was no binding and complete agreement as to anything other than the preliminary studies and sketches, and the compensation of the architects was limited to the value of their services in regard to such studies and sketches.

Considering Lot Title Before Building

From H. F., R. I.—I am preparing to build a house, but desire first to have everything in black and white, so as to avoid future trouble. About four years ago my sister and I bought a lot on contract for $400 and it is now about one-half paid for. Last summer my sister married and deeded her interest to me. The consideration recited was $1, but it was understood verbally that my paying a doctor's bill for her should pay for her share of the lot.

What would prevent my sister's husband from making trouble? What would you advise me to do? How

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Metal Lath has proven to be the strongest, most rigid and best backing of all the materials used for the purposes of the test.

Under the pressure of Screwjacks, the walls that were constructed with Metal Lath as a base showed least distortion of any materials used.

Out of Ten Different Types

of stucco walls, erected by the Government Bureau, the back plastered Metal Lath was the only one to receive a perfect rating in all inspections during the test. It did not develop cracks under pressure.

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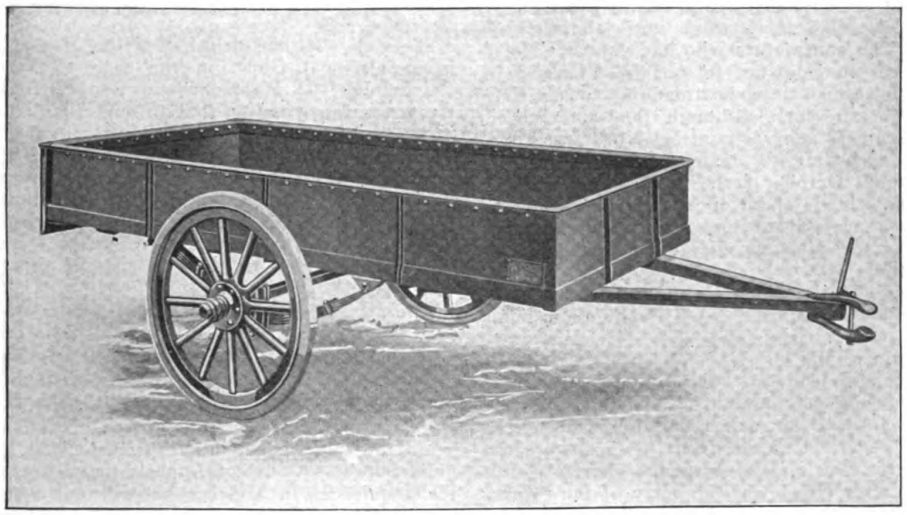

Capacity—2,000 pounds. Body—8 feet long, 46 inches wide, 12 inches high. Body and under frame built of open hearth steel. Axles—1½ inch square bed, special high carbon steel. Springs—Semi-elliptic, oil tempered and double heat treated. Bearings—Roller. Wheels—1½ inch spoke, artillery type, second growth hickory. Tires—32-2, solid rubber. Weight—534 lbs. Other models with gates at front; also extension tongue which permits carrying lumber, poles, ladders, etc., 30 feet long.

Write for Catalog A

ALL STEEL TRAILERS — EVERY TYPE — 1 TO 10 TONS CAPACITY

ROGERS BROTHERS COMPANY **Albion, Penna.**

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can I mark the building itself to show that I built it?

Answer.—You show good sense in desiring to have everything down in black and white, and in being sure that you have good title to the lot on which you propose to build. Too many persons, including builders, find out to their sorrow after it is too late that they have gotten themselves into trouble by not taking heed of actual ownership of land on which the structure has been erected.

The only safe thing for you to do is to obtain an abstract of title covering the lot and take it with any unrecorded instruments affecting the title to some dependable attorney and let him determine whether these papers show that you have good title. If the title is found to be in good shape and your sister has validly released her interest you can proceed. But I advise against building on the property until you have a deed from the seller, if one has not already been obtained, and a legal release of your sister's interest. Otherwise, her husband might make trouble by refusing later on to sign a paper releasing her interest. Your letter shows sufficient consideration for release of her interest.

There is no legal way of marking a building so as to identify it as having been erected by a certain person. The proper way to preserve interest in real estate on account of building a house on it is by deed, contract, mortgage, mechanic's lien or some other instrument or proceeding.

Contractor's Claim for Being Delayed

From S. L., Mass.—I am supervising architect for the construction of a building in Massachusetts, the owner of which was to furnish materials, and the labor cost was divided into two contracts; contract No. 1 being for the foundation and floors, which were of cement, and contract No. 2 for the rest of the construction.

The contractors who were awarded contract No. 1 were to have completed the same within ten weeks from the date of starting, which was July 12, but as a matter of fact did not complete their work until about three months later. The contractors who had contract No. 2 signed the Uniform Contract form 19642-PL, and in the same there was no statement made as to the time they were to begin work, although they understood they were to begin as soon as contract No. 1 was completed, which, according to their statement, they expected to be about October first.

They have now made claim upon the owners for reimbursement on account of loss they claim to have sustained by reason of a considerable advance in the wages which they were obliged to pay, due wholly, according to them, to the above-mentioned delay.

Have the holders of contract No. 2 a valid claim upon the owners?

Answer.—I am of the opinion that Contractor No. 2 has a valid claim for damages, excepting as his agreement with the owner may contain provision to the contrary. In the absence of such exemption, Contractor No. 1 is to be regarded as the agent of the owner, so far as Contractor No. 2 is concerned. Therefore, the delay by Contractor No. 1 was the delay of the owner.

The case appears to come within the holding of the Illinois Appellate Court in the case of W. H. Stubbings Co. vs. World's Columbian Exposition Co., 110-111. App. 210, that where an owner fails to have the premises ready so that plaintiff can proceed with the work **within the time contemplated,** and wages advance thereafter so that the cost of the work to the contractor is thereby enhanced, the owner is liable for damages ensuing from such delay.

The case is also governed by the following authoritative summary of the law as laid down by numerous court decisions:

"The owner is liable in damages to the builder for a delay in performance of his part, or caused by some act of his or of his representative, unless the particular provision of the contract relied on as a ground for recovery is intended merely to absolve the builder from liability for the delay, or unless the builder is himself the cause of the delay or the owner stipulates against liability for delay caused by his agents. In case of a delay caused by the owner, the builder is not obliged to abandon the work and sue for damages, but may proceed to complete the work and then claim damages. The owner is also, in the absence of any stipulation in the contract exempting him therefrom, liable for damages from delays caused by the failure of other contractors to perform work which they have undertaken to do for the owner, and which, as regards the former contractor, the owner is under obligation to do; but the owner may, by express stipulation in the contract, exempt himself from liability to one contractor for delays caused by other contractors." 9 Corpus Juris, 790, 791.

It is interesting to note, however, that the Washington Supreme Court has decided that, under a clause in an agreement to erect a building, providing for an extension of time in which the contractor might complete the work, commensurate with any delay caused by the owner, the architect, or any other contractor, the contractor could not hold the owner liable in money damages for delays caused by other contractors. Goss vs. Northern Pacific Hospital Association, 50 Washington Reports, 236, 96 Pacific Reporter, 1078. To the same effect is the decision of a federal court in the case of Haydnville Mining Co. vs. Art Institute, 39 Federal Reporter, 484.

It seems that the decision of the Massachusetts Supreme Judicial Court in the case of Blanchard vs. Blackstone, 102 Massachusetts Reports, 343, supports the general proposition that an owner is liable for delay in performance of a building contract, caused by some act of his or of his representative.

A New York decision holds that a contract for the performance of carpenter work entitled the contractor to damages for delay arising from neglect of the owner of the building to have it in readiness for commencement of the work **within a reasonable time.** Allamon vs. Albany, 43 Barb. 33.

The decision in another New York case—Del Genovese vs. Third Avenue Railroad Co., 13 App. Div. 412, 43 N. Y. Supp. 8—is to the effect that an owner is liable for delays suffered by the contractor through acts of the supervising architect, resulting in enhanced cost of doing the work.

On the other hand, it has been decided by the Virginia Supreme Court of Appeals that where a contractor acquiesces in a delay he will not afterwards be permitted to recover damages therefor, unless he makes clear proof of the damages sustained by him. Railroad Co. vs. Construction Co., 98 Va. 503, 37 S. E. 13.

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Practical rules. Problems worked out from the plans. Brickwork and carpentry. Excavations. Labor and material for footings in brick, concrete and rubble stone. Methods of practical builders. Re-inforced concrete—full plans and specifications for re-inforced concrete buildings. Estimates of labor and material required. Labor and material for brick work; figuring common and pressed brick walls of different thicknesses, etc. Chimneys, fire places and cisterns. Fire proofing, tile flooring, arches, partitions, furring, terra cotta, etc. Lumber and timber; figuring board feet. Estimating posts, girders, sills, joints, studs, bridging, rafters, etc. Estimating all kinds of roofs, floors, siding, cornices, etc. Labor for rough and finished carpentry.

Estimating mill work. Labor and material for window and door frames, sash, blinds, base board, wainscoating and all kinds of closets, cupboards, etc. Lathing and plastering, sheet metal work, exterior and interior marble jointing and decorating, glazing, plumbing, heating, wiring, etc.

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New Catalogs of Interest to the Trade

These catalogs may be secured direct from the manufacturer. If you prefer, write the date of this issue and the numbers of any catalogs on a postal and mail it to "Building Age," 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.

232. Handbook on Mixing Concrete. The Waterloo Construction Machinery Company, Waterloo, Iowa.—Illustrated booklet containing some very valuable data concerning concrete, such as the ingredients used for making concrete, proportioning of these ingredients, methods of estimating for various classes of work. The disadvantages of mixing concrete by hand are pointed out. The various types of Wonder Concrete Mixers manufactured by this company are described and illustrated.

233. Eye Comfort. National X-Ray Reflector Company, Chicago, Ill.—Extensively illustrated book describing various X-Ray lighting installations in theatres, factories, department stores where a strong, clear light is needed for matching colors or detecting fine shades and tints, etc.

234. Builders' Hardware. National Mfg. Company, Sterling, Ill.—112-page catalog describing and illustrating the hardware manufactured by this company.

235. Sylphon Specialties. The Fulton Company, Knoxville, Tenn.—Illustrated catalog describing the thermostatic instruments manufactured by this concern.

236. Du Pont Magazine. E. I. Du Pont De Nemours & Company, Wilmington, Del.—May issue contains many interesting articles, among which is one on color enamel, a new product made by this company.

237. Meadows Power Washers. The Meadows Mfg. Company, Pontiac, Ill.—Illustrated booklet describing the different types of washers marketed by this concern.

238. Our War Record. W. G. Cornell Company, New York City.—Book containing photographs of various buildings used for war purposes in which the plumbing, heating, lighting, sewage disposal, etc., equipments were installed by this company.

239. A Few Town and Country Residences. Lorillard Refrigerator Company, New York City.—A loose leaf album of residences in which the refrigerators were designed and constructed by this company.

240. Douglas Fir Lumber (Oregon Pine) and Its Future. Booklet containing a compilation of opinions and statistics from reliable sources, thus making it very valuable for reference work. Booklet compiled by George G. Hull, Jr., 27 Pine Street, New York City.

241. The Newport Automatic Feed Boiler. Newport Boiler Company, Chicago, Ill.—Illustrated book describing the advantages, construction and operation of the Newport magazine feed boiler. Various buildings in which these boilers have been installed are shown.

242. Norristone Art. The Norristone Studio, Rochester, N. Y.—Illustrated catalog of garden furniture made by this firm. Prices are given.

243. Quick Concrete Mixing by "The Standard" Method. Standard Scale & Supply Company, Pittsburgh, Pa.—Catalog Y 190 illustrates and describes the different types of mixers manufactured by this company, which also manufactures hoisting outfits, diaphragm pumps, etc.

244. Nokol Automatic Oil Heating for Your Home. The Steam Corporation, Chicago, Ill.—Catalog F describes and illustrates the construction and operation of Nokol burners. Comparison of costs of burning coal and burning oil with Nokol in the same heating plant is given. Testimonial letters reproduced.

245. Like Finding Money. Famous Manufacturing Company, East Chicago, Ind.—Illustrated catalog describing the design and operation of the different kinds of baling presses manufactured by this company. These baling presses can be used for the accumulation of waste paper, rags, etc.; also to bale sheet scrap, tin cans, wire and other refuse metal, all of which when baled becomes very valuable and easy to handle. Planing mill shavings, sawdust and other refuse in woodworking plants can also be baled in these presses. Famous and Champion baling presses are made in different sizes and can be advantageously employed in the office, home or factory. Prices given. Testimonial letters included.

246. Expanded Metal Construction. North Western Expanded Metal Company, Chicago, Ill.—May issue contains some interesting articles pointing out the fire-resisting qualities of metal lath. Samples of the different types of lath manufactured by this company sent on request.

247. Architectural and Decorative Ornaments. The National Plastic Relief Company, Cincinnati, Ohio.—Extensively illustrated catalog showing the various ornaments which this company makes, such as musical instruments, door headers, wall corners and mouldings, ceiling and side wall lighting fixtures, etc.

248. "La-Tite" Asphalt Shingles. Howell, Field & Goddard, Inc., Long Island City, N. Y.—Folder illustrating and describing these shingles, which are easy to lay, waterproof and fire resisting.

249. Small Cold Storage Rooms. Armstrong Cork & Insulation Company, Pittsburgh, Pa.—Illustrated booklet describing briefly the principles involved in the design of such rooms, and treating very fully on the subject of insulation.

250. Hack Saws and Their Use. The L. S. Starrett Company, Athol, Mass.—Illustrated booklet aimed at promoting the intelligent, efficient use of all makes of hack saws. Contains much valuable data of interest to users of hack saws.

251. The Pullman Sash Balance. Pullman Mfg. Company, Rochester, N. Y.—Illustrated catalog explaining the many money-saving features of the Pullman unit sash balances which are made of pressed steel.

252. Stanley Tools. Stanley Rule & Level Company, New Britain, Conn.—Catalog illustrating and describing the tools manufactured by this company, particular stress being laid on the Stanley "Pistol Grip" adjustable saw set No. 42.

253. Dumbwaiters and Hand Power Elevators. Sedgwick Machine Works, New York City.—Catalog illustrating and describing these dumbwaiters and hand power elevators, standard sizes of which are kept in

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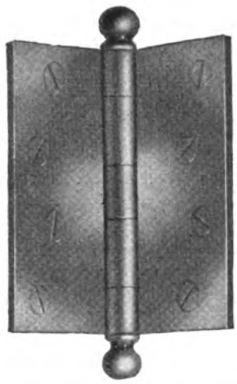

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stock. Blueprints and directions for erecting are furnished with each outfit.

254. The Most Enduring and the Most Attractive Roof at the Most Reasonable Cost. F. C. Sheldon Slate Company, Granville, N. Y.—Illustrated booklet containing interesting facts for those who contemplate having a new roof put on their house, or having an old one repaired.

255. Chains. The Smith & Egge Mfg. Company, Bridgeport, Conn.—Literature describing and illustrating the different varieties of chains manufactured by this company.

256. Bay State Brick and Cement Coating. Wadsworth, Howland & Company, Inc., Boston, Mass.—Booklet No. 19 describes the various Bay State liquid paints which this company manufactures.

257. Premium Mechanics' Tools. The James Swan Company, Seymour, Conn.—1920 edition of catalog illustrates and describes the different kinds of mechanics' tools made by this company. Price list is included.

258. Elevators. J. G. Speidel, Reading, Pa.—Illustrated literature describing the elevators for hand, belt and electric service made by this concern; also descriptive literature dealing with the dumbwaiters and sidewalk lifts also made by this concern.

259. Mineral Wool for Building. U. S. Mineral Wool Company, New York City.—Illustrated literature bringing out the advantages of using mineral wool which is fire proof and vermin proof.

260. Upson Board. The Upson Company, Lockport, N. Y.—Literature illustrating and describing the many advantages derived from the use of Upson board. Reasons for its superiority are given. Samples are furnished on request.

261. Starrett Catalog No. 21 "P." The L. S. Starrett Company Athol, Mass.—Catalog illustrating and describing 2100 tools manufactured by this company.

262. The Sanatar Portable Sewage Disposal Tank. The Sanator Company, Indianapolis, Ind.—Illustrated folder describing the advantages of this tank which affords a practical method for the sanitary disposal of house sewage where sewers are not available, and are especially adapted to homes, schools, public buildings, factories, etc., having running water and sanitary plumbing. Explanation is made of the construction and operation of these tanks which have received the approval of the State Board of Health of Indiana as well as other states. Directions for setting these tanks are given.

263. Set No. 1783. The Stanley Works, New Britain, Conn.—Folder illustrating and describing set No. 1783 of the Stanley Works garage hardware. Those interested and desiring to secure this folder should ask for it by its key number which is B 12.

264. Koehring Construction Mixers. Koehring Machine Company, Milwaukee, Wis.—Extensively illustrated catalog No. 22 fully describes the construction of the various styles of Koehring mixers. Instructions for operating these mixers are given.

265. Hot Water Comforts in the Home. Thermal Appliance Company, New York City.—Booklet describing the many advantages to be found in the domestic "Taco" water heater manufactured by this company. This book is replete with illustrations and diagrams featuring the "Taco." Comparisons are drawn between "Taco" and other heating devices. Directions for installation are given.

266. Big Reduction in Mixer Prices. Contractors Equipment Company, Keokuk, Iowa.—Bulletin P 21 illustrates and describes the Packard handy size batch-a-minute mixers manufactured by this company. Complete specifications and shipping data furnished.

267. Burt Oil Filters, Exhaust Heads and Ventilators. Burt Mfg. Company, Akron, Ohio.—An extensively illustrated catalog describing the construction and operation of the various styles of oil filters, exhaust heads and ventilators made by this company. Prices are included. A list of users of this company's products is given.

268. Test Data on Lime in Concrete and Mortar. National Lime Association, Washington, D. C.—Bulletin 303 is a study of certain tests and experiments upon the effects of hydrated lime when added to concrete mixtures under varying conditions and for varying purposes—together with comments and field observations.

269. Modern Garages, Store Buildings, Factories and Warehouses. International Steel & Iron Company, Evansville, Ind.—Broadside describing and illustrating various buildings in which the products of this company are in service. Letters of appreciation from customers are also reproduced. A complete list of this company's products is given.

270. Anti-Corrosion Engineering. National Tube Company, Pittsburgh, Pa.—Circular containing reprint of an article under the above title, which describes a practical method for preventing the destruction of steam and hot-water pipes.

271. Armstrong's Linoleum Floors. Armstrong Cork Company, Linoleum Department, Lancaster, Pa.—Catalog giving complete description and detailed specifications of Armstrong's Linoleum Floors for the use of architects, interior decorators and builders. Directions for laying are given. Comparative prices are included. This catalog is handsomely illustrated with colorplates of interiors.

272. O-E Perfect System of Heating. O-E Specialty Mfg. Company, Milwaukee, Wis.—Booklet A gives seventeen reasons why the packless graduated supply valve, ball check water seal return fitting and air exhauster and vacuum valve manufactured by this company, are most effective in various types of buildings.

273. Finished Oak Flooring Saves Time and Money. The Crooks-Dittmar Company, Williamsport, Pa.—An illustrated booklet describing "Cromar," a finished oak flooring which can be installed in a single day. Testimonials of satisfied customers are given. Nine points of contrast between Cromar finished oak flooring and unfinished hardwood flooring are listed. An accompanying folder, well illustrated, tells how to lay and care for Cromar.

274. Pozzo—the Italian Process Stucco. American Pozzolana Company, Indianapolis, Ind.—Booklet giving in detail the history of Pozzo, which takes the place of wood or brick and costs less than either. A comparative cost of Pozzo with the cost of brick or frame is shown. Testimonial letters are reproduced. Photographs of houses before and after treatment with Pozzo are included.

275. Neponset Black Waterproof Building Paper. Bird & Son, Inc., East Walpole, Mass.—Sheet showing sample of "Neponset Black" and ordinary sheathing paper. A comparison is drawn, showing that "Neponset Black" is air proof, odorless, vermin proof, and acts as an insulator against drafts and dampness.

276. Asbestone Composition Flooring. Franklyn R. Muller & Company, Waukegan, Ill.—Sheet showing various color suggestions. Several testimonial letters are reproduced. Prices and samples are furnished on request.

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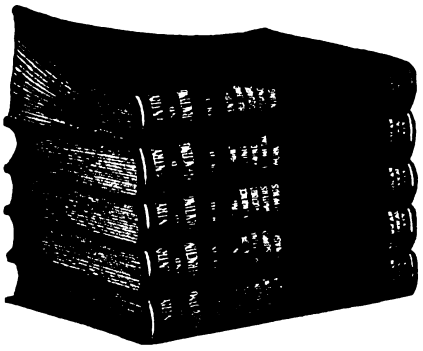

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News Items of Interest

Milliken Brothers Arrange Additional Offices

The Milliken Brothers Mfg. Company, Inc., New York, manufacturer of all-steel industrial buildings, known as Milliken Buildings, as well as other structural steel specialties, including transmission towers, radio towers and poles, will devote the greater part of its operations in the future to the production of Milliken Buildings. These structures are based on a standardized system of structural steel fabrication and erection. To give customers the best attention and service, the company has arranged for branch offices in the following cities, with representatives as noted: Chicago, Majestic Building, the Gagen Sales Corporation; Cleveland, Builders' Exchange, the Clymonts-Mohrman Company; Raleigh, N. C., Structural Supply Company; Atlanta, Ga., 1317 Third National Bank Building, Beaullieu & Applewhite; Chattanooga, Tenn., Volunteer Life Building, O. B. Stauffer; New Orleans, La., Ole K. Olsen, 822 Perdido street; Tulsa, Okla., Industrial Construction Company; Dallas, Tex., 1504 Commerce street, Moore, Shotts & Wilson Company; Houston, Tex., David M. Duller, Houston Land & Trust Company. The Milliken Manufacturing Syndicate, Ltd., London, will handle business in various European countries, while Australian territory will be covered by Gordon & Gotch, Ltd., Melbourne, Australia, with branch offices in other cities. Headquarters, heretofore located on the eighteenth floor of the Woolworth Building, New York, have been removed to larger offices on the twentieth floor of the same building, effective May 15.

Bestwall and Beaver Board Companies Consolidate

The Bestwall Manufacturing Company, manufacturers of "Bestwall," with plants located at Akron, New York and Grand Rapids, Michigan, have consolidated with The Beaver Board Companies, of Buffalo, New York, and The American Cement Plaster Company, of Chicago, Illinois, and Lawrence, Kansas.

The new amalgamation places the extensive gypsum mines of The American Cement Plaster Company, with estimated deposits of between twenty-five and thirty million tons, at the disposal of the "Bestwall" people, and thus insures them an unlimited supply of raw material.

Their association with Beaver Board not only gives "Bestwall" the assurance of an unlimited supply of fibre liner, but also gives them the advantage of the extensive resources of the Beaver Board Companies and enables them to carry out immediate plans of expansion. Manufacturing facilities are already being rapidly increased and by January 1 "Bestwall" will have a much larger production and a considerably wider distribution.

Arrangements are being made to improve "Bestwall" service to the trade in every way. The increased production will not only make possible better deliveries but lower manufacturing costs. Their new plants, when completed, will enable them to ship orders from convenient points and reduce freight charges. As a result, it is felt that "Bestwall" in the future will be an even more advantageous and profitable line for dealers to handle than in the past.

At present the "Bestwall" Mills are far behind orders and the first effort will be to speed up production in every way possible. No change is contemplated in the management of the company and the "Bestwall" offices will continue to serve the trade as in the past.

Manufacturers of Flex-a-Tile Roofing to Build New Plant

The Heppes Roofing Division of the Richardson Company of Cincinnati is beginning construction of a new plant to cost $750,000. It will be on twenty-four acres of land recently purchased at Melrose Park, Ill., at the junction of Lake street and the Indiana Harbor Belt railroad. Completion of the buildings has been promised in ninety working days, and it is expected to have the new plant in operation by January 1.

The Heppes Division, manufacturing a well-known brand of roofing known as Flex-a-Tile House Tops, is now at 4500 Fillmore street, Chicago, but a steadily increasing demand for Flex-a-Tile and kindred products makes it necessary to greatly enlarge their manufacturing facilities.

This company is also opening a new mill at New Orleans and a slate quarry of its own at Flexatile, Ga., forty miles northwest of Atlanta.

The main office and plant of the Richardson Company at Lockland, a suburb of Cincinnati, covers 125 acres of ground.

Plans for the new equipment at Melrose Park include a number of advanced ideas to meet the requirements for greater efficiency and spirit in modern business. Among the features will be baseball parks, tennis courts, swimming pools, and club houses; also a specially designed laboratory for scientific research, etc.

Additional Training as a Means Towards Increased Production

An industrial development which is creating widespread interest in the industry has been undertaken by the Curtis Brothers Company, Clinton, Iowa, the well-known makers of wooden sashes, doors, stairways, etc.

Since the ideals, policies and orders of the management must be transmitted through the foremen and other supervisory executives, production is largely dependent on how well these men transmit them and on this also depends the attitude of the employes. In order to give these minor executives a thorough knowledge of the business and the broad industrial principles underlying it and also to enable them to understand and handle labor more effectively they have organized a regular course in Modern Production Methods. There are fifty-two men studying the course, which is thorough in every respect, requiring three months' work. The men study six textbooks and after reading each one must solve a practical problem based on it. These answers are carefully criticized and rated and the men given individual attention. Every two weeks all meet for a lecture by some expert and for general discussion of problems and for questions. The details of the course are handled by the Business Training Corporation of New York, which furnishes the textbooks, lecturers and instructors.

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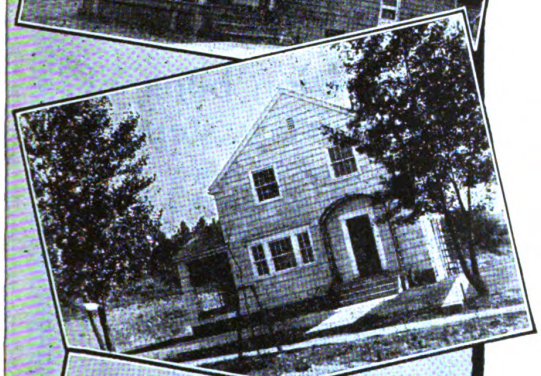
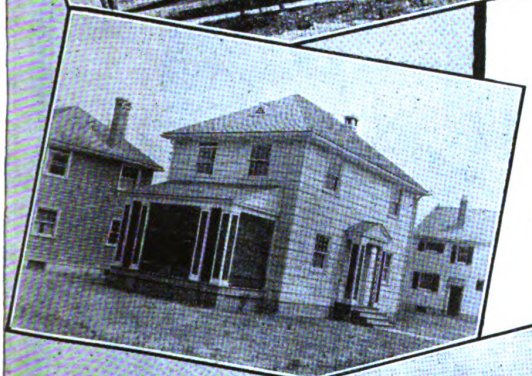
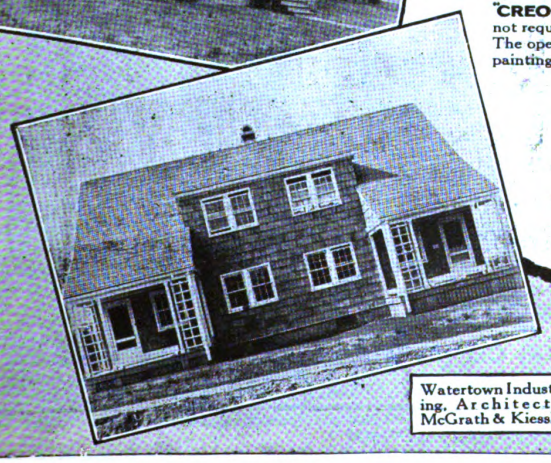
"CREO-DIPT" Stained Shingles











Better Industrial Housing

With Plan Treatment That Means Economy

Industrial housing is on a new plane. Various types of houses are now built—not only economically, not only durably—but ARTISTICALLY as well.

The following extracts from the description by the Architects of the Watertown Housing Project prove that, after months of intensive work by the Committee of Design and the Ordnance Department in planning the erection of three hundred houses within scheduled time, **"CREO-DIPT"** Stained Shingles were considered the best choice for side walls as well as roofs, for their *economy, durability, rapidity in laying, variety in treatment, beauty, and saving of labor and painting costs.*

"For the purpose of introducing variety in plan and design, FIVE PLAN TYPES were adopted. Each type of house has two variations in design; there are also four semi-detached groups, each formed by combining two of the above—thus providing fourteen different exterior designs. In addition, each design is reversed in plan, and an ADDITIONAL VARIETY ALSO OBTAINED IN THE COLOR SCHEME.

"The color scheme is such as will best carry out a colonial atmosphere. The **"CREO-DIPT"** Stained Shingles are 16″ and 24″ lengths in silver and weatherbeaten gray and **"CREO-DIPT"** Dixie White, trimmed with white, gray or cream, to harmonize."

Among other housing projects using **"CREO-DIPT"** Stained Shingles are Firestone Rubber Co., Goodyear Tire and Rubber Co., Carnegie Steel Co., E. I. Du Pont de Nemours & Co., Timken Roller Bearing Co., The Studebaker Corp., Island Creek Coal Co., Huntington, W. Va., Ticonderoga Pulp & Paper Co., Ticonderoga, N.Y., Storb, Snader & Co., New Holland, Pa., Greenfield Homes Corp., Greenfield, Mass., and U. S. Government Industrial Projects at Waterbury, Conn., Newport News, Va., Indian Head, Md., and Watertown, N. Y.

There are 30 color shades in greens, browns, reds and grays of **"CREO-DIPT"** Stained Shingles in 16″, 18″, and 24″ lengths from which to make selection. All earth pigments ground twice in pure linseed oil—carried into the thoroughly seasoned cedar shingles by a preservative creosote oil.

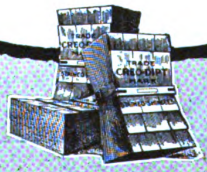
"CREO-DIPT" Stained Shingles come bundled ready to lay without waste and do not require any additional brush coat of stain or paint. No wedge shapes—no waste. The open market does not afford such quality. They save labor, time, material, and painting costs.

Home Builders write for Portfolio of 50 large Photographs of Beautiful Homes, large and small, by prominent architects, and sample colors on wood. They offer many valuable suggestions.

CREO-DIPT COMPANY, Inc.
1030 Oliver Street, North Tonawanda, N. Y.



Portfolio of Homes



Watertown Industrial Housing, Architects, Davis, McGrath & Kiessling, N. Y.

Developed by U. S. Department of Labor—United States Housing Corporation.

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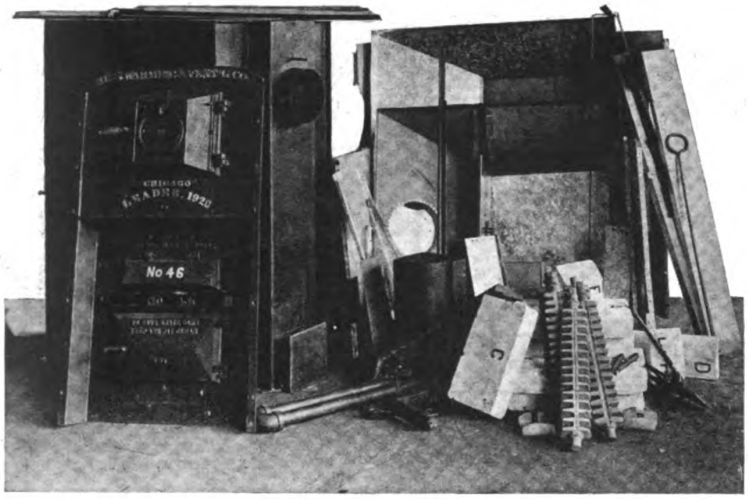
The Hess Welded Steel Pipeless Furnace



comes to you "knocked down" but completely fitted like the first cut on this page.

You can install it yourself with a few simple tools and when you have completed it, it looks like the furnace shown in the lower cut. WE MAKE PIPE FURNACES ALSO.

These photographs are taken from our instruction book of 40 pages of similar illustrations, showing every step in the erection of a furnace. We instruct you fully how to install our furnace, we furnish free plans showing where to place the heater with all details of pipes, registers, air supply, etc.

We guarantee complete success in heating and sell direct.

CONTRACTORS everywhere are buying and installing HESS furnaces, making friends and money. You can do likewise.

Ask for our literature—our references and our special contractor's rates. There's money in it for you.



HESS WARMING & VENTILATING CO.

1201 H. TACOMA BLDG., CHICAGO, ILL.

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It Paid for Itself on Every Job

Parks Ball Bearing Machine Co.
Cincinnati, Ohio

Gentlemen:

Answering your inquiry regarding the machine bought of you last spring.

I figure that on a residence job costing say $6,000 to $8,000, my saving in time would amount to probably twelve days' time for six men—including cabinet work, etc.

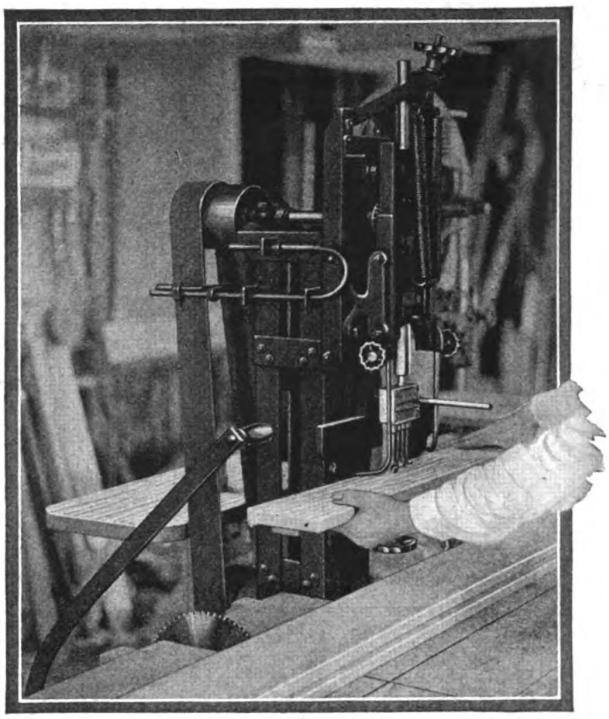
It has never failed me on any job, and I have tried it far beyond its legitimate capacity, having ripped oak R. R. trees—6x8" and it green. This necessitated cutting from both sides, of course.

By the fact of being equipped, my business is much better than it would be without, since I can do so much work I would not undertake.

It enables me to give my patrons better and quicker service, and last but not least, my scrap pile is *scraps*. I utilize everything from material that for years has gone into the kindling pile.

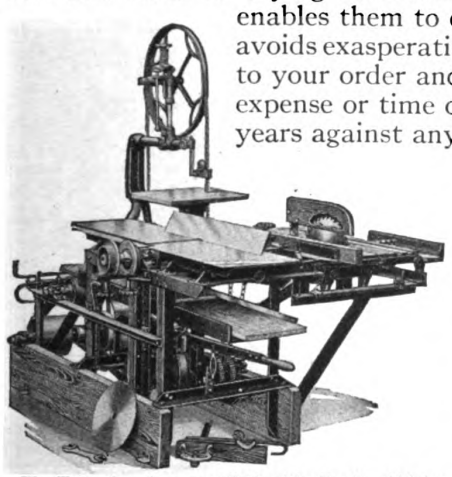
I am sending under separate cover a snap shot of interior of my shop.

Yours truly,
B. E. CROSSLIN,
Caldwell, Kansas.



B. E. Crosslin of Caldwell, Kansas, making Pulley Mortises with one punch of the sash pulley bit.

TWELVE days' time for six men—a saving on every job of several hundred dollars, that's what Mr. B. E. Crosslin of Caldwell, Kansas, reports as the performance of his Parks Machine. Saving of that sort means prosperity for you. Can you insure it at a lower investment? All users unite in saying that the Parks never falls down on the job, is easily moved, enables them to cut material to dimension right on the ground. It avoids exasperating delays while an overworked lumber mill is getting to your order and filling it. Operating costs are low and there's no expense or time out for repairs. Every Parks is guaranteed for ten years against any defect in material or workmanship.



The illustration shows our "Pride of the Shop"—which includes a self-feed 12 in. Pony Planer and Jointer, Circular Rip and Crosscut Saw, Band Saw, Rounder and Boring Machine. Shipping weight 1240 lbs., floor space 5 ft. 4 in. x 7 ft., pulley to belt to 10 x 4 in. tight, speed 550 R. P. M., power 4 to 5 H. P. Complete with one 12 in. rip saw, one 10 in. crosscut saw, one ¾ in. band saw and four belts, price $350.

The first manufacturer to use Angle Steel in the construction of woodworking machines, our progress in perfecting the production of light, sturdy, durable machines has been steady. Double rivets, headed up on power presses, eliminate vibration. All parts have been standardized so that they can be made up in large quantities. Our quantity production is all that enables us to deliver to you these machines, perfect in design and workmanship, at such low cost.

Write today for catalog and learn which Parks Machine will bring you in greatest profits.

The Parks Ball Bearing Machine Company
STATION A—CINCINNATI, OHIO
Chicago Offices and Show Room, 615 Machinery Hall
Canadian Factory: 200-210 Notre Dame East, Montreal, Quebec

WOODWORKING PARKS MACHINES

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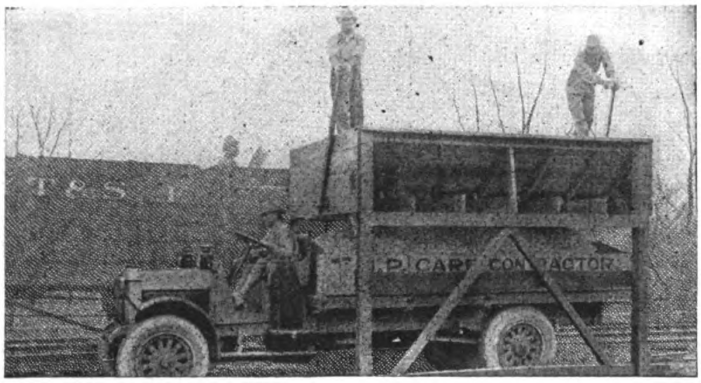
Another

FEDERAL



Federal Truck operated by J. P. Carr, Contractor, Shawnee, Oklahoma

Contractors measure the value of their trucks in terms of accomplishment. Honest performance, long life, and bed rock economy of operation and upkeep are the measures by which contractors choose trucks.

It is only natural, then, that Federal trucks are so often their choice, for these, too, are the standards by which Federal manufactures trucks. The ten years of earnest effort in which Federal has been building successful motor trucks has contributed most to their uniformly satisfactory performance.

"Traffic News," an interesting magazine of haulage and transportation will be mailed you free on request

FEDERAL MOTOR TRUCK COMPANY
39 FEDERAL STREET DETROIT, MICHIGAN



This is the sign of the Tenth Year Federal, a sign significant of ten years of success in every field of truck transportation.

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The Instant Appeal of Beauty

Homes quickly find purchasers when delicately-tinted walls and woodwork present the irresistible appeal of beauty.

Every detail of your color scheme can be artistically carried out when you paint with Dutch Boy White-Lead and Dutch Boy Flatting Oil—for any desired tint is produced in the mixing of the paint.

Flat Finish—Washable

Dutch Boy Flatting Oil produces a flat, lustreless finish, free from gloss or glare, and restful to the eyes.

The surface is lasting, smooth, impenetrable to dirt and impervious to water—can be washed as often as necessary without injury.

Less Paint Needed Lower Labor Cost

This paint covers—by test—25% to 50% more surface per gallon than inferior paints, spreads with such an absence of "pull" that labor cost is reduced, and has proved its superior economy on some of the country's biggest interior painting jobs.

Send for descriptive booklet

NATIONAL LEAD COMPANY

New York Boston Buffalo Chicago Cincinnati
Cleveland St. Louis San Francisco
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NATIONAL LEAD & OIL CO., Pittsburgh



Dutch Boy Flatting Oil and White-Lead

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DUPLEX TRUCKS

BUILT FOR BUSINESS

AN actual photograph of a Duplex Limited being lifted clear of the ground by a cable around the windshield frame.

This wonderful strength in the cowl, while perhaps startling, is still only typical of the extra strong, rigid construction of the Duplex Limited in every detail and in every part.

It is this great Duplex strength and honesty of mechanical construction that makes the Duplex Limited a truck that a business man can buy and use on a practical business basis.



The Duplex *Limited*

Speed and Power to Spare—3000 to 5000 Pounds at 5 to 25 Miles an Hour on High and the Motor Turning Over Only 1300 R. P. M.

* * * *

Free from Vibration—Scientifically Balanced — Electrically Equipped — Pneumatic Tired—Here is a Truck a Business Man Can Buy and Use on a Business Basis

SPEED and staying power are the big needs of the hour in trucks—and here is exactly the right truck for general business use because it is scientifically built for just exactly that kind of work.

Its balance is so perfect that one man can move it over the floor.

Its motor is so large and so powerful that *no special gear reductions were necessary*. The motor turns over only 1300 R. P. M. to develop rated speed with full load.

It hauls 3000 to 5000 pounds of any kind of freight.

It holds the road in a way you never dreamed possible in a truck. You can ride in it comfortably or drive it easily and without strain at full speed.

Its engine is properly and amply cooled—carries 2½ gallons of water and the water jackets are designed to properly cool valve seats where heat is greatest. Motor meter is seated in radiator shell and cannot be removed.

Complete electric equipment—that means starter too—so your driver won't mind shutting off the motor while truck is standing.

Easiest motor to take down you ever saw in a truck.

Large hand holes give easy access to valve chambers and man size bolts make handling easy.

Lubricating oil is strained twice in its circuit. Scientific hot spot breaks up wet drops into dry gas and makes even the present day gasoline develop full power.

Radiator mounted on patented spring suspension which prevents damage to core and eliminates the great source of leakage.

Standard tread—goes anywhere a passenger car can go and just as fast.

See it for yourself. It is a big, strong, rugged truck—will give you better service than you have ever known.

Any demonstration you want—it's a business truck and will do its work on a business basis. See your Duplex dealer—do it now—he will make the Limited prove itself to you as it is proving itself daily in the hands of users.

"Duplex Doings"—the Truck Users' Magazine, sent *free* to any truck user. Tear off a corner of this page, sign your name and we will put you on the regular list.

Duplex Truck Company

Lansing · Michigan

One of the Oldest and Most Successful Truck Companies in America

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Green Roofs, Red Roofs,
Natural Slate or Newport Grey



WHEN you use Ambler Asbestos Shingles you have a choice of the above colors or you can use these in combination, thus securing a mottled roof.

Many people consider the beautiful appearance of Ambler Asbestos Shingles as important as their durability and fire resistance.

Ambler Asbestos Shingles. Made in three styles, four permanent colors, Newport grey, natural slate, red and green. Lie snug to the roof, forming water-tight and fire-tight covering.
Also ¼-inch mixed color shingles in seven shades of reds, browns and greys.

Ambler Asbestos Building Lumber. For siding, partitions, fire doors and wherever fire resistance is essential.

Ambler Asbestos Corrugated Roofing and Siding. For industrial, railroad and farm buildings.

Ambler Linabestos Wallboard. Wherever a superior flame-proof, fire-resisting wallboard is wanted.

Send for Samples and Literature showing reproductions of installations

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AMBLER, PENNA.

Factors:
KEASBEY & MATTISON COMPANY
AMBLER, PENNA.

Manufacturers of: Ambler Linabestos Wallboard, Ambler Asbestos Building Lumber, Ambler Asbestos Shingles, Ambler Asbestos Corrugated Roofing and Siding. 85% Magnesia and Asbestos Pipe and Boiler Covering. Asbestos Textiles.

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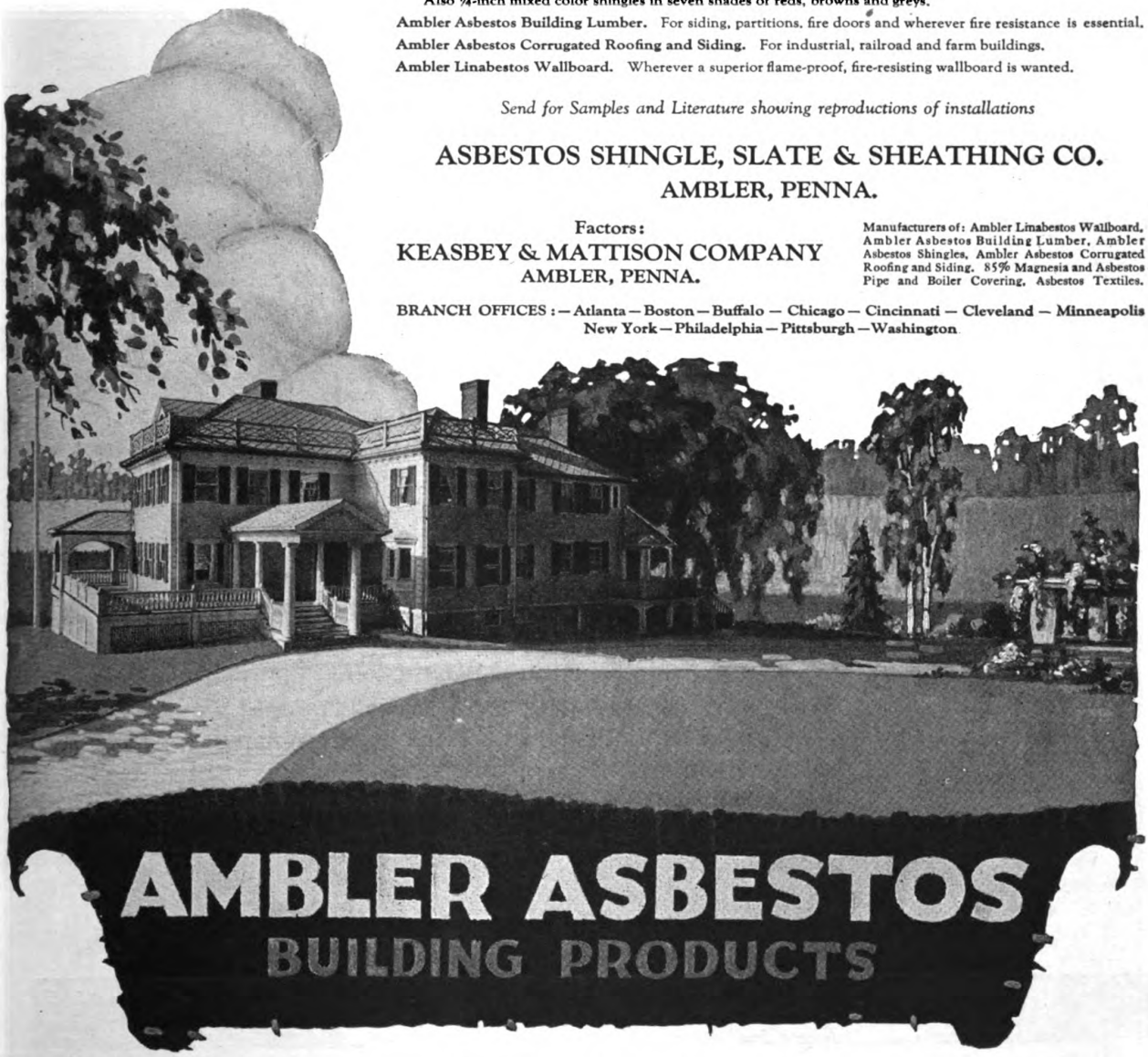

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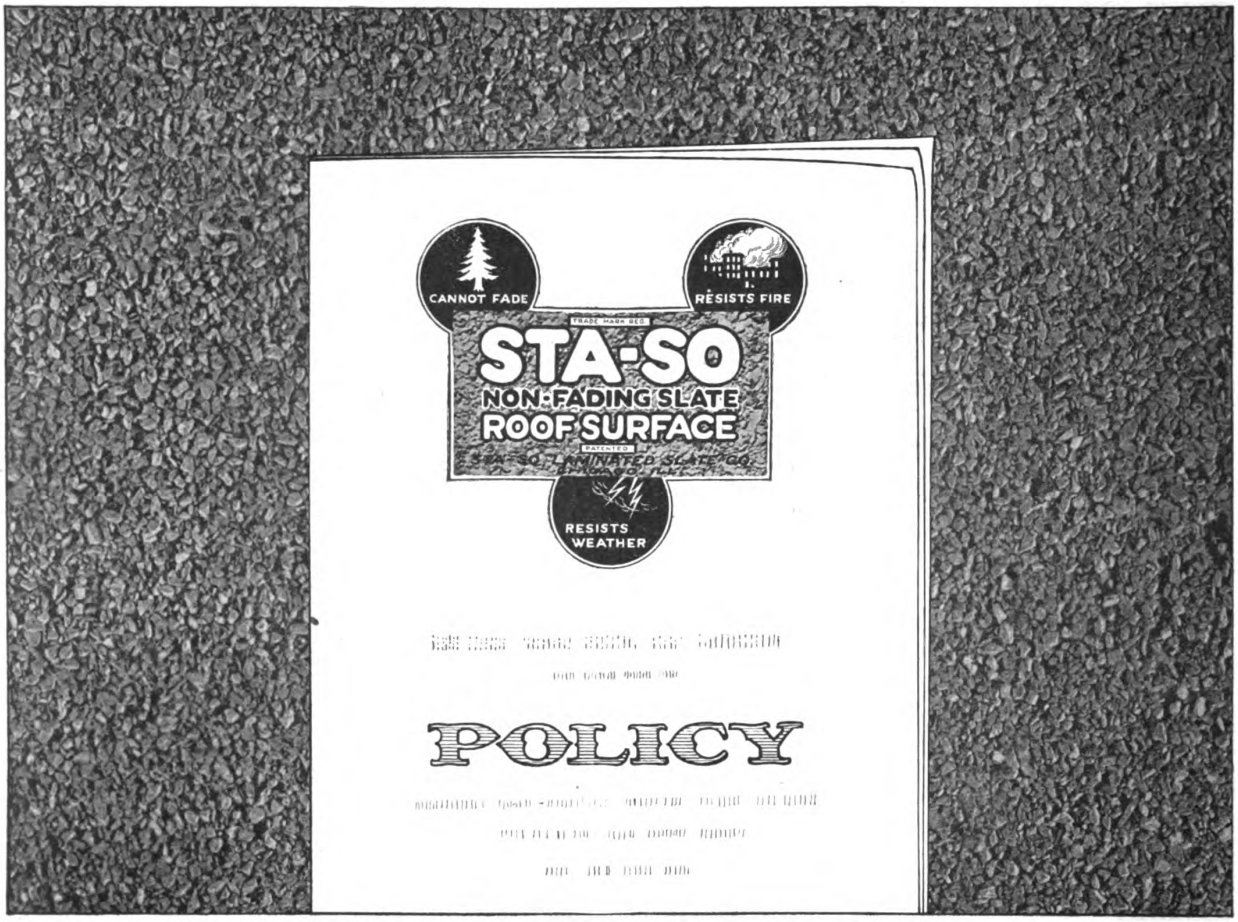

Like An Insurance Policy Against Complaints

Amalgamated Roofing Co. Chicago, Ill.
Barber Asphalt Paving Co. Phila., Pa.
Barrett Co. . . New York, N. Y.
Beckman-Dawson Rfg. Co. Chicago, Ill.
Bird & Son, Ltd. Hamilton, Ont., Can.
Bird & Son, Inc. East Walpole, Mass.
Philip Carey Mfg. Co. Cincinnati, Ohio
Flintkote Co. . . Boston, Mass.
Ford Rfg. Products Co. St. Louis, Mo.
The Heppes Rfg. Division
The Richardson Co. . Chicago, Ill.
Keystone Roofing Mfg. Co. York, Pa.
McHenry Millhouse Mfg. Co.
South Bend, Ind.
National Asbestos Mfg. Co.
Jersey City, N. J.
National Rfg. Co. . Tonawanda, N. Y.
B. F. Nelson Mfg. Co. Minneapolis, Minn.
Pioneer Paper Co. . Los Angeles, Cal.
Reynolds Shingle Co.
Grand Rapids, Mich.
Richardson Co. Cincinnati, Ohio
Safepack Mills Boston, Mass.
Si Fo Products Co. St. Paul, Minn.
Standard Paint Co. . New York, N. Y.
Usona Mfg. Co. Aurora, Ill.

H. F. Watson Co. Erie, Pa.
A. H. White Rfg. Co. New Orleans, La.
Wilberite Rfg. Co. Cleveland, Ohio

ON bundles of slate-surfaced shingles and on rolls of slate-surfaced roofing, the Sta-so label is your insurance against complaints that the color of the slate has faded.

The Sta-so label is your insurance against other slates or imitation slates that fade under the sun's steady rays and leave the roof drab and unsightly.

The Sta-so label is your insurance that the roofing is surfaced with genuine ***fade-proof*** Sta-so laminated slate—it is your insurance that the roof surface has that unique granular texture and that distinctive color of restful sage green or rich Indian red which are found in Sta-so laminated slate alone.

And this insurance is yours free. Simply ask to see the Sta-so label on the slate-surfaced roofing you purchase from the manufacturers at the left.

Below: Photograph showing actual texture of Sta-so surfaced roofing



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THOUSANDS OF BUILDINGS

IN ALL PARTS OF

UNITED STATES AND CANADA

HAVE BEEN AND ARE NOW BEING STRIPPED AND CALKED WITH

DIAMOND METAL WEATHER STRIP AND CALKING COMPOUND

-- SAVES FUEL --
KEEPS OUT WIND
DIRT AND NOISE

Scientifically Correct in Principle -
Practical in Use - Always Efficient -
Exclusive Features - Last As Long As Building



Contractors, Carpenters, Job Men

Sell and Install Them

WRITE TODAY FOR AGENCY PROPOSITION
SOME FINE TERRITORY STILL OPEN
WE FURNISH COMPLETE SELLING OUTFIT

YOU INVEST NO MONEY UNTIL YOU GET ORDERS

$13,000 PROFIT MADE BY ONE AGENCY IN ONE YEAR

ADDRESS

The Diamond Metal Weather Strip Co.

626 KERR STREET COLUMBUS, OHIO

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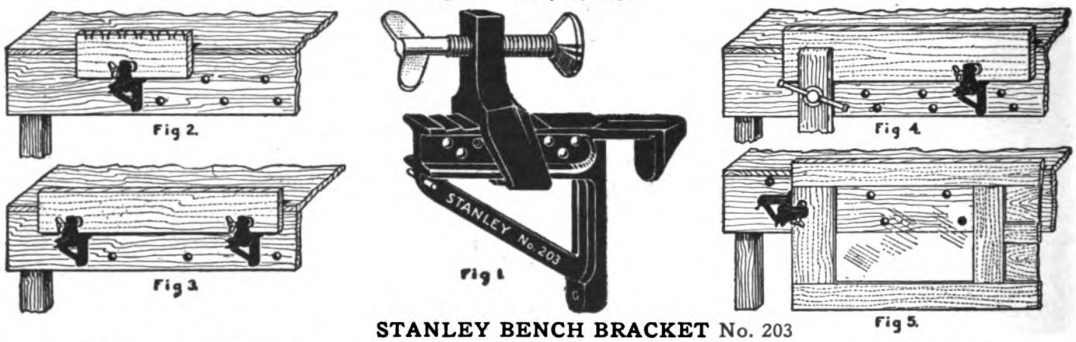
Stanley Tools



STANLEY BENCH BRACKET No. 203

A tool that will immediately commend itself to the Carpenter, the Cabinet Maker or in fact to any one occupied or interested in carpentry or woodworking of any kind where a bench is necessary.

It simply requires that one or more holes (not smaller than one inch) be bored in the front of the bench.

The shape of the tool is such that when the jaw or nose is put through the hole it is automatically held in place, and, by means of the screw clamp, the board being worked upon is quickly and firmly secured.

The illustrations show clearly a few of the many ways in which this Bracket may be used.

For instance:

Fig. 2. For holding a short board or box end—clamping same sufficiently rigid so that it can be sawed at any angle—as for mitering, dovetailing, etc.

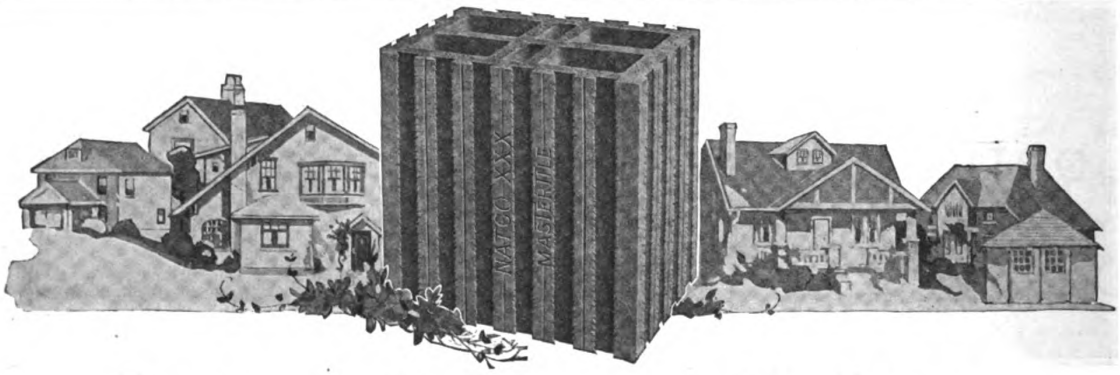
Fig. 3. For holding a long board (two brackets being used) where a bench vise is not readily available.

Fig. 4. For use in connection with a bench vise.

Fig. 5. For holding a door or window firmly in place while same is being planed to a fit, or mortised for lock or butts. The nail shown simply holds the bracket in a horizontal position.

For Sale By All Hardware Dealers

THE STANLEY RULE & LEVEL PLANT.
THE STANLEY WORKS
NEW BRITAIN, CONN. U.S.A.



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If you have used

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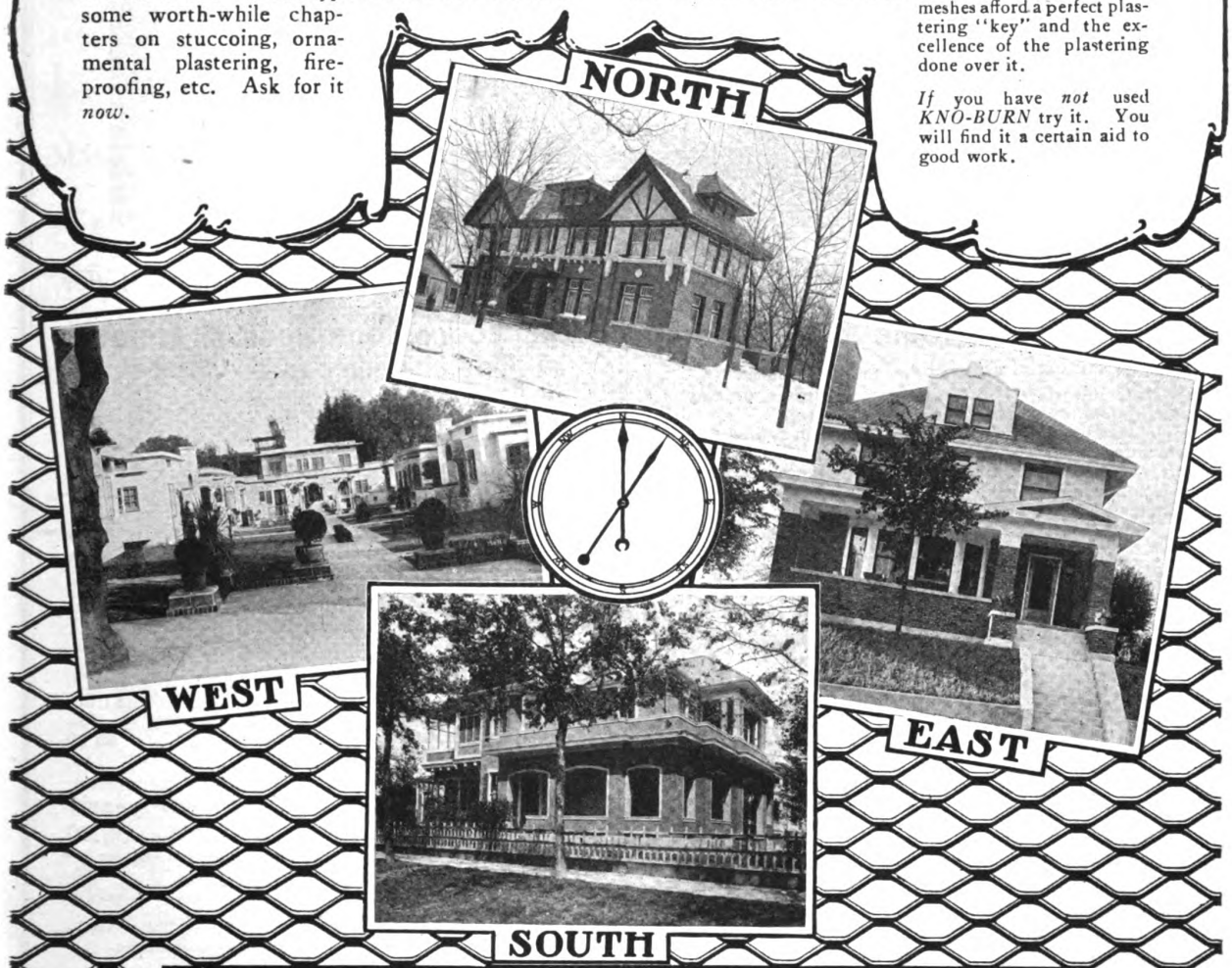

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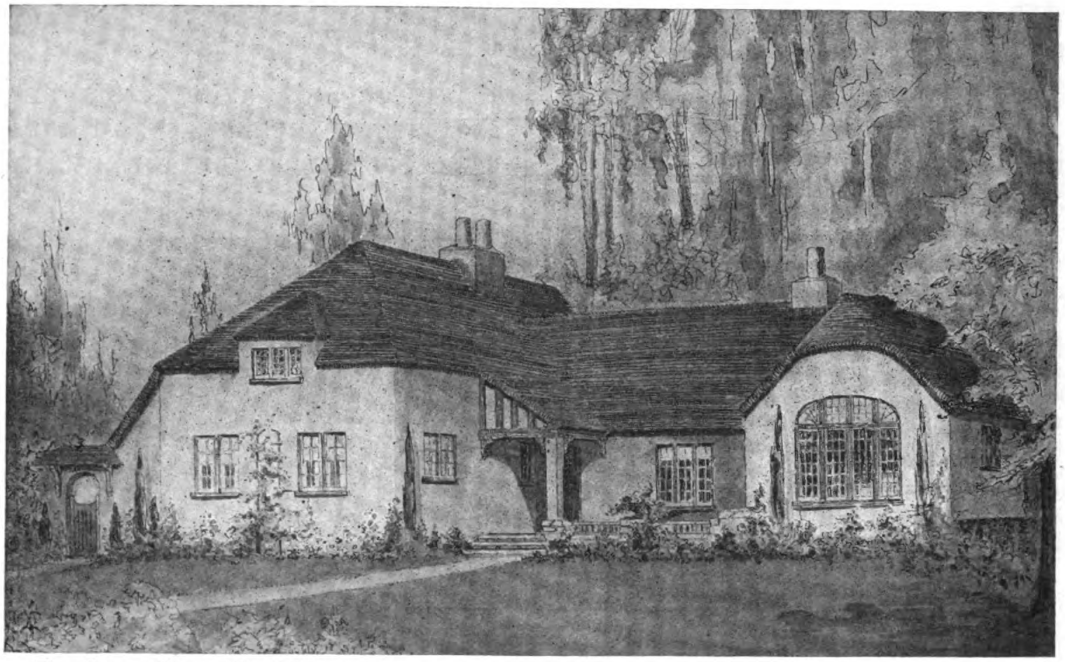

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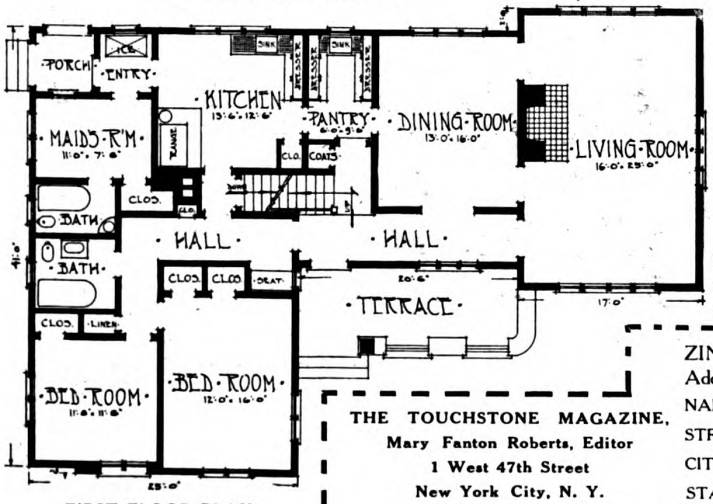

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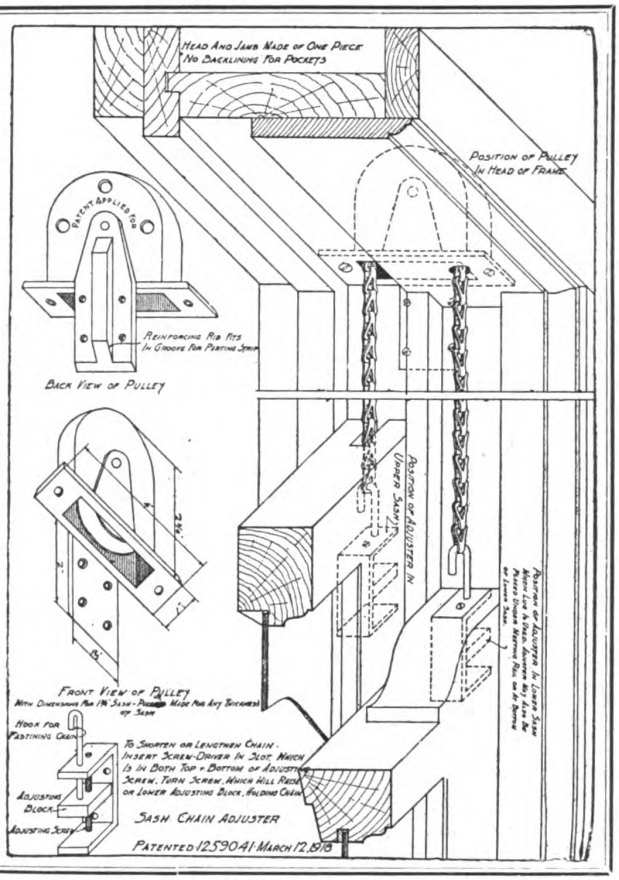

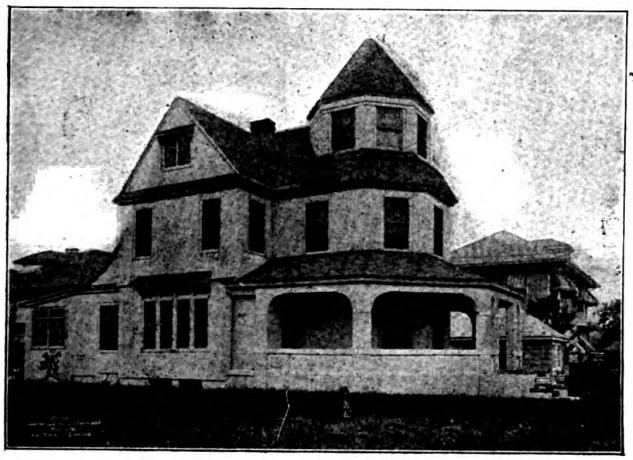

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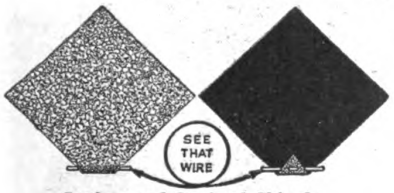

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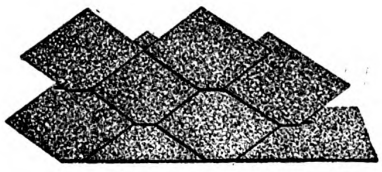

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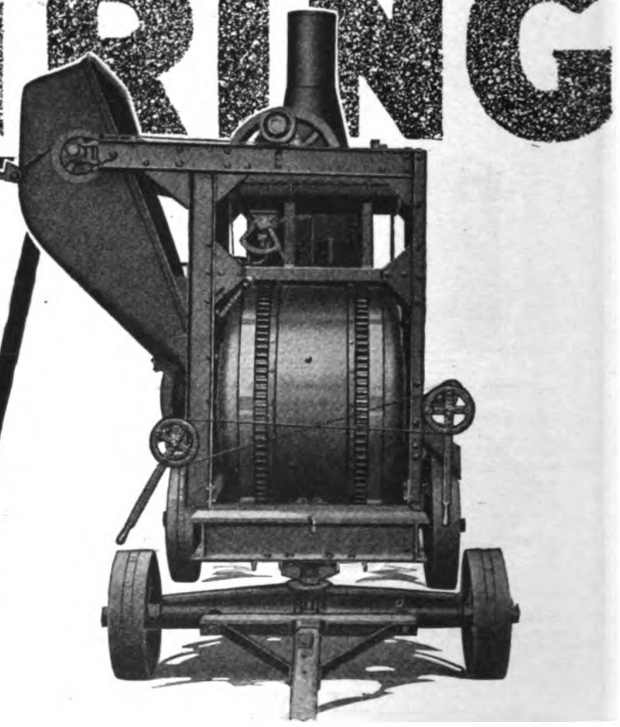

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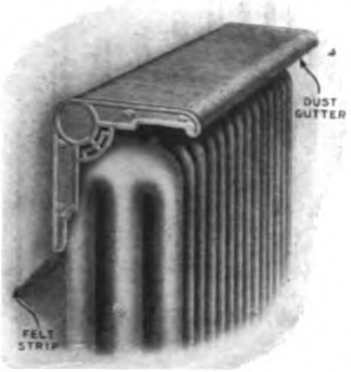

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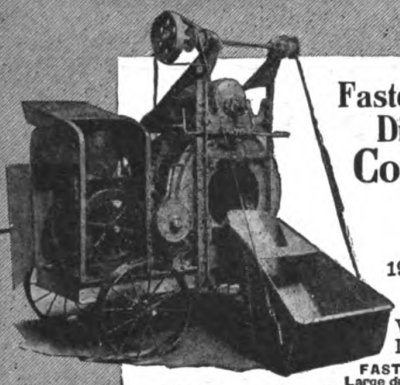

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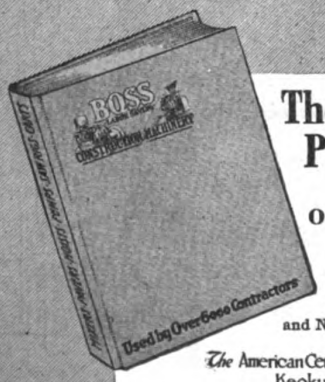

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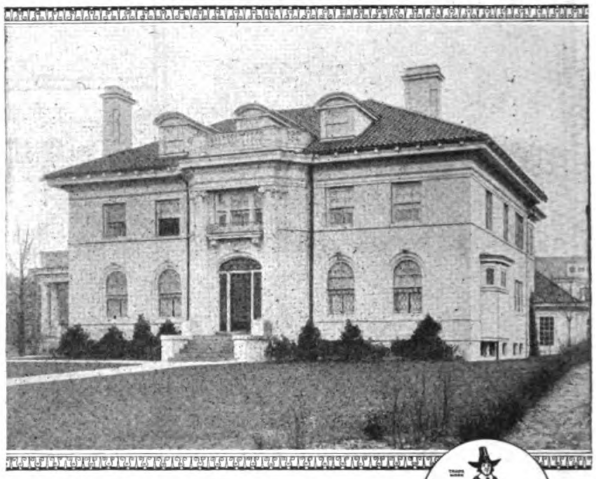

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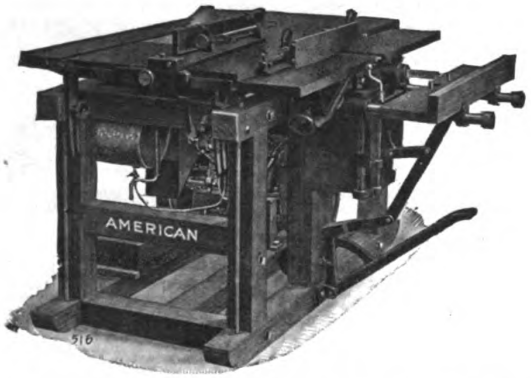

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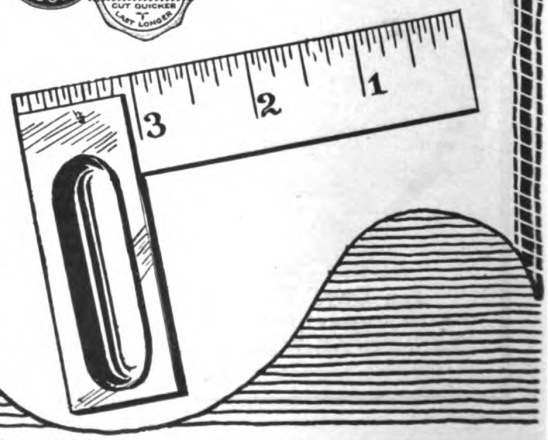

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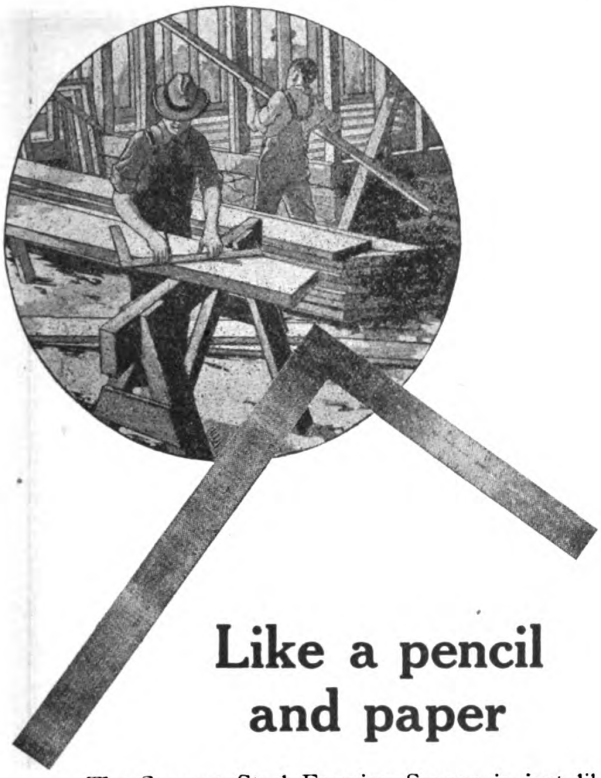

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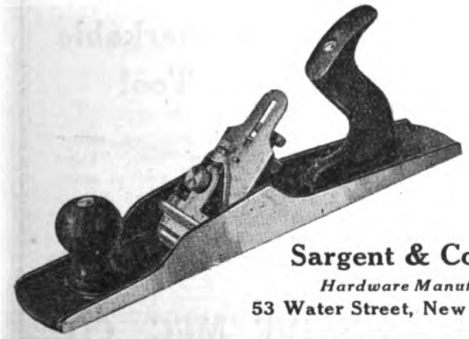

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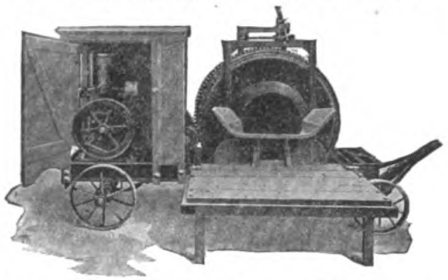
"THE STANDARD"

Low Charging Concrete Mixers



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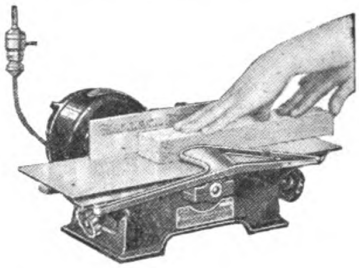

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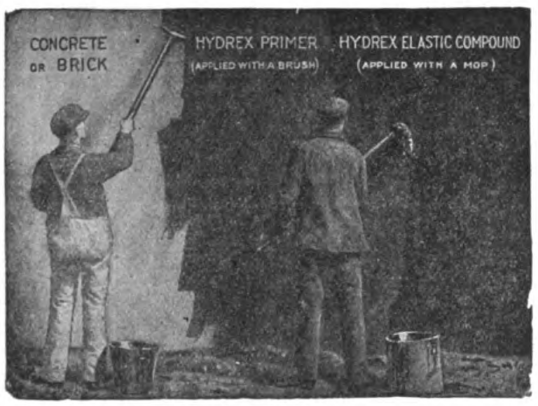

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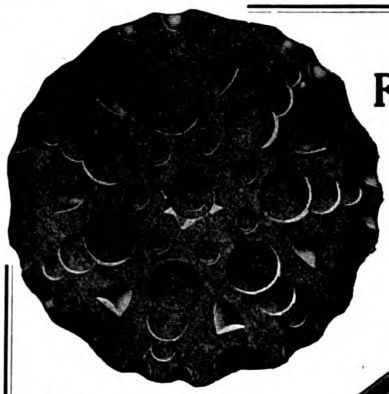

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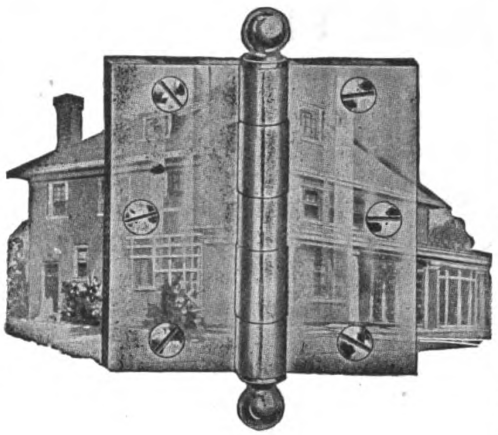

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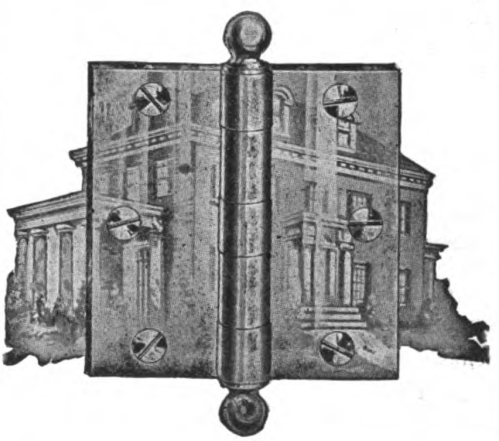

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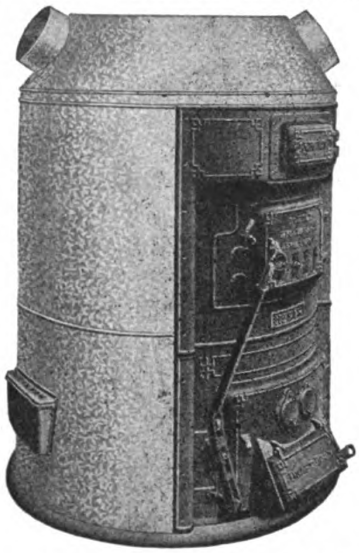

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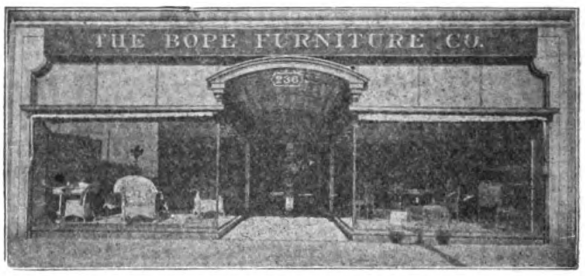

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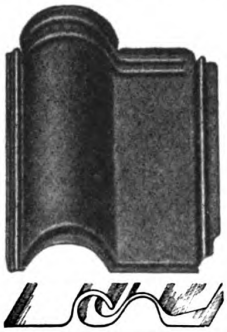

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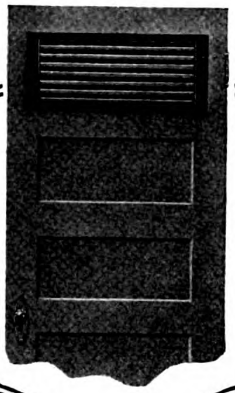

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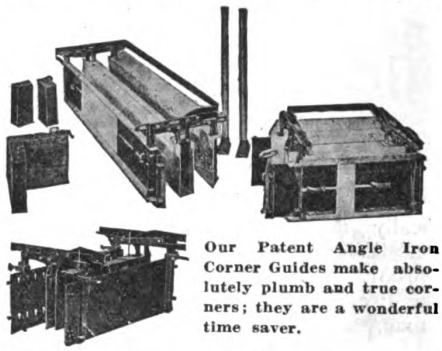

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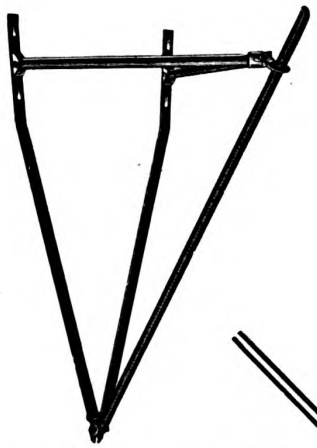

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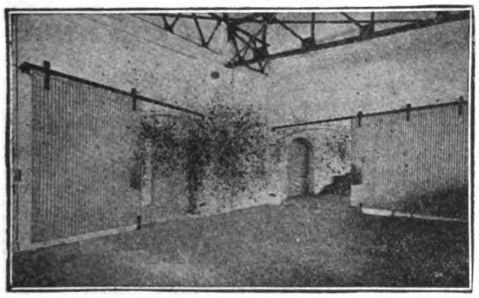

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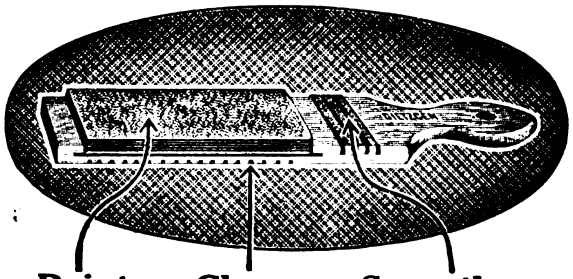

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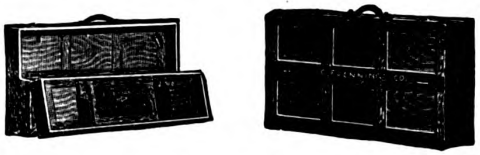

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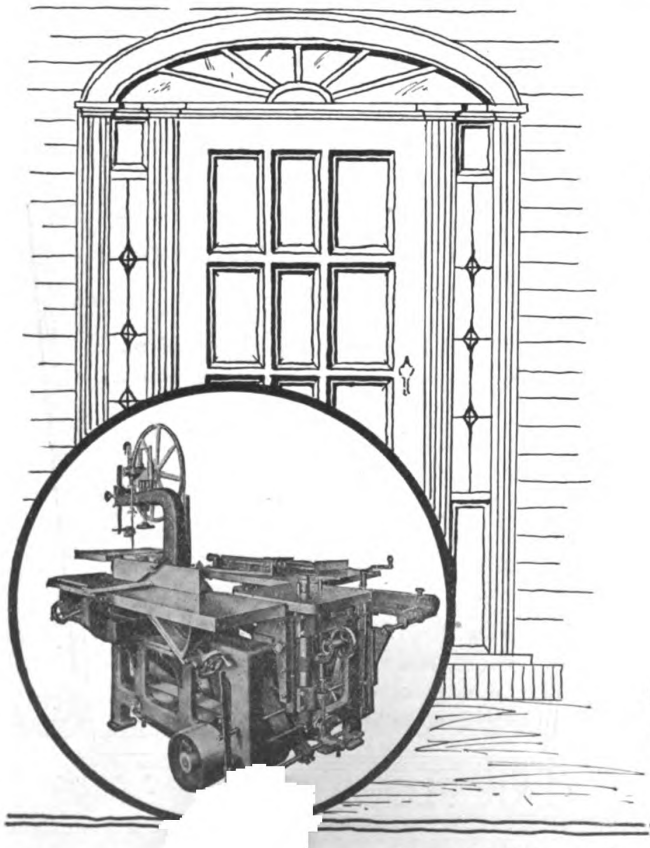

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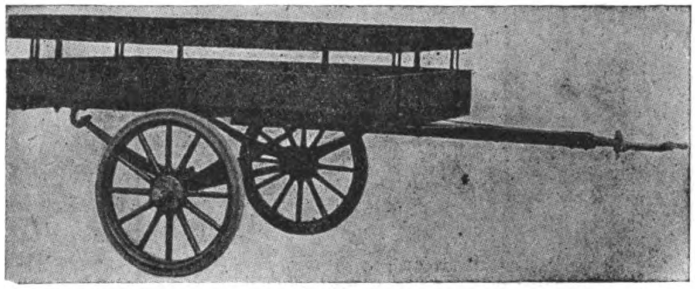

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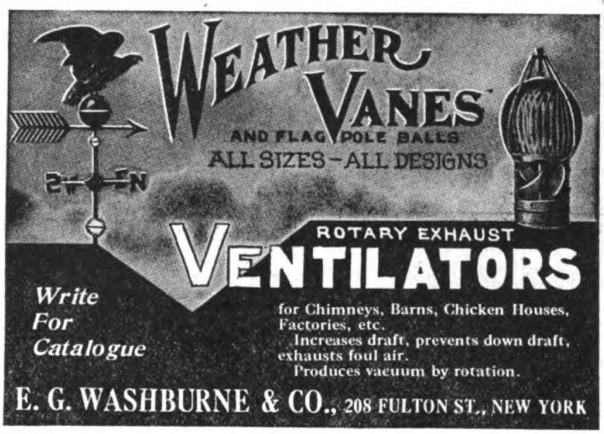

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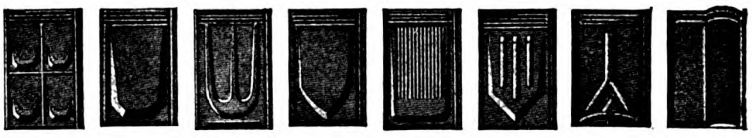

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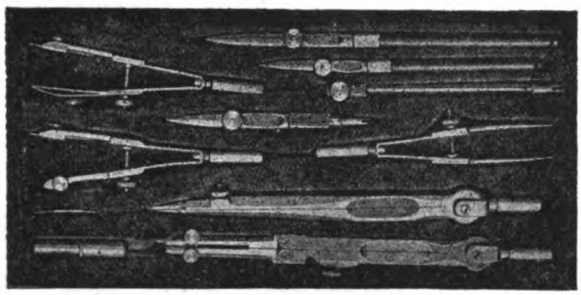

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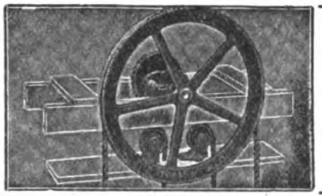

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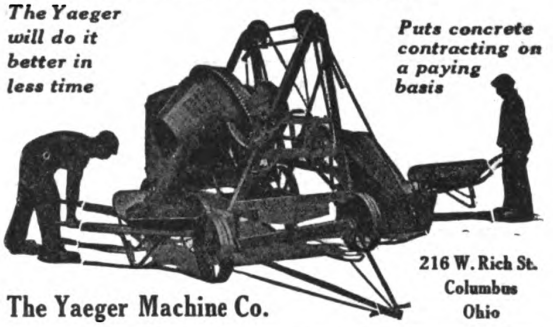

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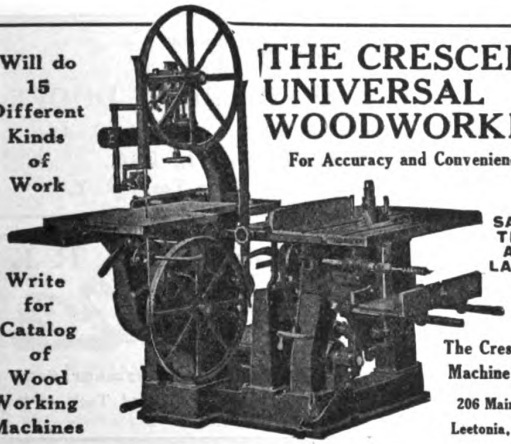

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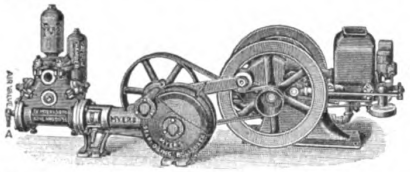

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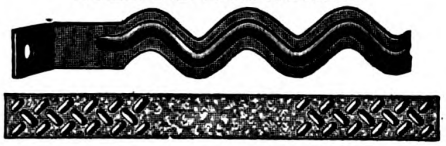

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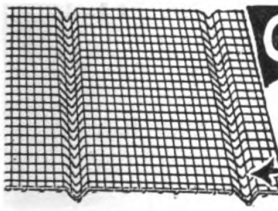

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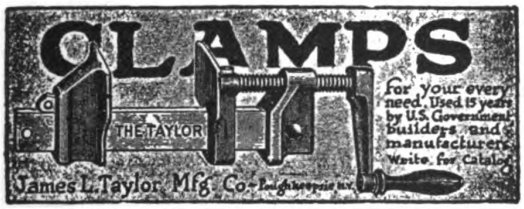

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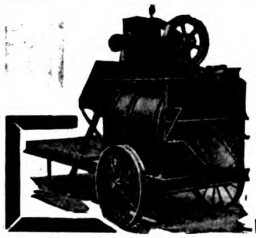

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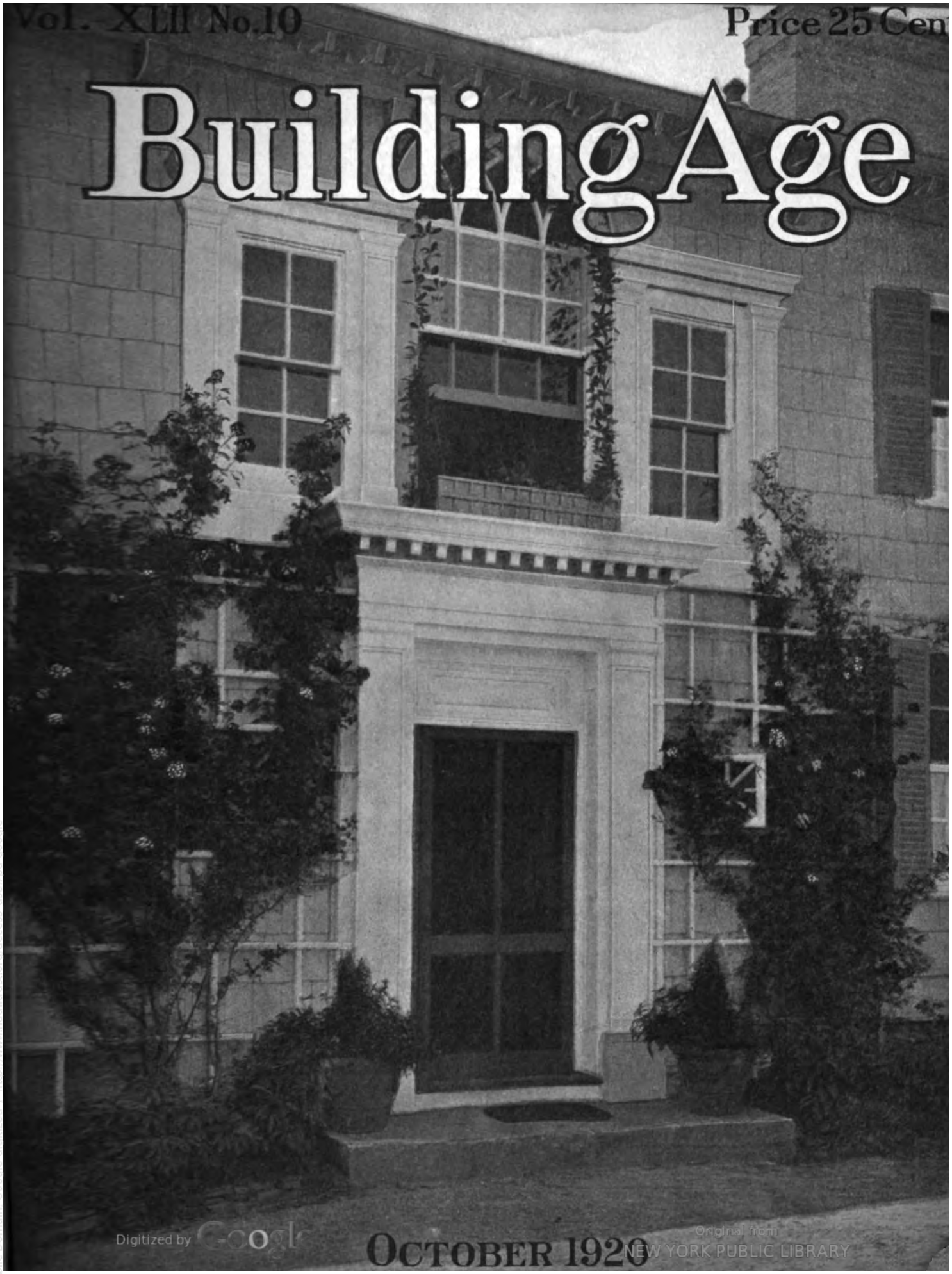

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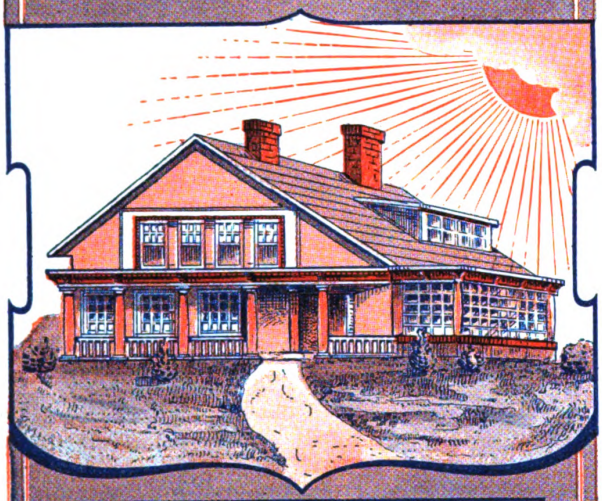

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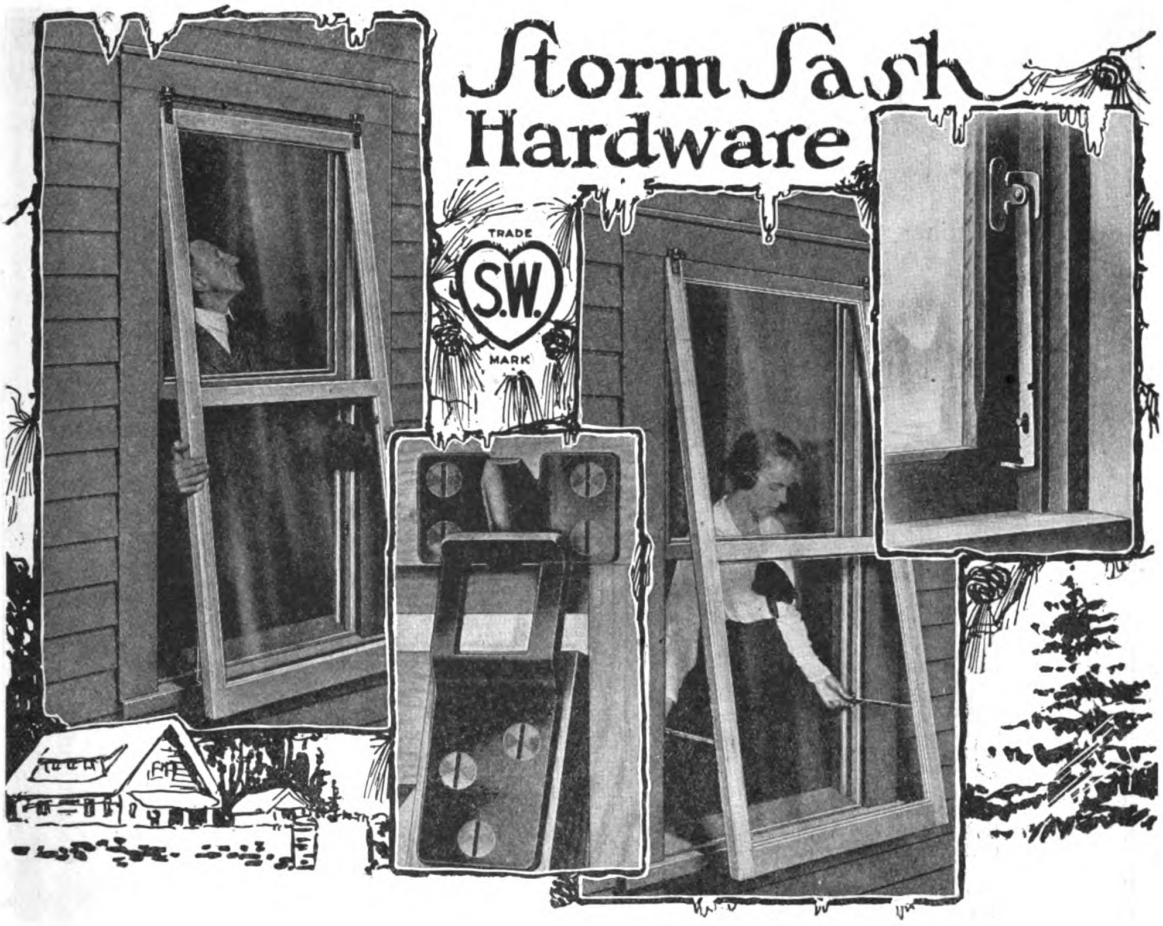

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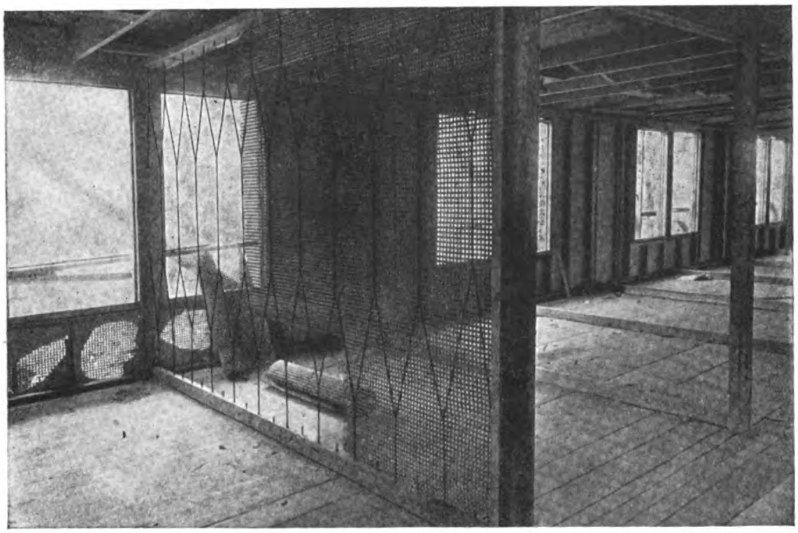

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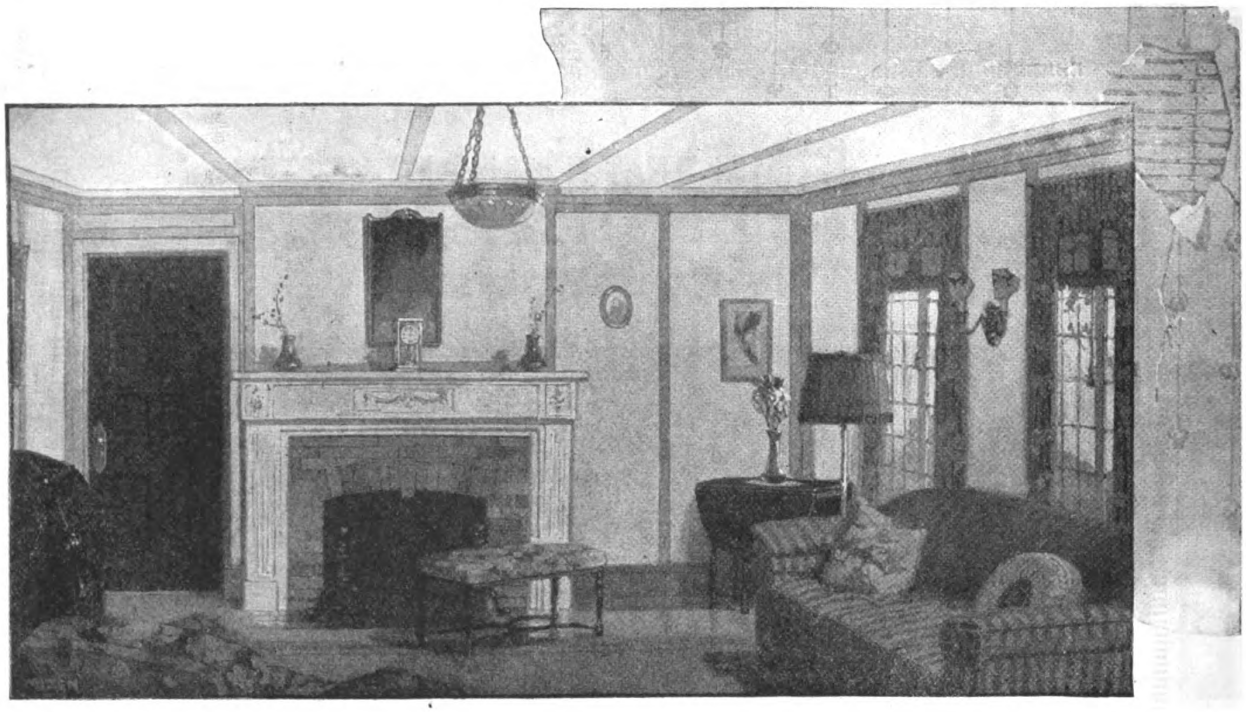

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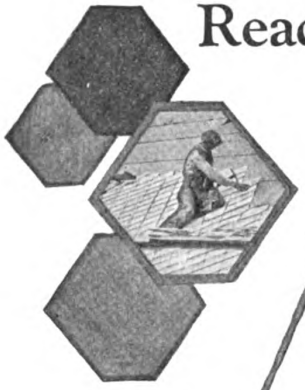

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I also noticed that when some of your mechanics took off some of this roofing the other day, of which you wanted a few samples, that in most cases the shingles were strong enough that they simply pulled the nails out with the shingle, when they were taken off, which shows that the Asbestos Shingle had hardened and crystallized to a remarkable degree.

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Very truly yours,

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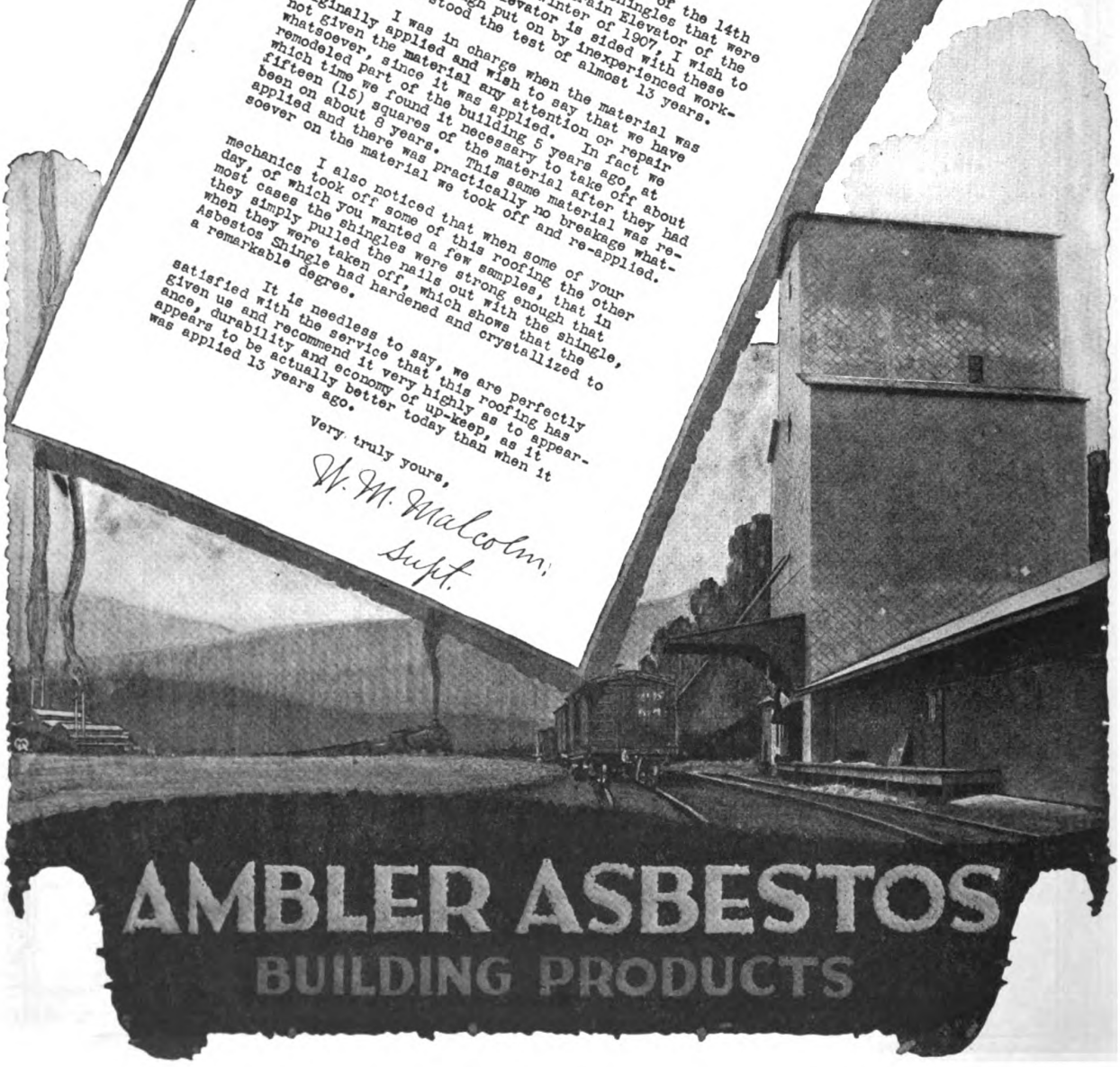
Supt.



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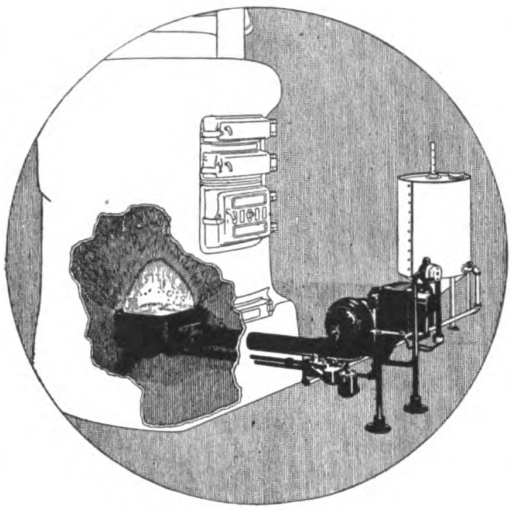

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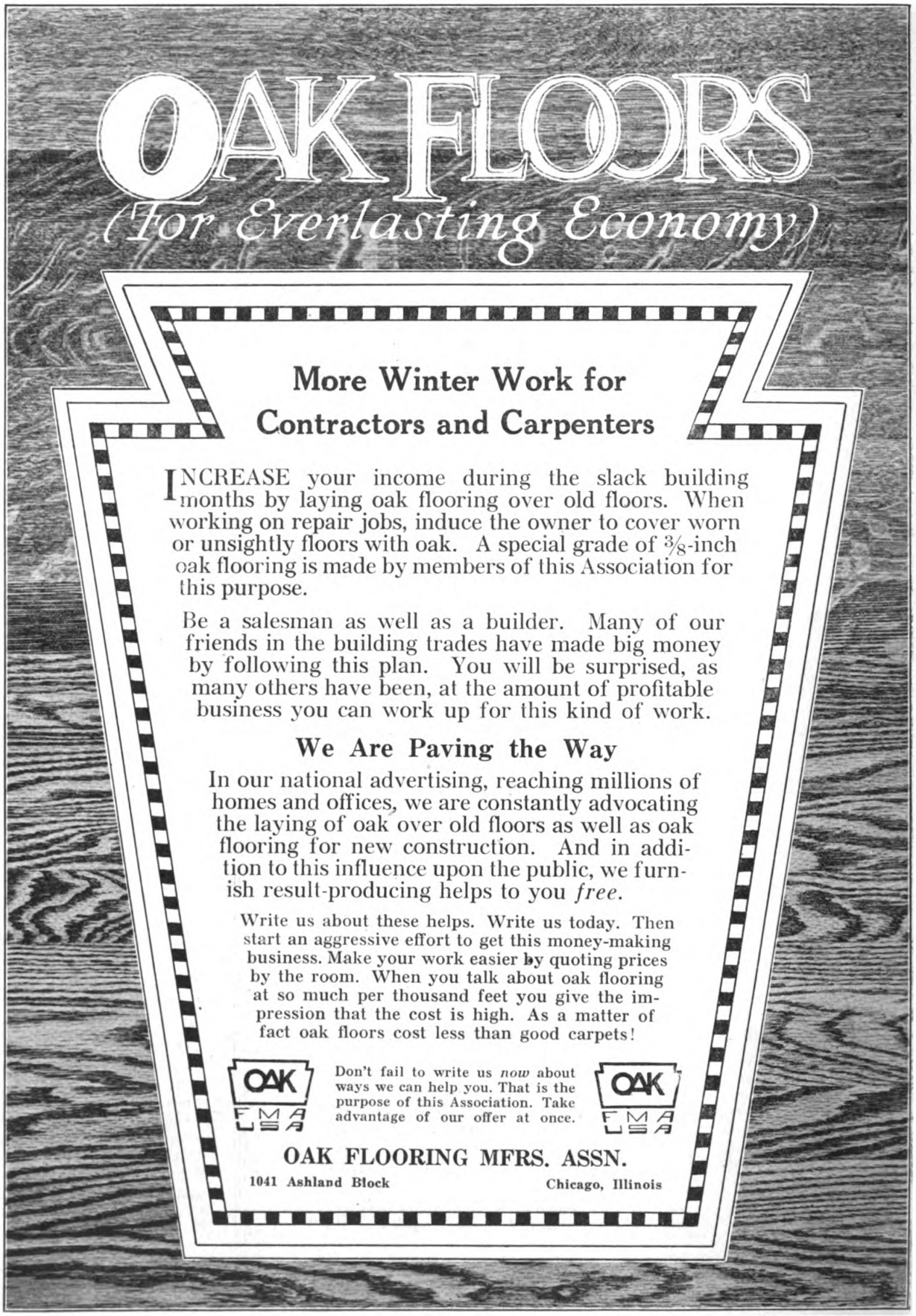

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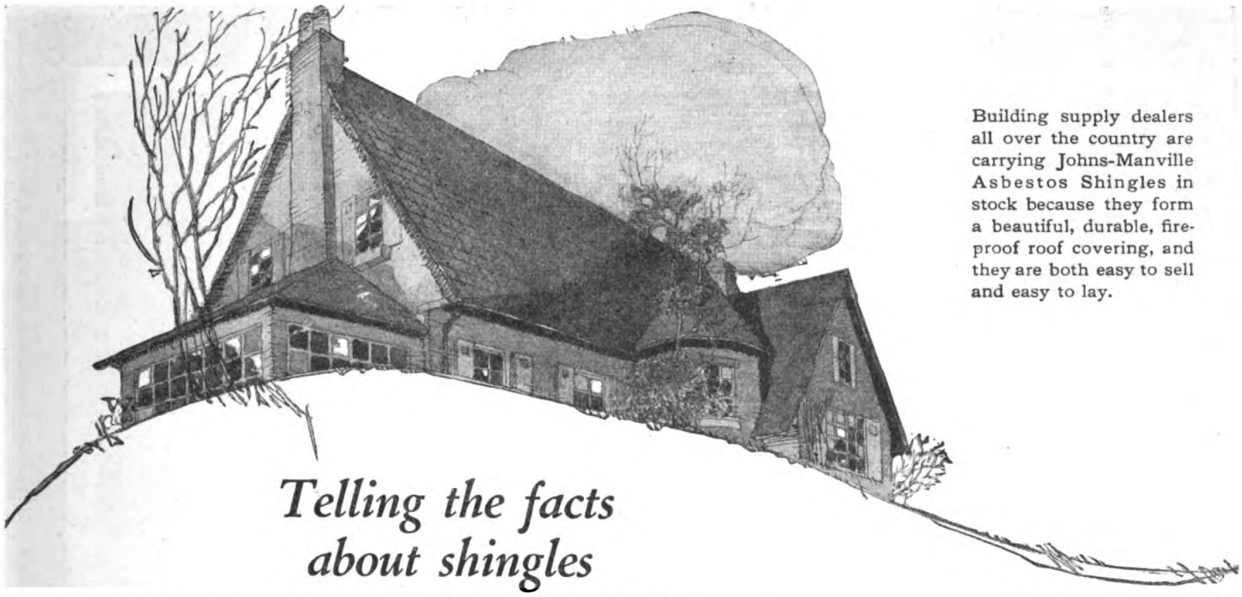

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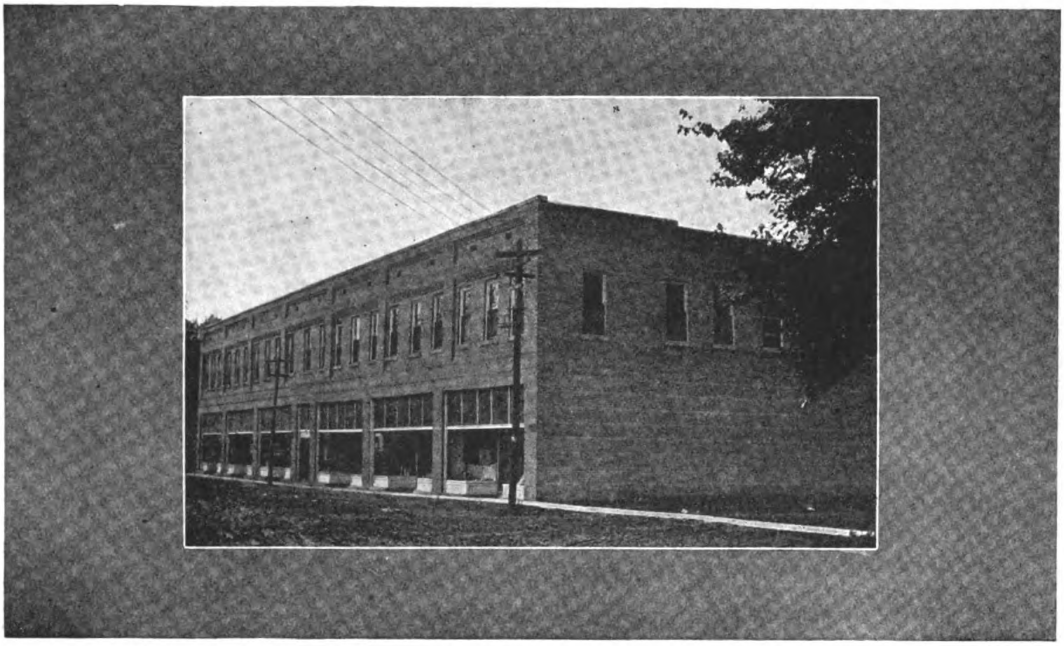

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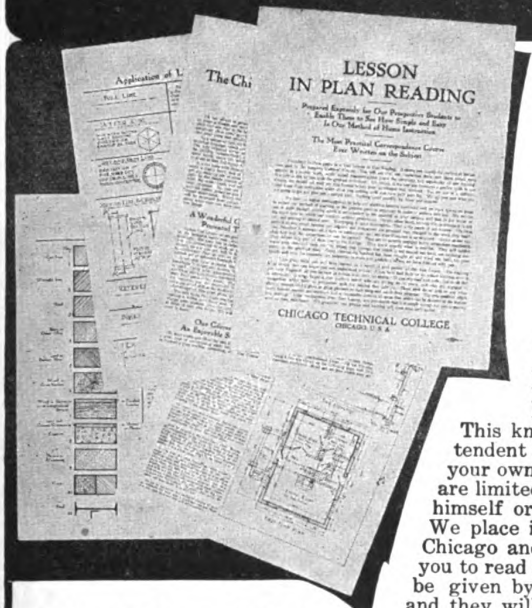

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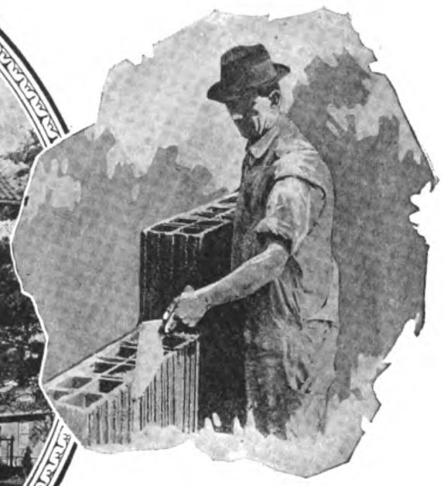





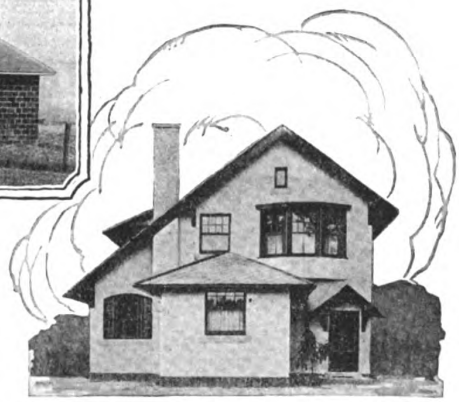

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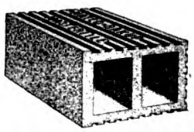

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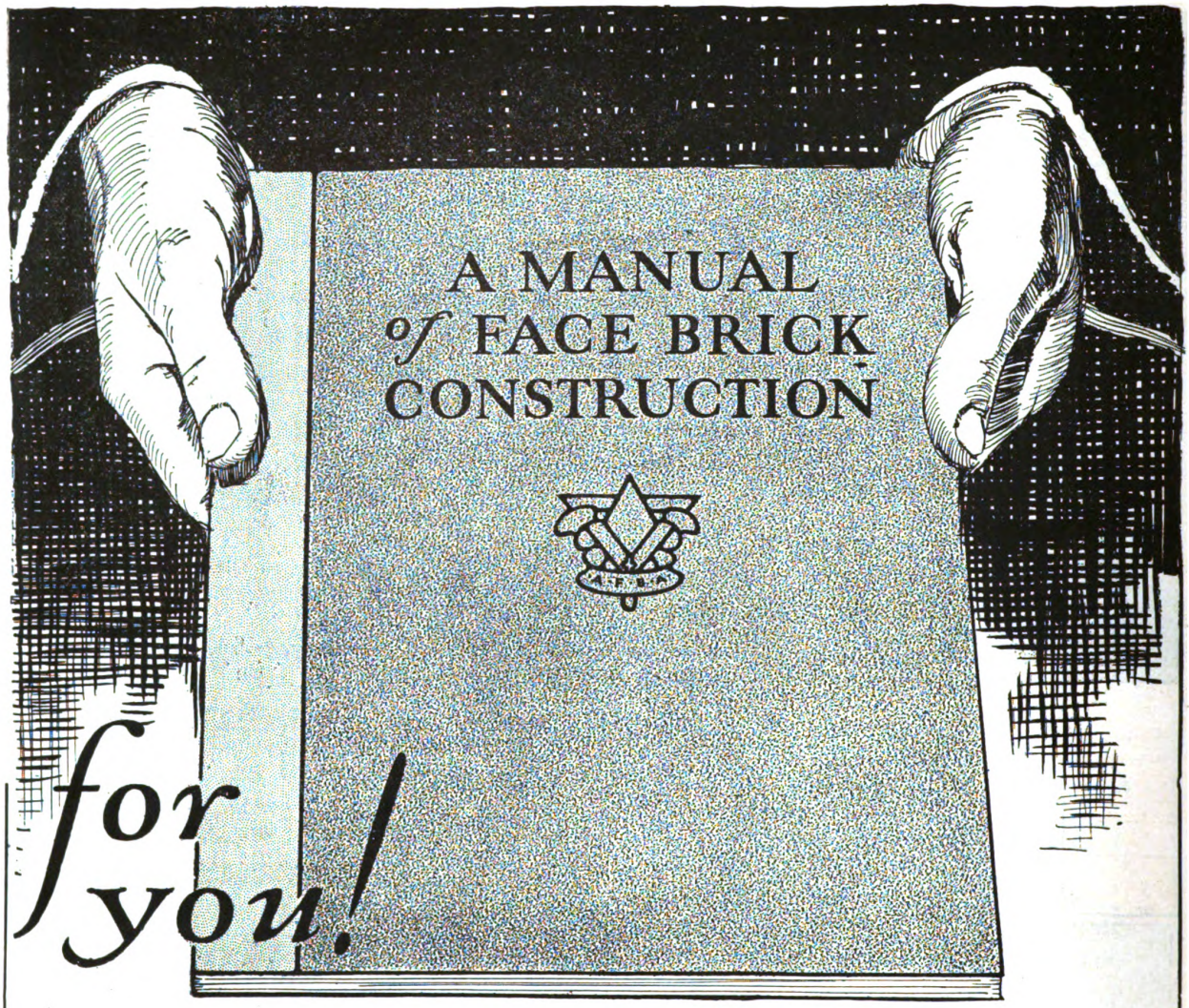

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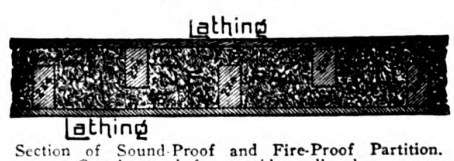

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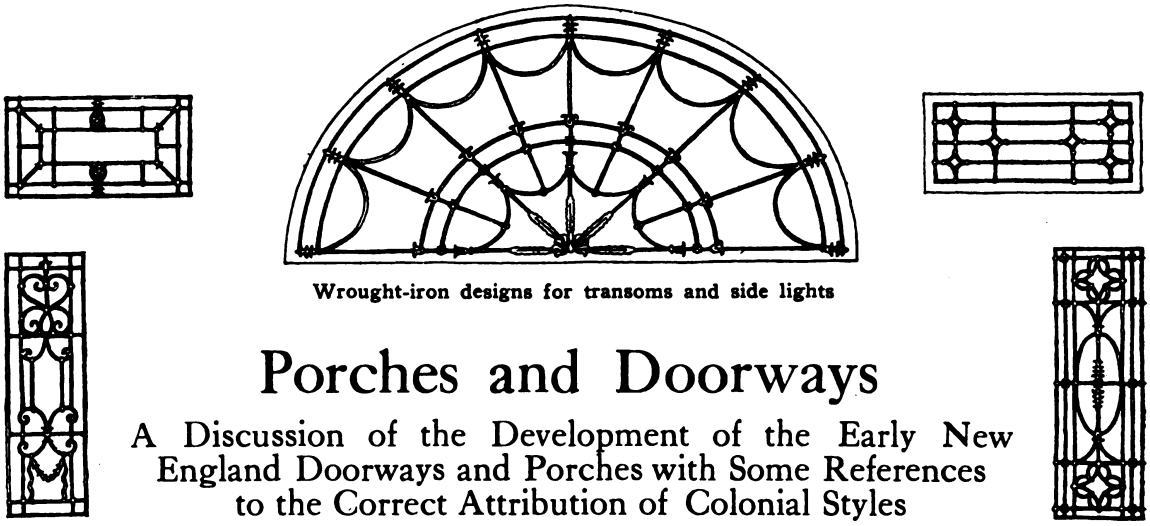

Wrought-iron designs for transoms and side lights

Porches and Doorways

A Discussion of the Development of the Early New England Doorways and Porches with Some References to the Correct Attribution of Colonial Styles

IN earlier days, before the world became filled with unrest and there was a real rural life, a very pretty custom obtained in New England. It was the neighborly thing to visit and to spend the visiting periods in pleasant weather on the front porches, where, engaged in lighter feminine tasks, the women of the family harmlessly (let us hope) gossiped and exchanged confidences. A place that was so closely associated with daily social customs would naturally receive all the solicitous housewifely care that could be given to it.

New England doorways have become famous everywhere. Like the human face, they are the most expressive things. Their design and the care with which they are maintained reflect the character of the inmates.

The early type, the simplest form of a doorway was not lacking in interest. They were as a rule most correctly proportioned. Their width as compared to their height was carefully studied as were always the window openings.

The real foundation of good design in domestic architecture lies in this endeavor of correct proportions or what is more technically described as the proper relation of solids to voids, the proper proportioning of all openings such as windows and doors to the dead surface of the facade. It was not alone necessary to get these proportions right in the simple doorway, but it was also quite as important that the panelling in the doors should be equally correct. A typical New England house plan is one of a square with a central doorway. This would naturally create a dark hall unless some means was provided to let in the light.

Transoms were added and these were equally carefully studied as to the correctness of their shape and size. In the larger houses with wider halls, the narrow doorway would create an element of bad proportion in the interior and would also demand larger or more light openings. These conditions would at once suggest the placing of "side lights," and all these features controlled the design of the porch and the hood above it. It will be quite easy to see how the porch grew in its adaptability to not only the artistic growth of domestic architecture, but also lent itself to meet such social customs as we have referred to at the outset.

At first a hood and a plain stone doorstep, then with a wider hall and side lights a wider hood with the necessary column support. The stone doorstep gave way under such conditions to a boarded floor and there occurred an addition of side benches that added a domestic and artistic feature.

New England doorways are with rare exceptions built of wood and the skill and artistic methods employed have been so very great that these door-

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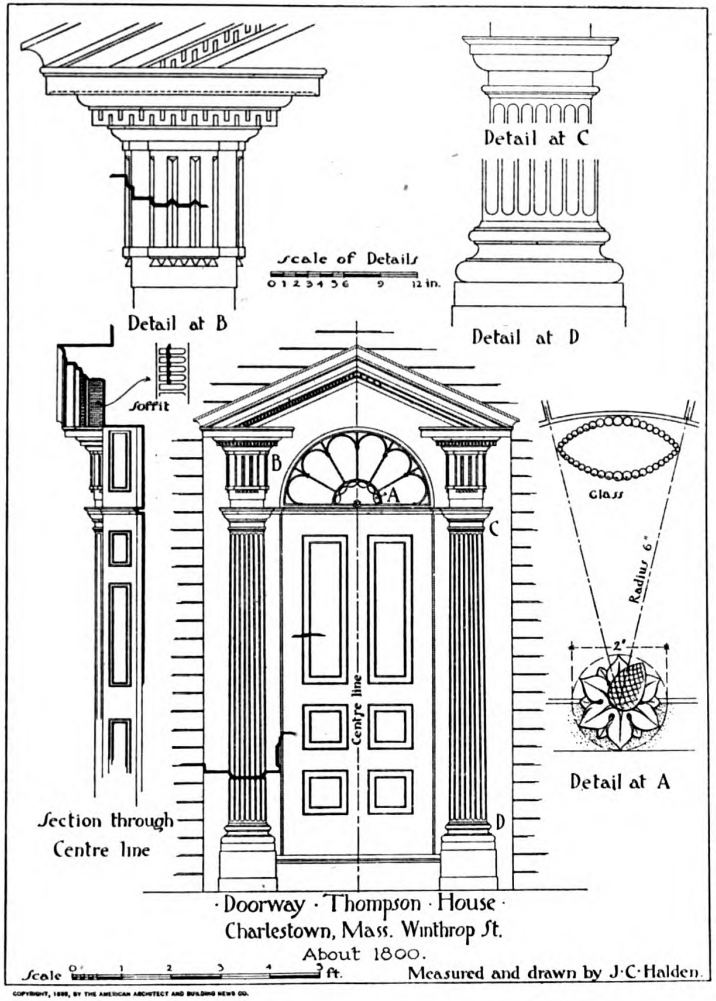

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Coolidge & Carlson, Architects

At left: Scale drawing of a fine type of New England doorway. Note the good proportion of the entire design and the correct paneling
At right: Doorways in a housing development in Suburban Boston. Note the artistic effect of shadows thrown by the haphazard projection of brick leaders

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ways have either been exactly copied or their design suggestively used all over this country. A good copy is of course better than a poor original, but it is always safe to bear in mind that a colonial doorway is



Doorway with an elaborate hood. Ayrault House, Newport, R. I.

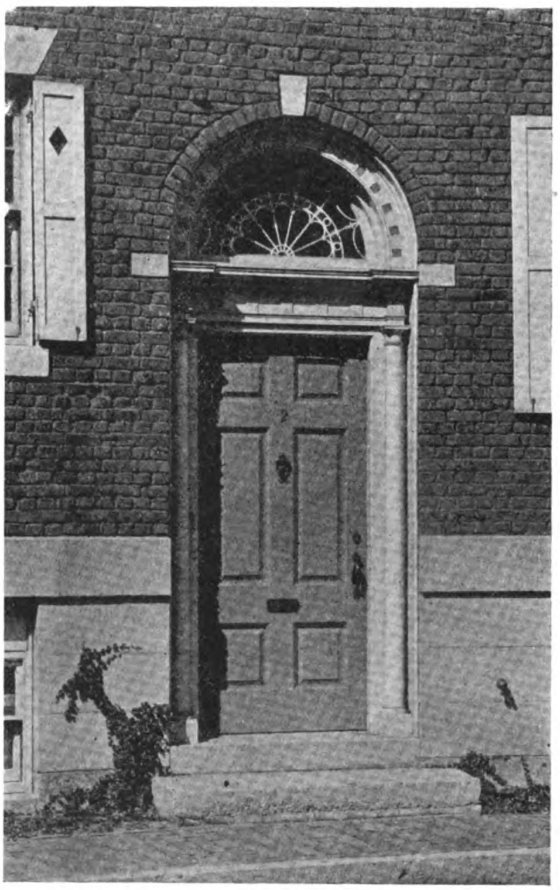
(From the Georgian period)

only properly placed when fitted to a true type of a colonial house. This type is as a rule what architects call "Georgian" and that name is derived from the reason that it originated in England during the reigns of Georges III and IV. It was during these reigns that so many English made their way as colonists or settlers to our New England shores and it was quite natural that they should continue to build here as they had learned to build at home.

MANY embellishments are added to colonial doorways today and many of them quite harmful to the good taste and general effect.

Transoms and side lights are, when properly constructed, fitted with hinged sashes so that air as well as light may be freely admitted. To serve the twofold purpose of ornament and a measure of safety, light iron grilles were introduced. Much attention has been given to their artistic design. The best, of course, were the earlier ones of hand wrought iron in designs that followed the accepted lines of the Georgian style. Later there were introduced cast iron grilles and these are continued today. While these grilles serve their purpose they do not as satisfactorily carry out the best features of the period they are supposed to represent.

Of course a colonial doorway should be colonial in all of its details. It is unfortunate to note the introduction of details that do not harmoniously relate. In the Georgian or English doorways the side benches should be simply benches, the backs of which would be supplied by the low railings that join the front columns of the porch to the house. It is



A single doorway with curved fanlight, all in good proportion.—Coolidge & Carlson, Architects.

not in strict keeping to place a "Dutch Settle" on each side of the doorway of an English colonial porch, but it is correct to put them on the porch of a gambrel-roofed Dutch colonial house with a porch and hood in keeping. It is these small things that

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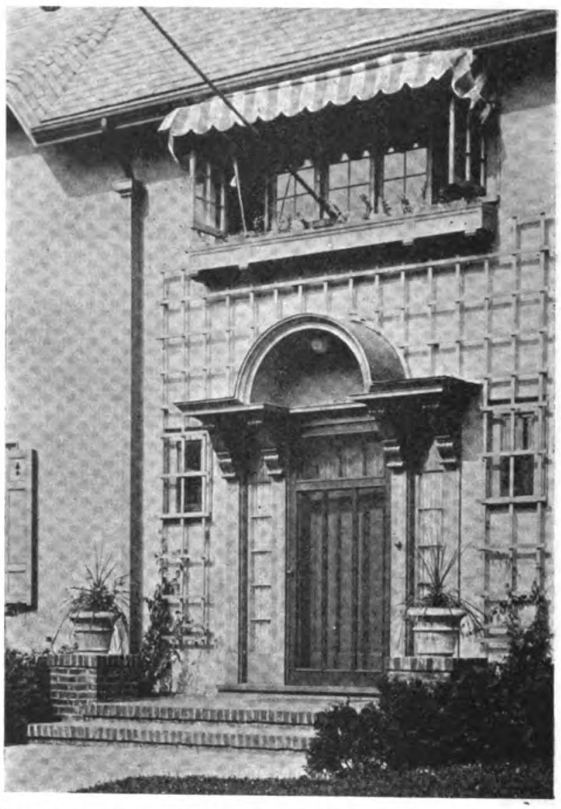
proclaim correct taste. The continued acceptance of the English colonial porch as developed in New England is due to the close adherence to these proper elements in design.

NOTHING can more beautifully suggest an air of good taste and a proper domestic atmosphere than one of these porches with proper planting to accent its beauty. The colonist found the honeysuckle vines or the lavender flowered wistria appropriate and hardy vines. These vines created a pleasant shade, gave the right amount of screen to serve privacy, and made beautiful spots of color.

Reference has been made in the preceding to the colonial architecture of these doorways and specifically to the Georgian. It is expected in succeeding issues to take up, discuss and illustrate other details of the house: windows, chimneys, pergolas, etc., and it may be well therefore to set down something as to the correct use of that misused word "colonial." There exists a somewhat hazy idea that colonial architecture or style refers broadly to those times which originated during our colonial period as a nation. This is only in a limited sense correct. If we are to speak of these things accurately we must prefix the type of colonial. For example the English who colonized our New England states and some parts of the south built on the English colonial. The Dutch who founded New York and spread over into New Jersey and some portions of Pennsylvania built the Dutch Colonial; while the Swedes when they settled along the capes of the Delaware followed a type now called the Swedish Colonial. In like manner the French created their own style in Louisiana and we have the old French town of New Orleans as a splendid example of the French type. The Spaniards, the earliest of all our colonists, put the impress of their architectural style on the peninsular of Florida and spread to the west into California. There the Mission style, or Spanish Colonial, survives as filling in all of its character the climatic necessities of the country.



Shows a well carried out decorative treatment of a doorway. The correct lines of door and hood are well supplemented by the lattice and structural window boxes. Notice that the lines of screen door and the general form are in good keeping



Porch of the Culver Homestead Brighton, Monroe Co., New York

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Resuming a further discussion of doorways, there is presented herewith a series that show the best features of design.

Many an old house has been made young by the addition of an attractive entrance feature. Many a house that has been offered for sale with no success, finds a ready purchaser when at a comparatively small expense a porch has been added, or such further embellishments as new shutters, artistically designed, a small pergola or a well constructed chimney. In fact the builder in the small town may create a very well paying business by seeking and securing at his suggestion just such alteration jobs as are comprised in these attractive details. This matter of entrances, doorways, or porches has, during the existing housing shortage in our large cities received careful consideration by many builders. Hundreds of city houses, many of them in whole blocks of similar fronts have been made attractive places by the remodelling of entrances, the addition of shutters and the application of paint carefully selected as to color. Further, there is proof everywhere and the unfortunate house-seeker early discovrs it, that these remodelled fronts have so enhanced the rentals of the properties as to create from an almost unrentable premises a very profitable investment.

What is true of cities, can be made equally true in country and suburban localities. The best advertisement a builder can secure is a house whose facade under his well directed efforts has been transformed from a commonplace thing into an attractive and home-like premises. This is a feature of the builder's daily business that he can profitably study.

Porous Concrete Slabs Used in Building Construction

A NEW building material, a porous concrete board called Porete, has been developed by E. Walter, an engineer of Newark, N. J. Mr. Walter, who has found much of interest in BUILDING AGE during the six years that he has been a subscriber, thought we would be interested in the new product and wrote us about it.

For the purpose of getting first hand information, the editor visited the new plant of the Porete Manufacturing Company, Newark, N. J., in the construction of which the new material was used wherever possible. A description of the material, its manufacture, characteristics and application to building construction follows:

At present the new product is being produced in slabs 1 inch and 1⅛ inches thick, and 24 inches by 32 inches wide. The 1 inch slabs or boards are reinforced with light 2-inch mesh poultry wire netting and are used for wall and partition construction, while the 1⅛-inch slabs are reinforced with expanded metal and are used for roof construction. The material weighs approximately 50 pounds per cubic foot, slightly more than that of the commonly used grades of lumber, and the slabs can be easily handled.

The porous character of the product is obtained by mixing with Portland cement and sand a quantity of mechanically produced pellets of a neutral wax-like material, about the size of "B B" shot. These pellets, while unaffected during the process of mixing and setting of the cement, are affected by heat, and melt or vaporize at a temperature below that which has any detrimental effect on the concrete. Thus by leaching out and evaporating the material composing the pellets, the spaces formerly occupied by them become voids and the structure of the resultant concrete very much resembles that of a rubber sponge. The material forming the pellets is recuperated and used over and over again. The process as well as the product is covered by U. S. Patents. A fine Rockaway Beach sand is used in the mix. The slabs are cast in metal forms, and while the upper surface of the finished slab is rough and porous, the under surface, due to contact with the form, is smooth. After the leaching process the slabs are stacked outdoors where they remain until shipment. An examination of a number of the earlier slabs, produced about a year ago, showed the material to be in good condition, and also considerably harder, as the setting process goes on, the same as with any Portland cement concrete. These had not been protected in any way and thus had been exposed to the elements during the past winter.

The plant for the manufacture of this product is 50 x 100 feet in area and one story (20 feet) high. The porous slabs have been used for all side walls, roof and interior partition construction as well as for the doors.

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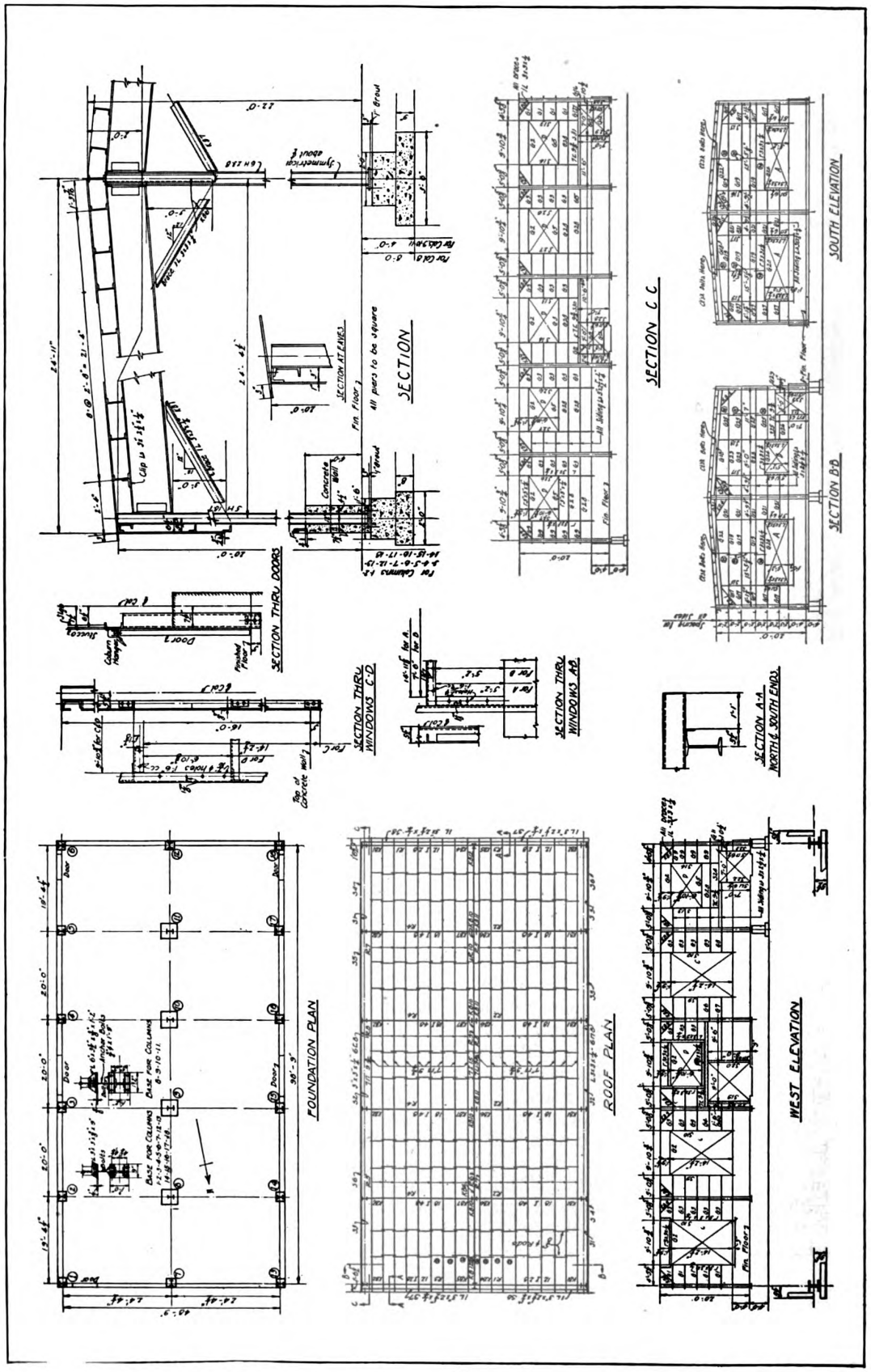

Plans, elevations and sections of structural steel framing, building for the Porete Manufacturing Co., Newark, N. J.
E. Walter, Designing Engineer

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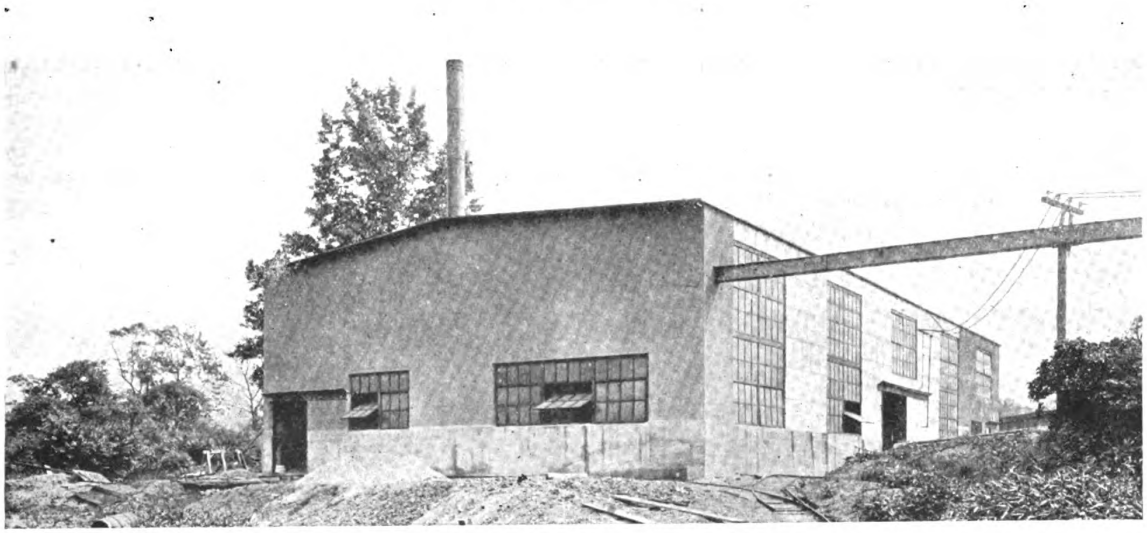
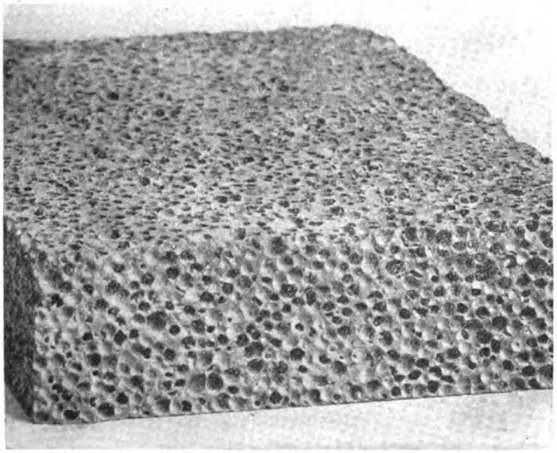


New building, Porete Manufacturing Co., Newark, N. J.
E. Walter, Designing Engineer

All footings are of normal concrete, placed 4 feet below grade. A concrete wall, 12 inches thick and extending 4 feet above grade, has been placed around the entire exterior, and this feature seems to be desirable, since it acts as a guard against damage by motor trucks, etc. The entire framework of the structure is of steel. The exterior columns are 5-inch H section and the interior columns, forming a row in the center, are of 6-inch H section. All columns are spaced 20 feet on centers parallel to the long axis of the building. The roof girders are 18-inch I beams set on a slight pitch, and braced to the columns by angle knee braces. The roof purlins are 7-inch channels 2 feet 8 inches on centers, with lower flanges resting on and bolted to the girders. Horizontal angles, spaced 2 feet 8 inches apart are connected to the outside flanges of the wall columns. All door and window openings are framed with angles and channels. The entire steel framework is well braced. A good conception of the construction will be obtained from an inspection of the photograph of the interior.



A specimen of the new product shown full size



Roof construction—Steel channels and porous slabs

After the erection of the steel framework, the walls were covered with the porous concrete slabs, set with the long dimension vertical. The slabs are held in place by specially constructed, heavily galvanized metal clips. Several of these clips, as well as the method of holding the wall slabs in place may be clearly seen in one of the illustrations. The only tools used by the workman setting these were a small hatchet and a pair of wire cutters. No scaffolding

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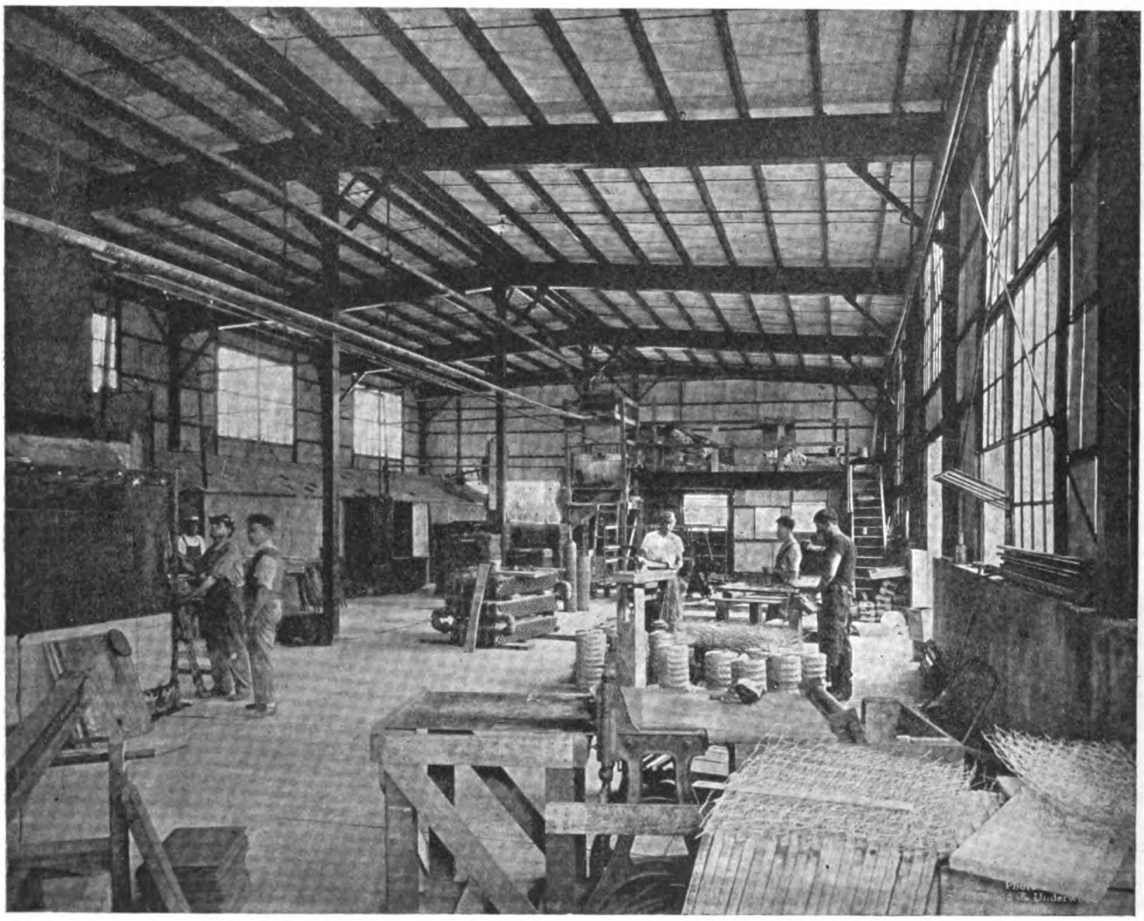
was required. The windows are of the solid steel sash type, now commonly employed in industrial buildings, connected to the steel framework in the usual manner.

The roof slabs were set so as to rest on the top flanges of the channels, and metal clips used to hold them in place. These clips are formed to hook over the edge of the channel flanges and have two projection lugs, one of which extends over the slab on one side and the other one over the adjoining slab.



Interior view of plant showing wall and roof construction

After the roof slabs were placed, a very thin surface of cement grout about 1/16 inch thick was floated over the slabs, filling the joints and smoothing the surface. Over this a build-up tar, felt and slag roof surface was applied.

Tests made on a number of the roof slabs with the surface finish on top gave an ultimate strength of approximately 350 pounds per square foot. The expanded metal reinforcement is placed toward the underside, but not close enough to the surface to be exposed.

The walls on three sides have been given two coats of Portland cement stucco applied with a stucco machine and present a good appearance. No cracks are noticeable to date. The fourth wall has been partly covered with one coat of cement stucco. The remaining sections are used for conducting various exposure tests.

The interior partitions around the office section, as well as two doors shown at the rear of the photograph of the interior, are also constructed of Porete slabs on a metal framework, and plastered.

These slabs can be nailed to wood studs without difficulty, the nails apparently not in any way injuring the material. A special wire clip is used under the nail heads which acts as a washer. A panel constructed of wood studs, similar to the wall of a frame building, has been erected in the open

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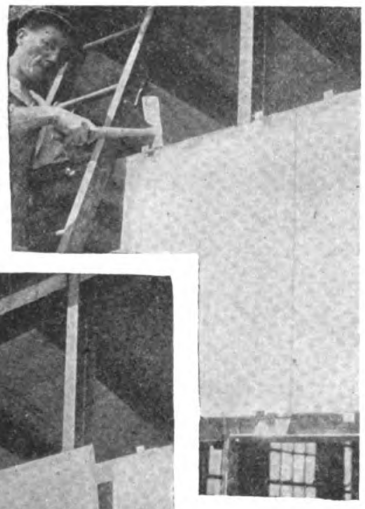
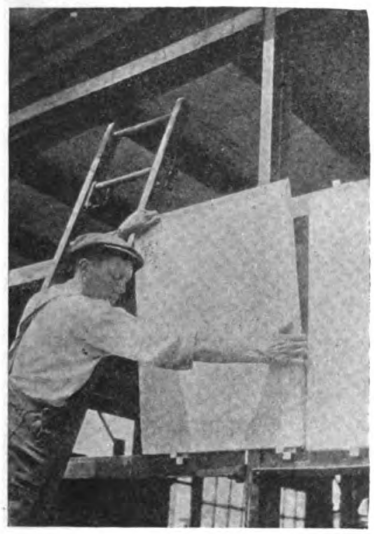
for experimental purposes. This has been covered by the slabs and one heavy coat of stucco. So far as could be determined, one single heavy coat of stucco appears to be all that is necessary to make a satisfactory siding. A dash finish would, of course, add to the attractiveness of the appearance.

It would appear that this material has a wide field, since it combines most of the enduring qualities of



"Close up" of method of attaching slabs to steel work



Note type of steel clip used to hold slabs in place

Portland cement concrete with very light weight, and in addition possesses excellent insulating qualities on account of its air cell structure. Not only can it be used for the exterior of frame buildings such as dwellings, which are to be stuccoed, but also for small and large garages and industrial buildings. For partitions, false ceilings and as a furring material for brick and concrete walls, as well as concrete roofs, it promises excellent results. As a roof-deck it combines with its fire resisting qualities, very light weight and good insulation.

The "board" idea has come into quite general use insofar as interiors for moderate sized residential buildings are concerned, and it is quite conceivable that for exterior work the same principle might, in certain classes of buildings, be found advantageous. Of course, as relating to the product here described, some type of weatherproof exterior coating is essential, since the material itself is not proof against the elements. However, considerable labor on the job may be eliminated, since but a single coat of stucco seems adequate.

The construction so far as this building and similar types are concerned has received the approval of the building department of Newark, N. J.

Wall Board Industry Shows Prodigious Growth

Think of it! An industry with a 1,500 per cent growth in 14 years! That's the wonderful record of the wall board industry.

The facts are given in the following figures. The production of wall board in 1906 approximated 500,000 square feet at a value of $15,000. The production in 1919 estimated at 550,000,000 square feet has an approximate value of $22,000,000.

Why this remarkable growth? An executive of The Upson Company puts the reason in very simple language. He says, "The wonderful growth of the wall board industry is due to the fact that a dependable wall board meets an existing demand. It offers a lining for every type of building, new or old, that cannot crack, chip, or fall like plaster, a lining that can be painted in accordance with the modern way of finishing interiors, thereby affording washable, beautiful walls and ceilings that can be kept spotlessly clean and fresh."

There can be no question of the merits of wall board. It has proven to be practical for every kind of building, and it has also proven to be the ideal material for use in place of more expensive building materials. Its widespread appeal is due to the easy manner of application, and the fact that wall board makes a sturdy wall that withstands hard usage. It is not affected by shocks and vibrations, having sufficient flexibility to adjust itself to strains that come in the inevitable settling of buildings.

The many sizes and thicknesses in which wall boards are today manufactured make possible many pratcical and unique panel effects. One company makes a complete line varying from one-eighth inch to three-eighths inch thicknesses; lengths from six to sixteen feet and widths from thirty-two to sixty-four inches. Thus with careful planning it is possible to secure virtually unbroken wall surfaces with the wide panels or very artistic and dignified panel and beam effects with the narrower widths.

Wall boards, like other materials, vary in quality, so that it behooves every purchaser carefully to investigate the quality of this fast growing material for walls and ceilings before deciding upon the make of board to use in his work.

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Fig. 6. House at Radnor, Pa.
Bissell, Sinkler & Tilden, Architects

The Possibilities of Brick as a Home Building Material

PART III

By Victor D. Abel

COMPOSED as it is of so many small units, each of clay burnt to a high degree of resistance of fire, the completed brick wall has an advantage over many materials in that it possesses a very considerable strength with a reasonable thinness of wall. This encourages its use wherever height as well as ability to carry weight is an essential requirement. As a result of these adaptabilities, brick has been much used from the earliest days of building construction, where engineering as well as design was a part of the problem. Naturally, therefore, most structures of large size have brick in the outer walls, even when they are faced with stone or some other decorative material. Behind the exterior facing, no matter what it is, the probabilities are that there is the necessary brick doing its not inconsiderable share in the support or enclosure of the main structure of the building.

The proper use of brick in the constructive strength of the building and as an engineering problem is too well covered by the requirements of the building codes of the various localities to have any attention in this article. It is in the use of brick in exterior design that we are interested and it is to be noted that here the small unit of the individual brick is an advantage just as it is in construction.

The larger house and the apartment house, as well as the public building, institution, etc., offers a much more varied field for brick in design than the small house. The larger wall surfaces allow of combinations with plaster, terra cotta, stone, etc., impossible in the small dwelling. The selection of the exterior brick, its color, texture, etc., can be made with more care and with greater freedom from the consideration of expense. This encouraged the development of the "face" brick, with its special colors, surfaces and uses. The rough surface of the "tapestry" brick



Fig. 2. Detail of entrance porch to a house at Elkins Park, Pa.—Bissell & Sinkler, Architects

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or others similar in texture are admirably adapted to large wall surfaces.

The possibility of securing facing brick in colors other than red, such as grays, buffs, granites, etc., has likewise been a great incentive to the use of brick. Particularly in the larger apartment houses and buildings for business, semi-public or public uses it has not always been desirable to use red and a lighter and different color has thrown the balance

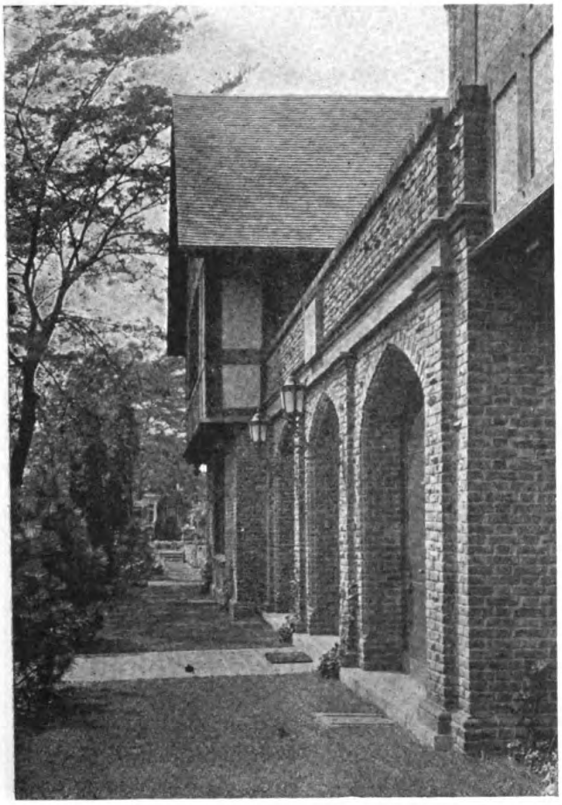

Fig. 3

in favor of brick. How well this has resulted to the advantage of the building is shown by the especially good examples of different treatment of brickwork illustrated herein.

Illustration No. 4 is of the true English half-timbered type so seldom carried out in detail as here shown in the house designed by Mr. Hobart Upjohn. The spaces between the solid timbers forming the half-timbering are filled with brick nogging. The intensive study of the entire house is seen in the detail of the brick panels. While the main body of the house is laid in common bond with header courses over windows, the panels have been laid in varying patterns, as though a different workman had laid



Fig. 1. Before alteration

the brick in each space. The brick is of a rough texture, dark red in color and of varying shades.

It does not always follow that a brick house need have brickwork exposed to the roof. Another facing material for large portions of the wall surface is often used, such as in the house illustrated in Fig. 2. The walls of the house are of brick, exposed in the first story and plastered above, but showing again in the copings at gable ends. The brick is laid in the garden wall bond, with wide white rough joints, carrying out the informality of the house.

The entrance porch detail of the house by Wilson Eyre and McIlvaine, shown in Fig. 3, shows an entirely different application of brick. The brick, rough in appearance and laying, with clinkers showing and a wide dark joint forms the backbone of a house with formal cut stone bands and treatment



Fig. 5. After alteration.—D. Knickerback Boyd, Architect

and massive half-timbering with plaster panels. The main body of the wall is laid in Flemish bond, combined with the arches are moulded brick, rarely used. The same moulded brick forms the water table at the base of the house.

In Figs. 1 and 5 are shown the same house, giving an excellent and unusual opportunity of illustrating the difference between the ordinary brickwork of thirty and forty years ago and its modern intelligent use. The views are taken of the same end of the house, the bay window showing in both photographs.

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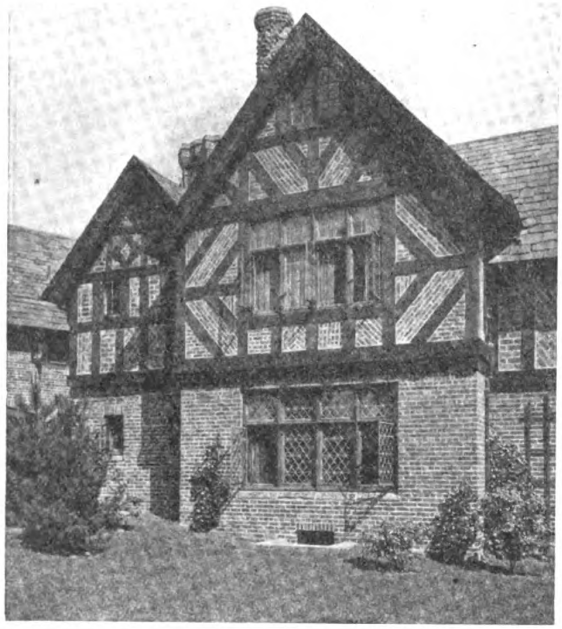

Fig. 4

In the house as altered, Fig. 5 note the restfulness of the brick surfaces in the walls of the house and of the terrace.

The home illustrated in Fig. 6 is a different type of English house, using the English bond. The red brick with wide white joints forms the main wall

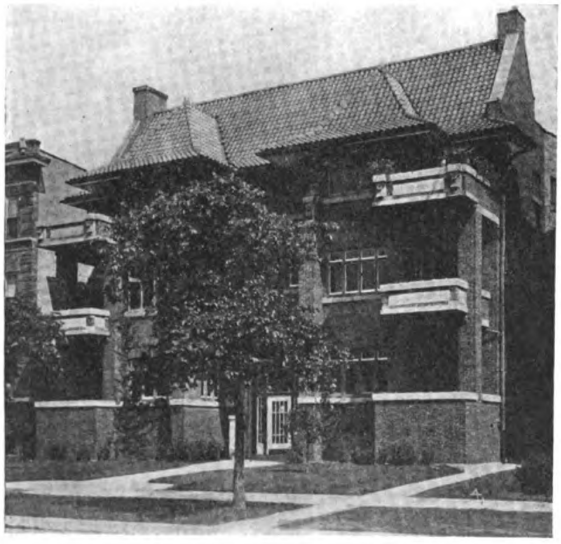

Fig. 8. An apartment building on Sheridan Road, Chicago

surface, nowhere relieved by any bands or courses and yet not lacking in interest therefore.

In the revival of brick work there is perhaps no larger field than in the apartment house. This is also true in the planning of the apartments for land value and light and air and which lends itself admirably to the interesting use of brick. This is well shown in the illustration in Fig. 7 of an apartment

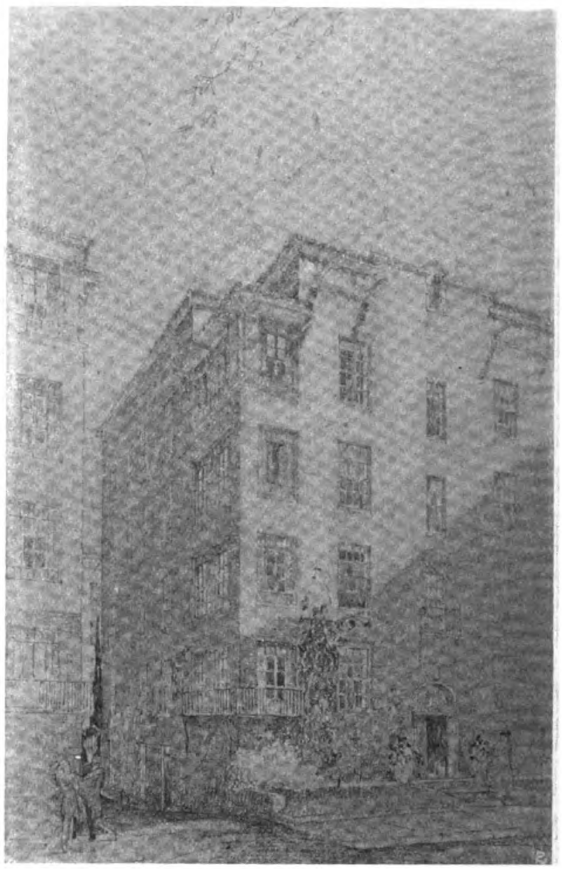

Fig. 7

house designed by Mr. Andrew J. Thomas. The brick work, usually laid in American bond with wide joints, is relieved by the treatment and position of the various openings, and by the use of roof treatment other than the usual straight wall with coping. In the building here illustrated all of the various arches, bands, decorative treatments, etc., are carried out in the same brick as the wall.

All of the preceding illustrations are from Eastern work and the article would not be complete without some photograph of a building in another location. The one presented in Fig. 8 of an apartment house in Chicago is typical of good design in that section.

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The brickwork, laid in Flemish bond, is relieved by the use of terra cotta bands, panels and decoration of limestone gray color.

It is to be regretted that, of necessity, so large a subject must be condensed in so small a space. The use of brick in its various forms is infinite in the variations of color and design possible. But, after all, it is the study and treatment of openings, as well as the color and bonding of the brick, which goes far toward the finished design of any type of building and this must be studied in the individual case. In these photographs, it has been only possible to endeavor to show good precedent in brickwork in several types in general use rather than to attempt to cover an entire field.

Again, the use of brick in schools, colleges, office buildings, public buildings, etc., present different problems, which are entirely apart from the use of brick in the home and these cannot be treated in this series. The final article will be devoted entirely to detail, being close-up views of interesting bits and uses of brickwork, as much for practical carrying out of bonds and treatment as for design.

Book Reviews

EXERCISES IN LETTERING. BY GEORGE G. GREENE. PAPER—2½x5¼—32 PP. THE BRUCE PUBLISHING CO., MILWAUKEE, WIS.

This is a convenient little booklet for the draftsman and all others who find it necessary to do artistic lettering. Various styles of alphabets are shown, including Roman, Old English and Architectural as well as styles suitable for show cards and posters.

A PRACTICAL COURSE IN ROOF FRAMING. BY RICHARD M. VAN GAASBEEK. CLOTH—4½x7½—148 PP. FREDERICK J. DRAKE & CO., CHICAGO, ILL., PUBLISHERS

To the practical mechanic who has puzzled more than once over cuts, pitches and other items incidental to the framing of a roof, this volume will especially appeal. Starting with the framing of a simple gable roof, problem after problem is considered and worked out in an understandable manner, until the most complicated roof framing problems have been covered. This work treats of a subject claiming the attention of every builder of houses, and for this reason should prove popular, and fill a real need.

MECHANICAL DRAFTING MANUAL, PARTS I AND II. BY CHARLES B. HOWE. PART I—15 LESSONS; PART II—16 PLATES. 6½x8½. JOHN WILEY & SONS, INC., NEW YORK CITY, PUBLISHERS.

These plates and the accompanying notes constitute a series of lessons in the fundamental principles of drafting. They are designed to be used in connection with a drafting course and will be found of material benefit to instructors who have not already developed their own plates, notes, etc. Where several classes are held on the same subject, their use would standardize the work. Part I deals with lettering, isometric drawing, inking, tracing and blue printing, while Part II treats of the geometry of drawing, each plate containing several individual exercises.

BUILDING CONSTRUCTION, PARTS I AND II. BY CHARLES F. MITCHELL. CLOTH—5x7. PART I—473 PP; PART II—952 PP. B. T. BATSFORD, LTD., LONDON, PUBLISHERS, AND D. VAN NOSTRAND COMPANY, NEW YORK CITY.

Part I is devoted to brick and stone masonry, carpentry and joinery, steel girders and roof trusses, roofing and building quantities. This is an excellent volume, well illustrated, but as would be expected, featuring all construction work from the British standpoint. While methods of construction in the main are very similar in both this country and England, details vary considerably. For instance, no mention is made of the common or American bond in brickwork, a framing plan shows 3 in. by 9 in. joists; and several terms not familiar to American builders are used. Under "Plumbing" no mention of drainage is made, this section dealing with sheet lead ridge rolls, flashings, gutters, etc.

Part II termed "Advanced Course," treats more largely of materials and construction methods employed in the construction of larger buildings, and also contains engineering data such as a chapter on graphic statics, data on the design of steel and reinforced concrete beams, girders, etc. Skeleton steel and reinforced concrete construction are described and illustrated. Other chapters deal with stair construction, sanitation, water supply, heating and ventilating, electric wiring, etc. Part of the data given, especially that dealing with reinforced concrete, plumbing and electric work, would hardly be considered as altogether up-to-date by those familiar with present day practice in this country.

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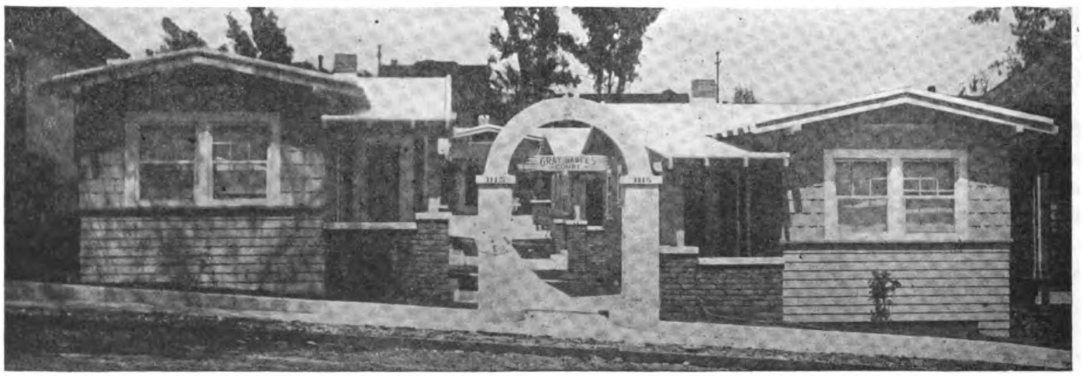
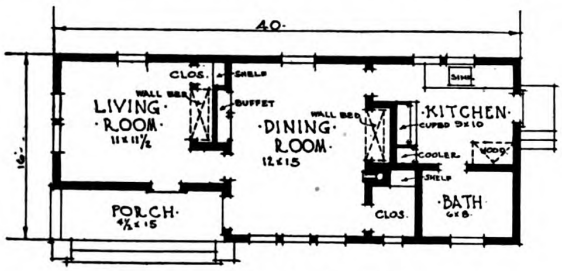


An Inexpensive Bungalow Court

By Charles Alma Byers

HERE is a bungalow court that should appeal with particular interest to the man who owns but a comparatively small plot of ground and has only a small amount of money with which to improve it. It constitutes an especially well-paying investment; and, since the little homes which it provides are so complete and so attractive as to be rarely vacant, the income derived is always quite dependable.

The plot of ground occupied by this court is 50 x 150 ft. in dimensions, and is valued, because of its close-in location, at about $2,500. It accommodates five fair-sized bungalows, and, since the one in the rear is double, there are six apartments, or complete homes.

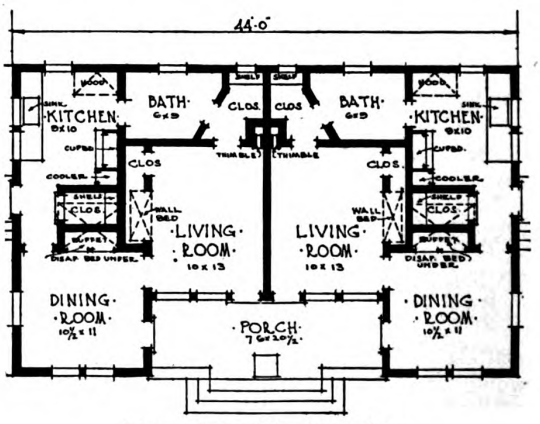


Plan of Single Bungalow

Known as "Gray Gables," this court is located in Los Angeles, Cal., and one of the apartments of the double bungalow is occupied by the owner himself —H. G. Balance. It was designed by E. B. Rust, architect, and was built by W. L. Miller, contractor —both of that city.

The bungalows are so planned and placed that considerable space intervenes between them, and in no way does the ground plot seem overcrowded. The court, as a whole, presents an attractive appearance to the street, and the bungalows themselves are especially pleasing in outside structural lines. The entrance from the street is marked by an artistic little arch, bearing the court's name, and a cement walk traverses the center of the plot, from which branch the individual walks to the different houses. There are two single bungalows facing this walk on either side, and the double one faces the street from the rear.

All of the bungalows are of frame construction, and are very much alike in general appearance. The walls are covered with ordinary weatherboarding from the foundation to the lower edge of the window casing, and from this point upward they are covered with sawed shakes. The walls are painted a "battleship" gray, and the trimming is done in pure white. The porch walls and the chimneys are of blue-red brick, coped with cement, and the porch flooring is also of cement, while the foundations are



Plan of Double Bungalow

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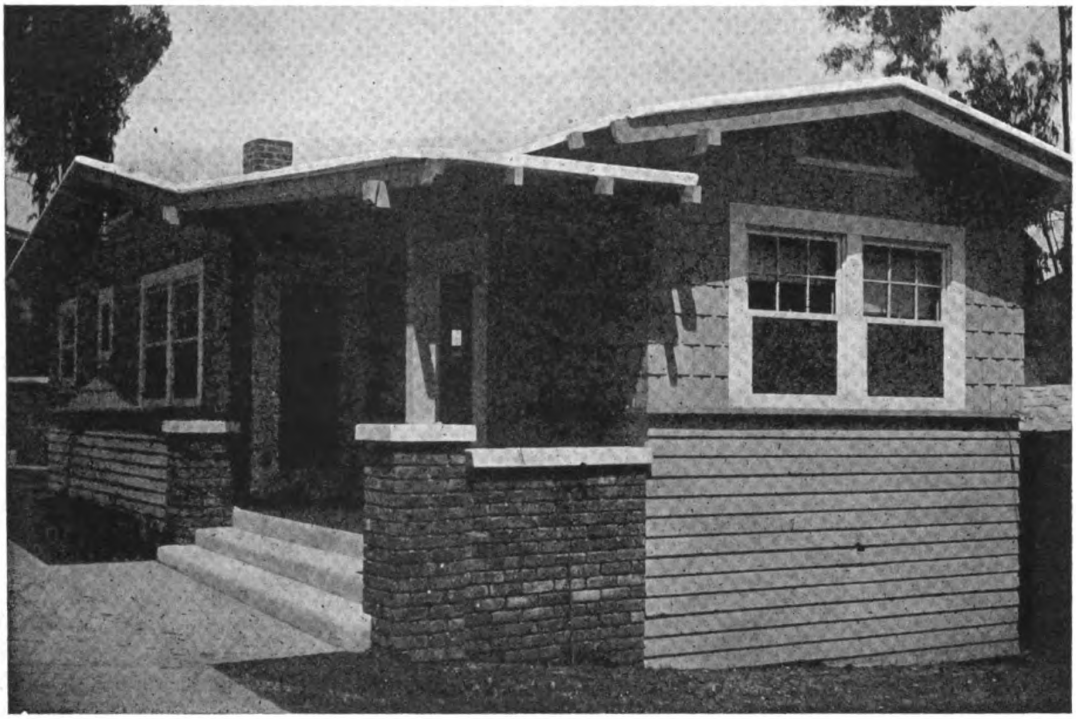
of concrete. The roofs are covered with a white asbestos-like composition, and are comparatively flat, with the usual wide overhangs in the eaves and gables. The color scheme, as a whole, is very effective.

Each single bungalow, and each half of the double bungalow, contains three rooms and bath, as well as a large number of built-in features. The four single ones are of exactly the same size and arrangement; and herewith are reproduced floor plans of one of these and the double bungalow that occupies the rear of the plot. These plans should be carefully studied by the prospective builder.



One of the bungalows

Each of the single bungalows possesses a small porch, 4 ft. 6 in. by 15 ft. in dimensions, and from this porch a door opens into the living room and the dining room. The living room contains a wall bed and a small closet, and in the dining room is found another wall bed, as well as a built-in buffet and a closet. The woodwork of these two rooms is of Oregon pine, stained to somewhat resemble fumed oak in color, and the floors are of oak. The plastered walls and ceilings are papered.

The kitchen contains all of the usual conveniences, including a draught cooler, a hood for the range and a great deal of cupboard space. This room, as well as the bathroom, is finished in white enamel, and the floors are of pine, covered with linoleum.

In the main, the same description can be applied to each half of the double bungalow. One large porch, however, 7 ft. 6 in. by 20 ft. 6 in. in size, occupying the center, is here made to serve for both apartments. Besides the wall bed and the small closet, corresponding with similar features in the single bungalows, there is also a large closet, which serves to provide one of the passageways to the bathroom. In the dining room the disappearing bed and the built-in buffet are combined into one feature, the bed being concealed beneath the buffet countershelf. This arrangement necessitates a large closet, with an elevated floor, to which access is had by way of the small hall that intervenes between the dining room and the kitchen. The side entrance to each apartment also leads into this hall.

Because of so many built-in conveniences, the houses require the use of but little furniture, which comprises a feature that it always much appreciated by the renter. The houses are comfortable and cozy in every way, and they constitute a type of home that is always in demand. While they have no fireplaces nor furnaces, there are chimney places to enable the use of stoves for heating purposes. It would be extremely difficult to construct a flat building, which would provide so many apartments, for the sum expended on this court, and it is quite certain that flats could neither be so easily rented nor afford the privacy here made possible.

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Safeguarding Water Supply for the Isolated Country House

Some Important Notes on Its Selection and Installation

By William C. Tucker, Sanitary Engineer

THE introduction of a water supply system for the isolated country house, which shall be permanently safe, of reliable quantity, and of low cost, is a problem which demands scientific and business acumen.

SURVEY OF PROPERTY:

The owner of a country estate should not enter upon the development of his property, be it small or large, in an impulsive or haphazard manner but with careful forethought. To accomplish this and to aid him in his study, a topographical map should be accurately prepared.

Immediately upon obtaining possession of the property, a casual examination should be made for a permanent water supply, during which it is well to note carefully the location of that on the neighboring land, and the method of pumping. This will eliminate much perplexity and save the loss of valuable time, leaving the more promising features for a thorough and scientific investigation. Every possible source must be marked for observation,—springs, brooks, water shed, seepy ground, and points of vantage for the location of an artesian or driven well, should all else fail.

SOURCE OF WATER SUPPLY:

A careful examination of the environment of the source of a proposed water system should always be made. The slope of the ground, the drainage area, the character of tillage of adjoining land, with the thought in mind of the possibility of direct or indirect contamination. The writer has in mind a flowing well in a section of New Jersey, given to the beautiful homes of New York men of means, which upon analysis by the State Board of Health gave indications of insecurity, never satisfactorily explained. It was discovered that excessive amounts of fertilizer had been applied to the poor land of an estate three miles distant, under control of a wealthy and impatient owner who wished to produce glowing results over night, but whether this suspicion was tenable or not is problematical.

The permanent source of the water supply with its tributaries must, if possible, lie wholly within the confines of the property, to insure absolute control and freedom from contamination. Its rate of delivery must be accurately known from a series of careful intermittent gaugings, taken at different periods, some of which must be in the fall of the year, when the flow is at its lowest. It must be at a safe distance from the house, barn, and farm activities, and other points from which there may be fear of the slightest possible future contamination, but with which it must coordinate as closely as possible. This demand is often most perplexing, and may lead to an undesirable solution.

EXAMINATION OF THE WATER.

WHEN the permanent source of supply has been selected, after careful investigation, a sample should then be sent to the State Board of Health for a chemical and biological examination, with accompanying reports. This examination is free of all charge, except that for the container, to and from the laboratory. A number of examinations, within reason, will be cheerfully made. The report will clearly indicate the chemical constituents which the sample may contain and their percentage. The biological examination will show the pathological germs discovered if any, and the count. Such a report also contains a most comprehensive and concise statement of the deductions as indicated in the analysis, which is most valuable, is always conservative, and must be conscientiously followed, often necessitating the abandonment of a beautiful and what may appear healthy source of water supply, and the renewal of investigation for a substitute source. The enthusiastic owner is so often deceived by the appearance of the limpid and sparkling water from a running spring; and analysis should be made once a year or

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at such time as there may be cause for the slightest apprehension. This is well illustrated by an incident which occurred to the writer in the course of his professional duties. The young members of a family and their mother, living in a beautiful home in the country, surrounded with every luxury and comfort, from some cause became listless and lacking in animation; their food was wholesome, the air invigorating, and they had ample rest and recreation. The writer made diligent investigation and suggested that an analysis of the potable water be obtained. This was ridiculed as being unnecessary, as "the spring has been running ever since grandfather was a boy." The water was analyzed and the report came back indicating contamination, which was then easily traced. Another incident most similar occurred in connection with a well on the property of a large, fashionable and most exclusive young ladies' school on the Hudson River not far from New York. This well was most popular and had been in use many years, and "I drank from this well when I was a boy," said the old gardener, who was well over sixty. This water, too, was analyzed with similar results. Thus time may change conditions.

There is an erroneous impression along the country side, particularly amongst those of untutored mind, and tenacity of opinion, that any impurity contained in flowing water will in time be removed. This is true of any impurity held in suspension which can be removed by sedimentation in quiescence, but this does not hold, should the impurity be of a pathological nature. It is possible, of course, to remove pathological impregnation, but the method is most delicate, of the highest scientific attainment, requires unceasing scrutiny, and is most costly. Boiling will absolutely purge the most contaminated of waters; this has often been demonstrated by intrepid explorers in tropical climates. It may be accepted as an axiom, that should the water under consideration show any evidence of contamination, that source must be abandoned, and search continued for a pure, wholesome, healthy supply. It is doubtful if most persons fully realize the importance of pure water.

An Ideal Source.

THE ideal source is the isolated, never failing, cool and refreshing bubbling spring. Such a source is to be highly treasured. It must be thoroughly explored, its tributaries traced and its complete history learned. The intermingled earth should be removed, and the spring surrounded with a watertight masonry wall to exclude ground water, which must be extended well above surrounding surface with curb to provide against surface drainage. Bottom of spring must be left absolutely free. It is most essential in this connection that all the branches be gathered together, so that the greatest possible amount of water may always be available for which there will always be found use. Excess supply may be used in the creamery or a swimming pool. The spring must be provided with suitable housing for protection against the intrusion of superficial material and to insure its exclusive use for potable purposes.

Other Sources.

The use of the brook meandering through the property with its foreign source, it not to be received with unalloyed complacency. That portion within the boundary is, of course, under control as to safety and conservation, but that beyond is not. There is always the fear of pollution and interference with its entire delivery.

The development of seepy ground as a source of water supply is not to be encouraged. There is always the fear of unreliability of purity and quantity.

The reversion to the artesian or driven wells as a source of permanent supply is only to be entertained, to the writer's mind, as a last resource, when all other methods are found wanting; the initial cost is never definitely known until water of desired quality and quantity has been obtained; the permanency of rate of delivery is not certain; the quality is generally hard and not as beneficial as that from the spring, and it is generally unpopular for use in the laundry.

Reserve Supply.

PUMPING directly from the water source is inefficient, and lacking in engineering ability; a reservoir or reserve supply should always be maintained. The rate of flow of the spring may not be great, but it probably is constant, and the total yield per day will usually be found sufficient to meet all demands. The reservoir may be located at any point which may be found appropriate, in relative proximity to the farm activities and well below the spring so that the overflow may be quickly delivered, thus obviating freezing. It should be well constructed of masonry, carefully laid in Portland cement with brush smooth inner surface, and of strength to withstand the earth pressure from without when empty and the water pressure from within. The wall should extend well above ground with curbing. The reservoir should be so located that it may be drained for cleaning and repairs, the drain should be at centre of bottom, from the four walls so that in making repairs should leak occur, only small section of flooring would be flooded.

It will be found advisable to provide a small silt or grit chamber, with removable wire screen, at end of basin of which it forms an integral part, to in-

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Decorating and Furnishing the Low-Cost House

Planning and Decoration of Bedrooms

A BEDROOM, as its name would imply, is first of all a room for a bed. It should be fully and freely ventilated and need contain nothing more than a chair and a clothes tree in addition. The nearest approach to the ideal bedroom is the sleeping porch, which is gaining in popularity everywhere. But the necessities of small houses rarely permit of a real bedroom in this sense. It is usually desired by the housewife as a place not only where she may sleep, but where she may dress, read, write, sew and lounge.

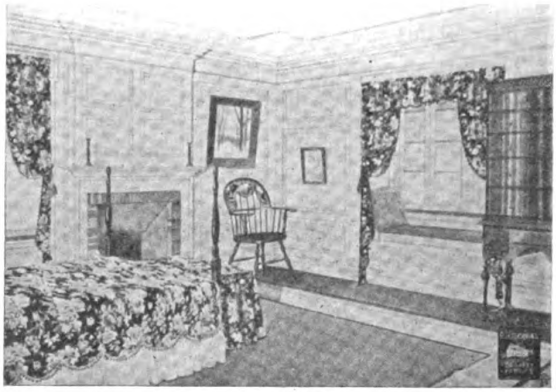
It is of course possible, and this is the general course of procedure, to combine and group the conventional bedroom activities. Instead of one large room, two smaller ones, one in which to sleep, dress and lounge, the other for reading, writing and sewing, are found very satisfactory, as permitting independent processes to be independently carried on. When this arrangement is not found practicable, the large room should be subdivided, one portion being adapted for sewing, another for dressing, another for writing, etc. Then these things will be more efficiently done and with the least amount of inconvenience.

Each person should of course as far as possible have a separate room which may be ventilated, furnished and arranged to suit oneself.

A bedroom should be well ventilated. There should be windows on two sides, or lacking that, a transom over the door. Ceilings should be high and the tops of the windows near the ceiling. Casement windows are preferable to the common type of sliding ones as permitting the full area of the window opening to be availed of. At present it is possible to obtain double hung windows so constructed that a 100 per cent. clear opening is possible. Beds should not face an east window as this forces the sleeper to face into the strong morning sunlight.

More closets cannot be built than the housewife will find use for. The conventional wardrobe should have a pole suspended horizontally from one side of the closet clear across to the other. This will accommodate compactly more coat hangers and therefore more garments than the hooks heretofore stuck into the closet walls. Provision should be made in all built-in closets where electricity is had, for a low candle power lamp suspended therein, which will either light up automatically as the door is opened, or be lighted by turning a switch. This prevents much groping. The woodwork of the closet should be that of the furture. Builders are incorporating in built-in closets all the advantages and good features that appear in other pieces of bedroom furniture, such as the bureau, wardrobe, trunk, chiffonier, etc.

A very important closet for the bedroom may also be constructed advantageously. This is a combination lavatory, medicine chest, towel cabinet and toilet



A typical Colonial treatment. The built-in window seat is a good architectural feature

built in the wall and shut off by a door with a mirror panel on the inside, all parts to be sanitary and adequate ventilation provided. Such a closet occupies but a small space and may also serve as a communicating passage between the mother's and children's rooms in which event an additional door is required. If modern plumbing cannot be obtained the old-fashioned washstand and other appurtenances may be similarly closeted with towel chest and medicine rack. Other closets may take the form of hollow window seats.

The thing of prime importance is the bed itself. Reflecting that at least one third of one's life is spent there, it would seem reasonable to have it as comfortable and well appointed as possible. The bed should be strong and stable, preferably of metal, for wood tends to warp and crack, and affords a

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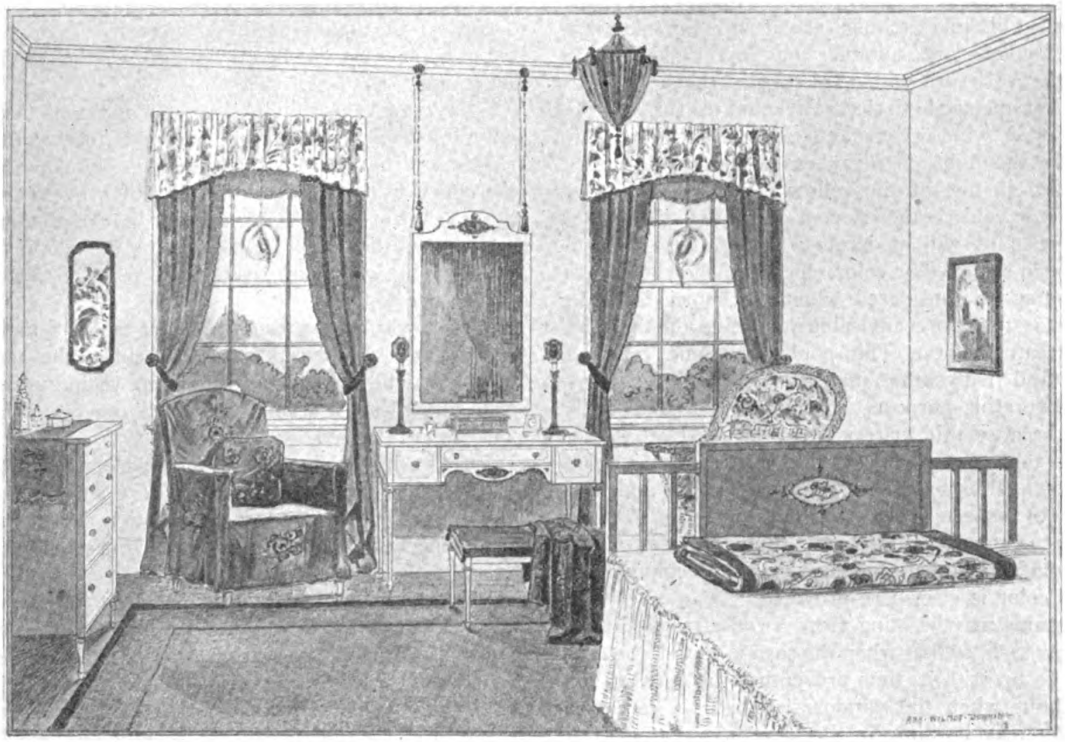
nesting place for vermin. It is possible to obtain metal beds treated to resemble the wood in the rest of the room.

In planning a location for the bed, it is desirable to place it as close to the entrance door as possible. This causes the movement of those who enter the room to be away from the bed, making that piece of furniture a subordinate feature during the day, and bringing the emphasis to the fireplace or other living part of the room.

Keeping always in mind the aim of perfect cleanliness and simplicity, white enamel finish or other light wood is desirable. The whole aspect of a bedroom should be cheerful, light and airy. A dark, sombre bedroom is obtained by the use of heavy draperies, thick carpets, doleful, carved furniture just waiting for dust—everything in contradiction to the spirit of cleanliness. Upholstered chairs are not so good as wood, leather, cane and wicker, all of which are cheaper, cleaner and just as comfortable. Cushions may be used in them when desired, and may be made at home of washable cretonnes to match the curtains, bureau covers and other accessories. Carving in the wood should be avoided, as it should also in picture and mirror frames. If dark wood is had, mahogany or redwoods are preferable to oaks, which have a depressing effect. Particularly in a room where there is white panelling is mahogany appropriate. But lighter woods will be found cheaper and more effective.

Bedroom floors where possible should be of hard wood, with rounded or so-called sanitary corners. When hard wood floors are not used a most serviceable covering is perhaps a linoleum of the higher grade in subdued patterns. There should always be a rug at the bedside and also at other places of most wear. Mattings tear easily and are short lived and should not be used where the bed must be drawn out from the wall.



A bedroom with painted furniture

Cleanliness is facilitated where paint is used instead of wall paper. If the latter is however used, when repapering it is necessary to remove all old wall paper first and place the new on the bare, clean wall surface to avoid vermin and disease germs. In choosing wall paper designs, the tone should be light and is best when perfectly plain, or at most, two toned and inconspicuously marked. There is a restlessness imposed in viewing would-be moving figures on the wall—birds that never alight on flowers half an inch away. Wherever the curtains or covers in the room are of cretonnes or other figured materials, it is practically essential to have a plain wall

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surface. Where the wall has been painted, a stencilled border provides a good finish.

In lighting any bedroom, the lights should be at centers of action and not dangling from the middle of the ceiling. At the sides of the dresser, at the desk, at the reading table, these are a few suggestions. Where there is electricity, outlets should be provided for electric fans, the vacuum cleaner and so on, all of which will be discussed in a future article.

Pictures in the bedrooms should be of simple and wholesome topics and should avoid anything of the sombre or heavy, either in subject matter or presentation. Oils and etchings are usually in this class. Water colors are suitable, but just a couple are enough. Mirrors with a picture in the upper part of the frame are both decorative and useful.

Colored window curtains are often desired to modify the light or carry out a decorative effect. Curtains in one of the yellow tones will enliven a dreary or cold room. A cool green or soft blue or lavender blue will moderate a room where there is too much glare. The color scheme of the room must of course be considered when the choice is made, and it is therefore advisable to decide on the window treatment first. Thin poplin, cretonne, Japanese crepe and many other materials will suggest themselves for this purpose. Cretonnes are particularly good because this material may be used on wicker chairs, table covers, bedspreads and elsewhere about the room, thus providing the interrelation and harmony of aspect always to be sought for. Plain white curtains of voile, scrim, dimity or other washable and simple materials also may be recommended if the color is elsewhere provided.

Curtains may be hung from a rod attached to the window sash, so that when the sash is raised, the curtains go up with it, thus preventing the usual blowing about when the window is open. The upper curtains may be hung in the usual way from a rod attached to the inside of the casing. The curtains may be drawn aside to permit free admittance of air. If a valance is used, it should be fairly narrow for the same reason. If a room is used only for sleeping and there are no other accessories, curtains are unnecessary as opposing strict simplicity, but even then they may moderate the light or serve a purpose of modesty. These are matters of self determination. If the window is narrow, a wide valance with curtains suspended chiefly beyond the outer edge of the window frames will increase its apparent size. If the window is low, the valance may be placed well above it, just overlapping it enough to conceal the upper part of the sash. A vertical stripe emphasizes the height and should be used in low rooms.

A day bed is useful in small single rooms especially for young people who desire to receive their friends or study there. This assumes the character of a couch in the daytime. It may then be covered with a rich rug-like drapery or with lighter cretonne, according to the aspect of the room. Abundant pillows of similar texture make it a cozy and attractive feature.

Where twin beds are used, a light table 18 inches square should be placed between them at the head. On this may be placed a reading lamp, vacuum water bottle and glass, a watch, and such other appointments as are desired.

The dressing table should have triplicate mirrors as a measure of convenience. There should be a clothes tree in every bedroom on which day clothes may properly air over night, or wet ones may dry, instead of the makeshift chair with its disorderly pile of clothes huddled upon it. A Martha Washington sewing table is very serviceable, having small drawers in it for the various needs that suggest themselves. They come in mahogany, but similar and equally useful pieces may be had in wicker, enamel and other materials.

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A ¾-ton speed wagon with rocking "fifth" wheel, used to haul brick

Effective Use of Trailers for Hauling Brick

By Donald McLeod Lay

SEVERAL thorough tests of the possibilities of the trailer in hauling brick were made recently by a large brick manufacturing firm of Chicago, and the results are of particular interest, not only because of the accuracy and reliability of the records, but also because the statistics bring out forcibly the superiority of the trailer with the truck over horse-drawn wagons.

A ¾-ton truck with a fifth-wheel semi-trailer was used, the latter being equipped with a brick-wagon bed. The trailer was loaded at one of the company's yards with 1,000 brick. The truck and trailer then proceeded to a construction job, where the brick was unloaded. The trucktrailer unit next went on to another yard of the company, loading 800 brick and 100 pounds of mortar color. The truck and trailer then returned to the yard where it had started, taking on 550 additional brick, or 1,350 in all, which, with the 100 pounds of color made a total load of 8,540 pounds. Starting out again, the 550 brick were delivered at a building job and the remainder of the load taken to another job. The empty truck and trailer then returned to the yard from which the start had been made, arriving there at 5.10 P. M.

As the first loading had been begun at a little after one o'clock, the work had been accomplished in half a day, or in a trip of approximately four hours, including loading and unloading. To have done the same work a team would have required a day and a half, taking for granted that there would be no delays.

A Speed Test.—During the trip a speed test of the truck and trailer with their load of over three tons was made outside the city limits, on a smooth road. A rate of thirty miles an hour was easily maintained. In spite of this high rate of speed there was no chipping of the bricks, thanks to the efficiency of the springs of the trailer. In fact, the chiping of the brick during the whole trip was less than that which takes place when teams are used, for

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Editorial

America Face to Face With a Crisis

THE world has had a great deal of trouble these last few years and the builder has by no means escaped his full share. During the war when practically all private building operations were stopped, patriotism stilled any tendency to complain. After hostilities ceased, every builder looked forward to an extended period of great building activity and prosperity—and rightly so. But this boom was nipped in the bud as it were, almost killed by a combination of maladies—transportation indigestion, high price fever, anaemic money market, low labor production, etc. It really is surprising that even the present amount of building has been carried on. But the industry is seriously affected, and today the "doctors" are frantically looking for a remedy. Many "cure-alls" have been proclaimed, but we doubt if there is any single cure. There are, however, certain remedial measures which will surely stimulate building. The shortage is most acute where housing is concerned, hence, methods to stimulate the erection of residence buildings should be given prime consideration.

Out of all the conferences, studies, investigations, etc., certain well defined facts have developed. It must be kept in mind that building involves many things besides the laying of brick and framing of timbers. It has become a complex industry. Before actual construction work on any building can be started, the operation must first be financed. Therefore, if there were no other obstacle in the way of an active resumption of building operations than a lack of mortgage money, this in itself would seriously retard building.

After satisfactory financial arrangements have been made, a steady supply of the materials necessary must be assured. Inadequate transportation facilities have seriously interfered with a free and adequate supply of building materials. This has resulted directly in higher prices at the source of supply, since inability to ship means decreased production, and the percentage of overhead which must be added to the net cost of production always increases with a decrease in production, and is minimum under conditions of maximum production. A further increase in cost must also be borne by the builder, and ultimately by the owner, since the dealer fortunate enough to be able to supply materials when a shortage exists, exacts for himself a premium.

Adequate skilled and unskilled labor, rendering reasonable service, must be available. Finally, unless the building can be constructed at a cost-making price which makes it a *safe* and *economic* investment, it is not sound business policy to produce it. This is exactly the condition we are in today.

IN order to provide a freer money market legislation should be passed to exempt the income of money invested in mortgages from the operation of all income tax laws. This requires the action of Congress, and, where a state tax is in force, of the State legislature also. Every builder should at once get in touch with his Congressman and the Senators representing his state and impress upon them the importance of this action. Whether this exemption should apply to incomes from all mortgages or to those for new construction, or on mortgages on new residence buildings only, is a matter requiring careful consideration. Economies in Federal administration could to some extent be made to balance the reduction in the receipts of the national treasury which such action would cause. When tax exempt securities can be purchased yielding returns of over 6 per cent., it is easy to see why money is not being invested in mortgages, which while yielding 6 per cent. gross, yield only the following net returns, after the Federal income tax has been deducted: 5 1/3 per cent. on an income of $10,000; 5 per cent. on $20,000; 4¾ per cent. on $30,000; 4½ per cent. on $40,000; 4⅛ per cent. on $50,000; 2⅝ per cent. on $100,000, and 1¾ per cent. on $500,000. The removal of the income tax will place mortgages on a par with other gilt edge securities, a position it held prior to the operation of the present system of taxation.

An improvement in transportation is already apparent. The Associaiton of Railroad Executives is making an earnest effort to increase both the average rate of travel of a freight car and its average load per trip. This will have the same effect as a material increase in the number of cars. As new equipment is received further improvement will occur. Committees representing the Construction Industry are being formed at various centers for the purpose of acting directly with the Association of Railroad Executives in securing prompt movement of construction materials essential to public interest. More building and better transportation will permit in-

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creased output at the factories manufacturing building products, which in turn will make possible a decrease in prices. Increased output on the part of labor, while not causing any decrease in the wage scale, will decrease the total labor cost on the job.

A further stimulant which should be given, and one which will provide increased housing facilities, is exemption from local taxation for a period of from five to ten years of all new residence buildings. The land should be taxed the same as before, therefore the municipality will not suffer any *decrease* in its income due to this measure. What will occur will be a postponement of the receipt of the increased taxes due to new residence construction. This is in effect an indirect subsidy, and while in normal times, such a proposal would be given scant consideration, yet in this emergency it is probably the most powerful stimulant which it is possible to administer to home building.

Procrastination in home building has resulted from a belief by the public that prices would come down. We believe they will, but just when and how much is problematical. Certainly we will never reach pre-war prices. Therefore, granting that the value of the home built today will be less five or ten years from now, the owner will have by then been compensated for this loss, in that he has been exempted from local taxes on the value of the building.

AFTER a thorough and careful study BUILDING AGE presents the following program as one which will go far toward bringing about a resumption of normal building activity:

(1) Exemption of interest from mortgages—at least on all new residence buildings—from all state and federal income taxation.

(2) Stimulated effort to provide adequate transportation of all building materials. If necessary placing materials to be used in the construction of residence buildings on a priority list. The further formation and active co-operation of committees representing the construction industry and the Association of Railroad Executives to accomplish a free flow of materials needed in the construction of essential buildings.

(3) Efficient planning and execution of the work so as to effect every possible economy.

(4) Standardization of building products wherever possible, thus eliminating unusual sizes and styles, reducing the number of styles produced and thereby effecting a reduction in the cost of production, which should be reflected in lower prices.

(5) Increased production on the part of both skilled and unskilled labor. Where union labor is employed, and agreements are in effect, the renewal of all agreements upon expiration for a period of at least one year, without demands for increased wages on the part of labor. A reversal of the policy demanding continued upward revisions of wage scales in return for decreased production.

(6) Exemption of new residence construction from local taxation for a period of from five to ten years.

(7) A postponement in the construction of non-essential buildings in all localities where the housing shortage is extremely acute, if the construction of such non-essential buildings would interfere with the construction of residences.

This program should have the active support of every person engaged in the construction industry. Put into effect, such a program should bring about a very marked improvement. If nothing is done to effect a resumption of building activities, and the condition is further ignored, this country will face the greatest crisis of its history within the next year. Our governmental representatives in office have a great public duty to perform. Will they measure up to it? The New York State legislature convened in special session at the call of Governor Smith, September 20, to consider the housing crisis. At this writing the results of this session are not known. They should be of such a nature as to effect immediate and practical aid. New Jersey has already passed laws making possible the exemption of new residence construction from local taxation. Every state legislature and the national Congress must do their part or be considered derelict in the performance of their public obligations. Every person engaged in the construction industry, the second largest industry in the country, must cease to remain passive, and become active in impressing upon his representative that the time has come to quit talking and *do* something.

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Lumber Market Review

Light Domestic and Reduced Foreign Buying Held Responsible for Lower Prices

THE continued inactivity in buying has had the effect of breaking the lumber market during September, particularly with reference to hardwoods, which has been weakening for several weeks. In most instances the decline in prices more than equalled the additional freight charges which had been added to the delivered cost when rates were advanced on August 26. The close of September brought little change in the situation. The market is still very unsteady with regard to all woods, except possibly cypress.

Although there have been many dealers who thought prices would drop to a more reasonable buying level, the market break as a whole came rather unexpectedly and just at a time when conditions were approaching stabilization. Even manufacturers and wholesalers now admit the market is weak and the softening will doubtless continue for several weeks, especially in the woods which had risen to formerly unheard of levels. The battle for supremacy to determine who should absorb the additional freight charges has apparently been won by the dealers and consumers of lumber. Incidentally there has been a marked weakening in other departments of the building material market. The general tendency toward lower price levels has certainly reached the building material industry. There is no cause for alarm, however, for the actual need for materials is known to be far in excess of the country's ability to produce, and as soon as business conditions settle down and building is resumed—which must occur sooner or later—there will be a good, healthy demand for lumber and the market will be satisfactory to all branches of the trade.

Despite the claims of railroads that the freight car situation is improving, little change has been noted in the larger lumber-producing sections. In the south the yellow pine mills report they could ship twice as much lumber as they have cars to ship with. About the same situation prevails among the Douglas fir and redwood mills of the Pacific coast. For the purpose of bringing about speedy relief, the car service committee of the American Railroad Association has sent two inspectors to the southern pine belt to make a thorough investigation into the car situation, and within another month some improvement is looked for in that locality.

Although lumber mills in every section have been curtailing production for the past two months, stocks are accumulating very rapidly at producing points. Knowledge of this fact among the retail trade has been largely responsible for the break in the market. A free flow of shipments, however, would soon reduce the surplus of mill stocks.

Immediately after freight rates were increased the producers and wholesalers issued new price lists showing the additional freight charges had been added to delivered costs. New business grew less and less, however, until prices began to drop, and the delivered price today is practically the same as it was in the middle of August, the additional freight being absorbed before the material reaches the point of consumption.

Building material dealers will be interested to learn that the export demand for American lumber has fallen off considerably, due to the low rate of exchange, and Europe and South America are turning to Baltic and Scandinavian woods. Europe needs lumber very badly, but it is not willing to buy American woods when it is compelled to put up an equivalent of $1.50 to $1.75 to buy a dollar's worth of material. Under such conditions American lumber producers for the remainder of 1920 will have to look to the domestic trade for business.

An important factor which contributed to the break in the hardwood market was the slowing up of the automobile industry. Comparatively speaking, this industry has been entirely out of the market for several weeks, and normally at this period of the year it requires a large proportion of the hardwood lumber produced. Other industries using lumber have cut their purchases to rock bottom, with the exception of the railroads, which continue to buy heavily of timbers, dimension stock, ties and car material.

About the only retail yard business reported during the past two weeks has come from the more prosperous agricultural communities of the Middle West. In the cities and large industrial centres building activity is still being curtailed and the buying of lumber is exceedingly light.

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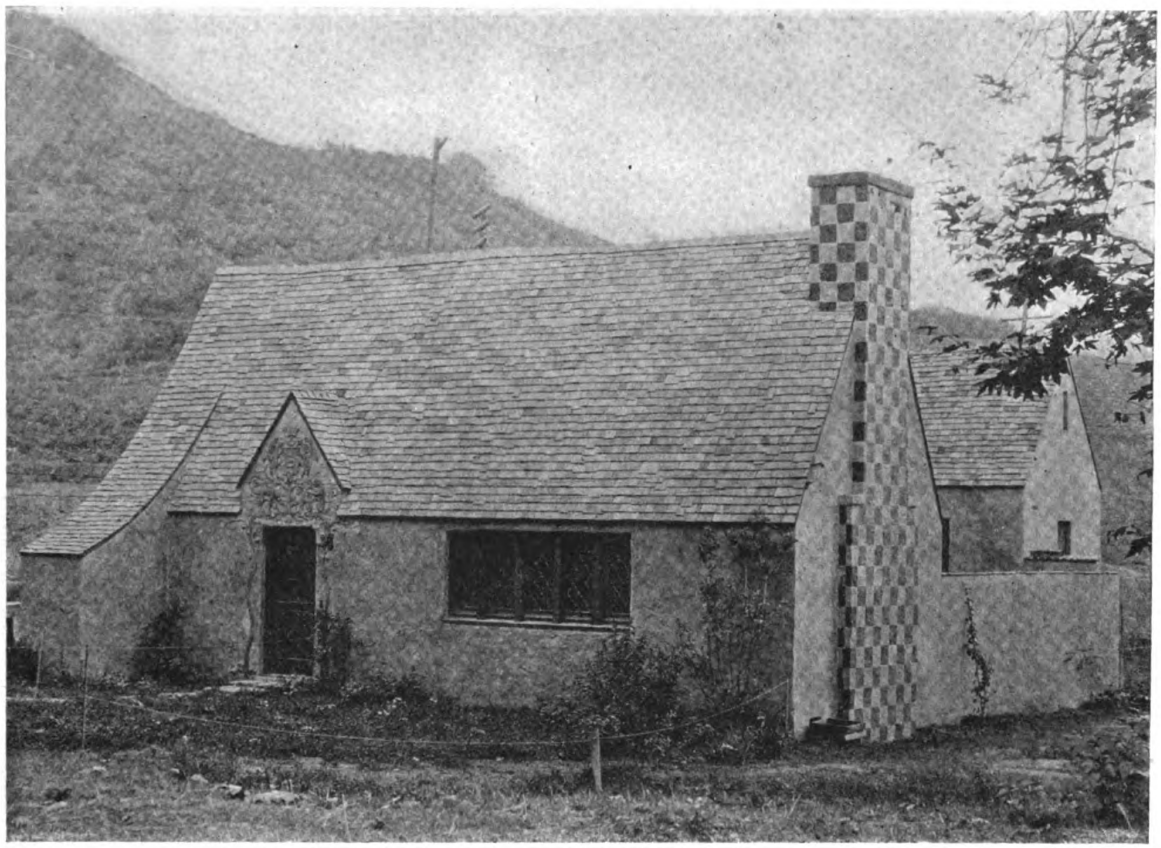

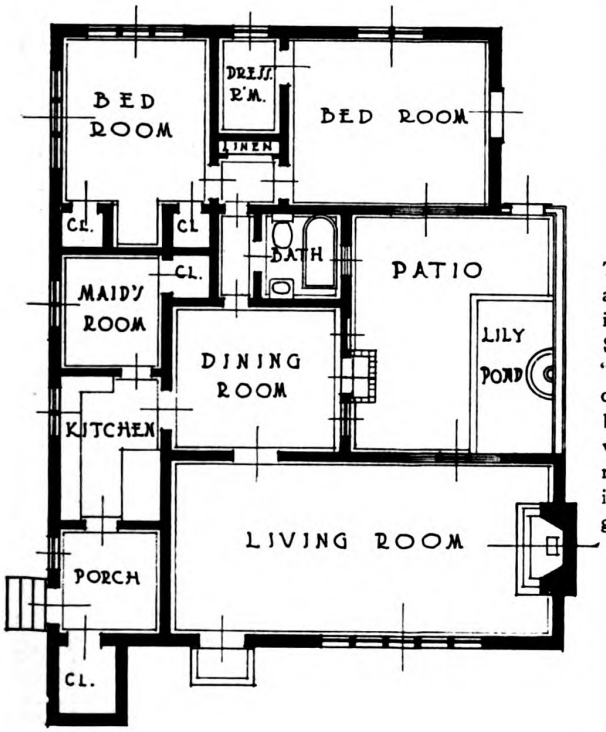

HOUSE IN LOS ANGELES, CAL.
Walter S. Davis, Architect

The inspiration for the design of the house illustrated above was furnished the architect during his services in the Camouflage Section of the Army Engineers' School in France, by the charming cottages of the "Côte D'Or." A true conception of the picturesqueness of this cottage is not possible from a photograph in black and white. The shingles on the roof were stained various colors, thus producing a beautiful variation of many shades, yet all in harmony. The stucco overcoating of the walls is also tinted. The planting of the grounds lends added charm to this picturesque setting

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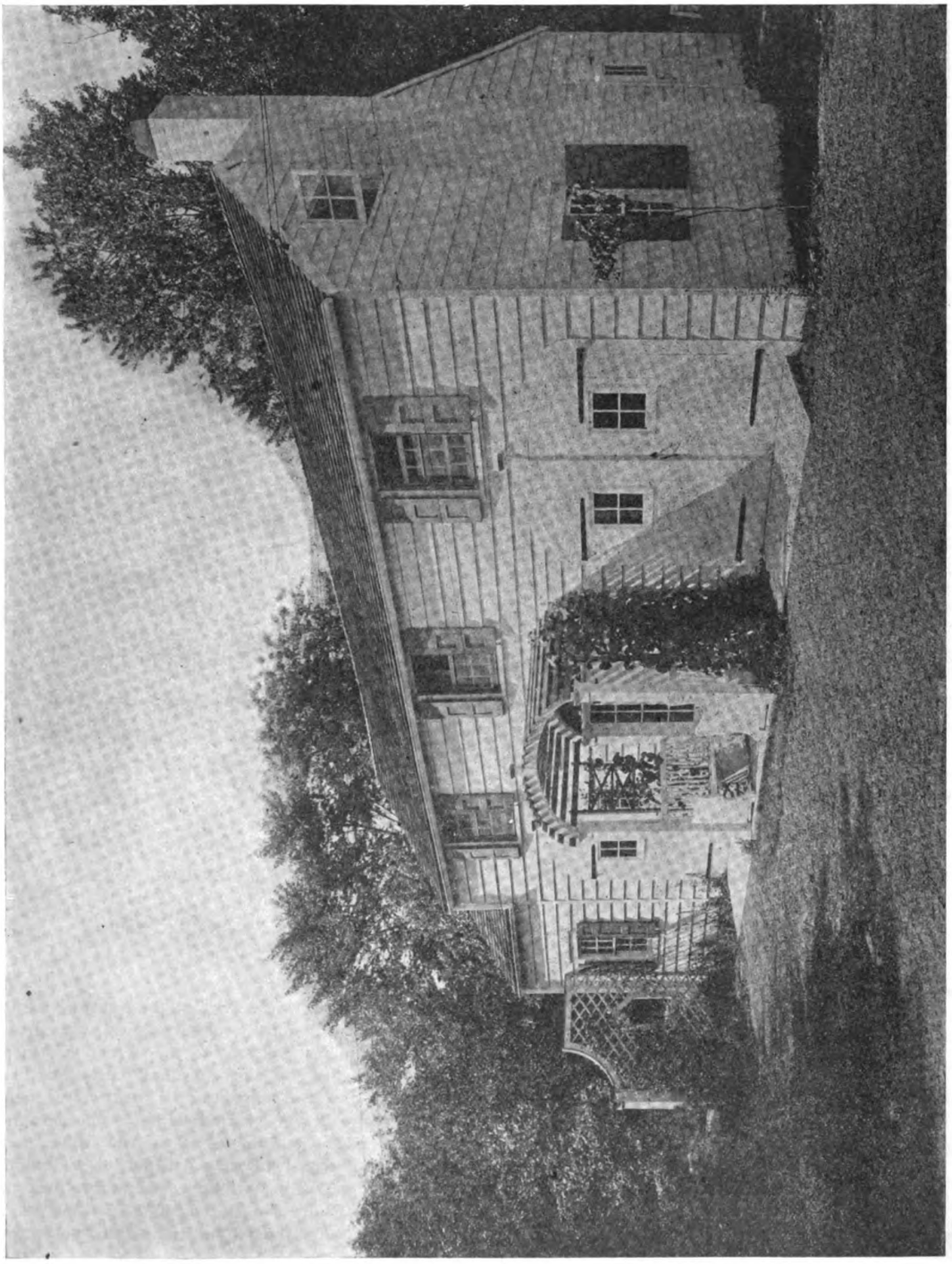

Chauffeur's cottage and garage of Edward C. Gude, Esq., White Plains, N. Y.
William Lawrence Bottomley, Architect

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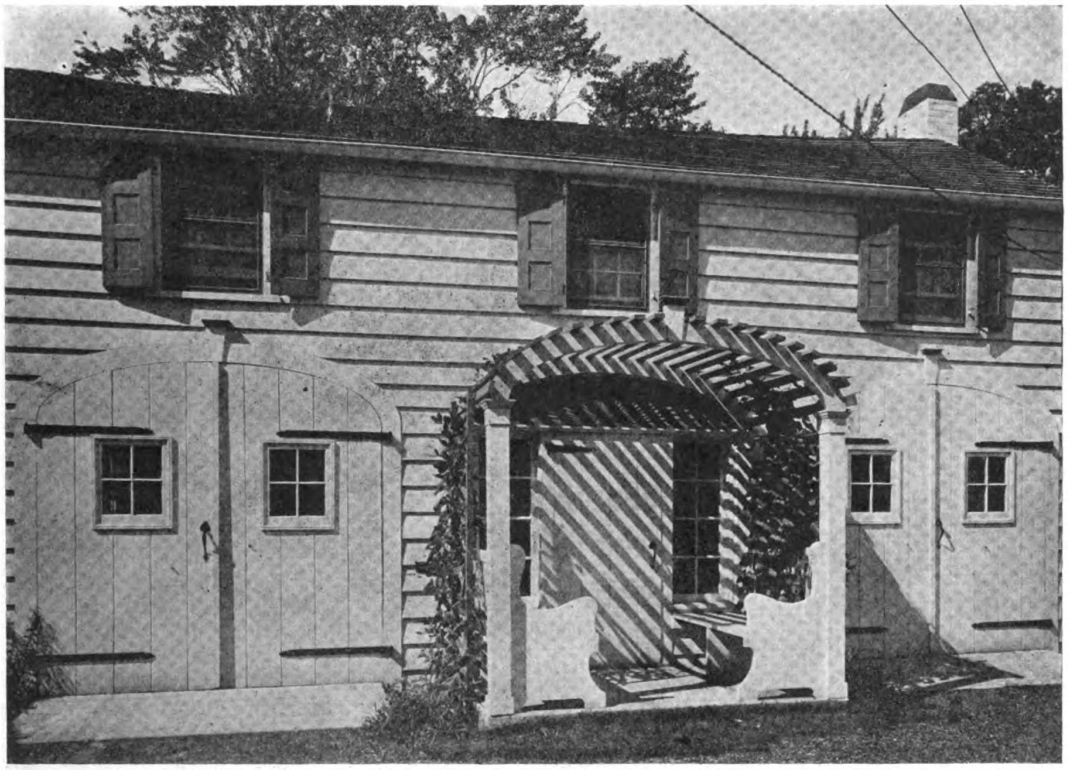

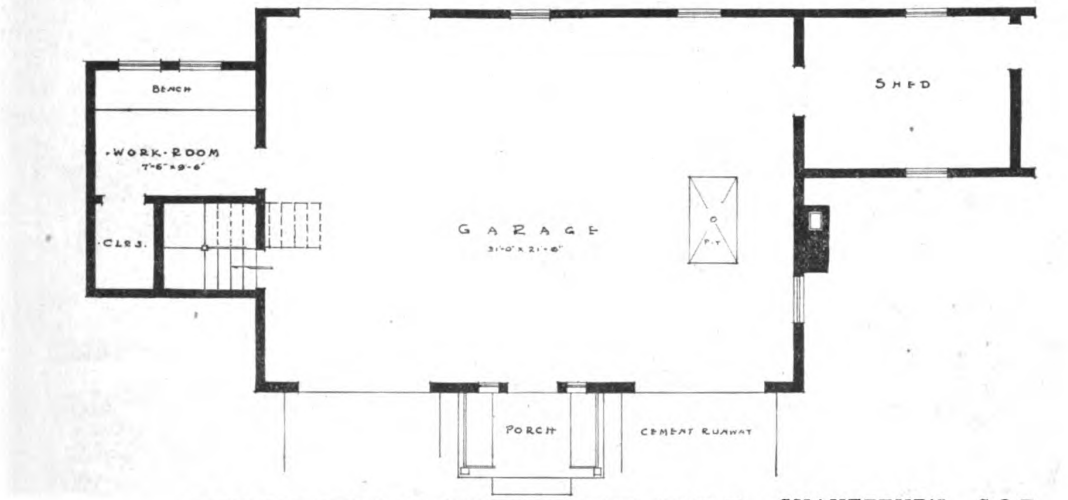

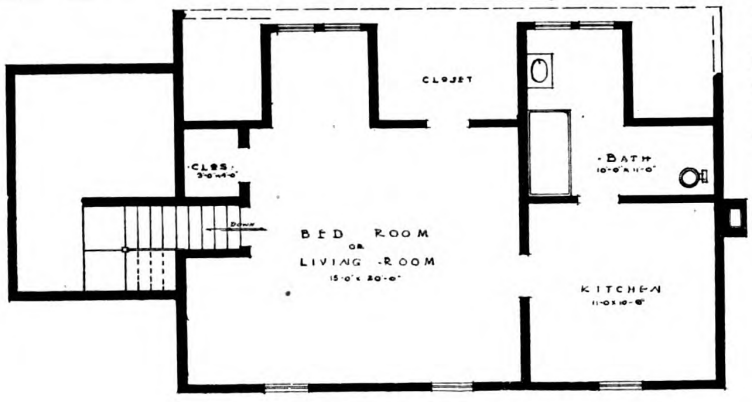

CHAUFFEUR'S COTTAGE AND GARAGE FOR EDWARD C. GUDE, WHITE PLAINS, N. Y.

William Lawrence Bottomley, Architect.

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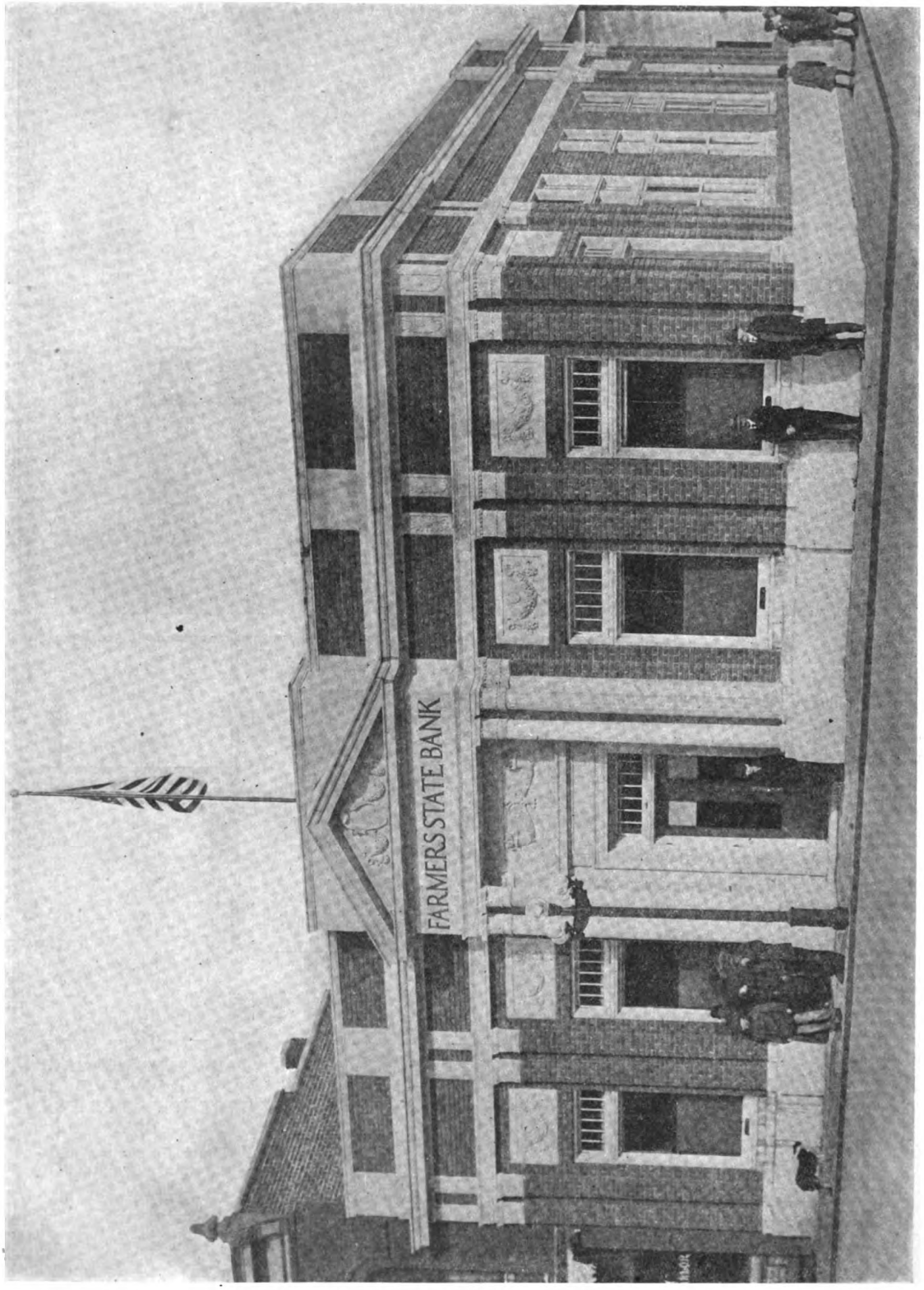

Farmers State Bank, Scribner, Nebraska.—A. Moorman & Co., Architects and Builders

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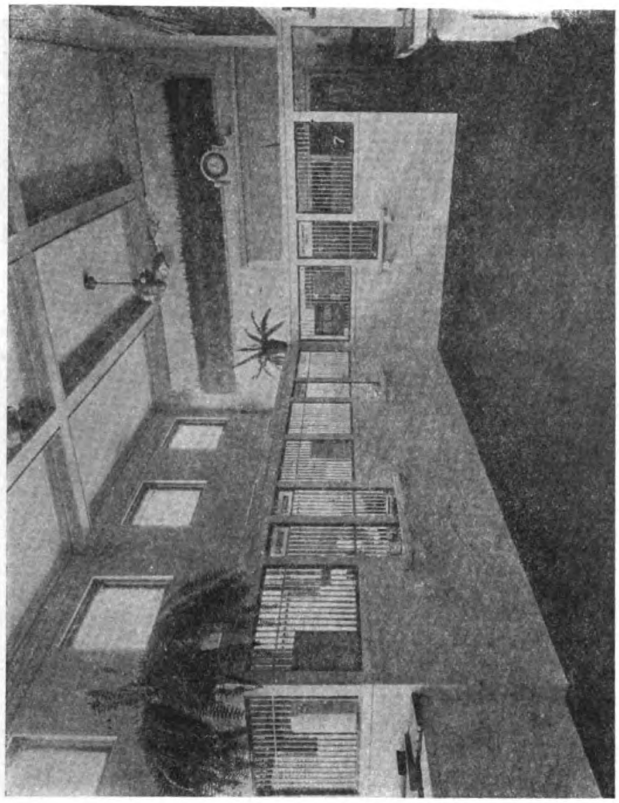

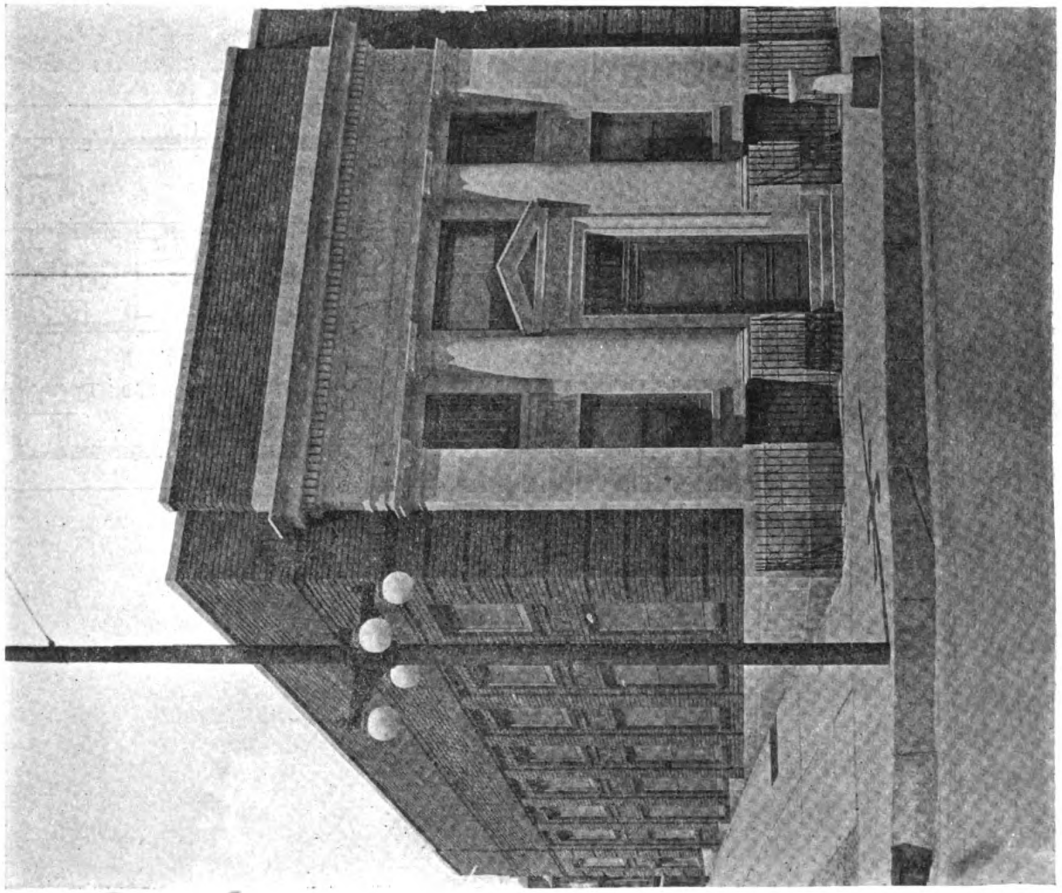

FIRST NATIONAL BANK, GILBERT, MINN.
A. Moorman & Co., Architects and Builders

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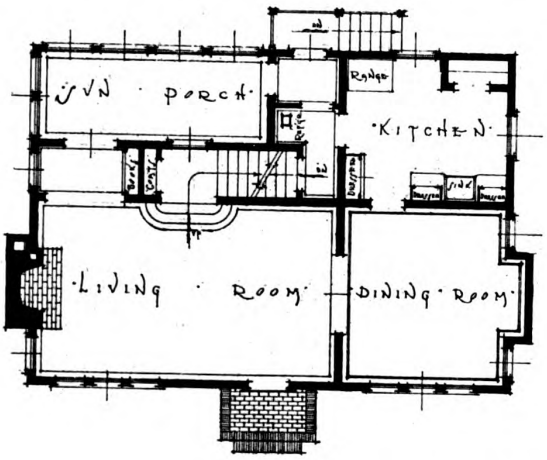

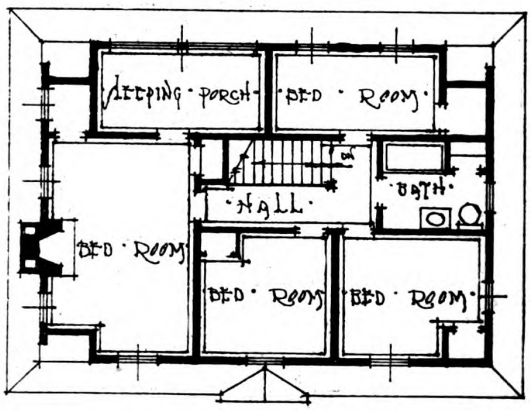

THE FELLOWS HOUSE, MAPLEWOOD, N. J.
K. W. Dalzell, Architect

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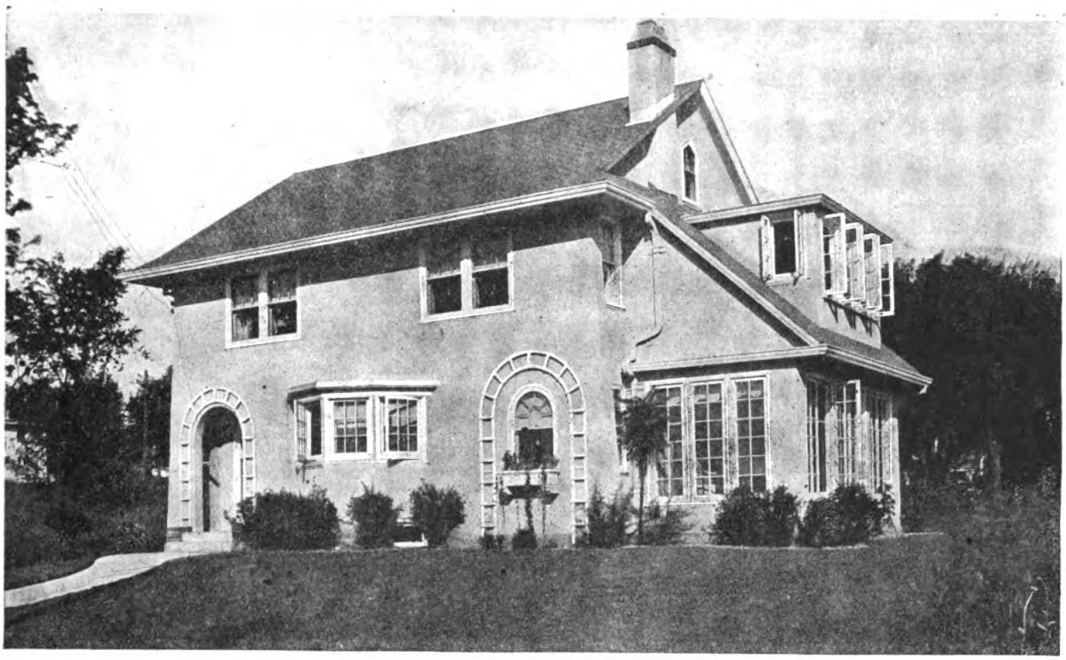

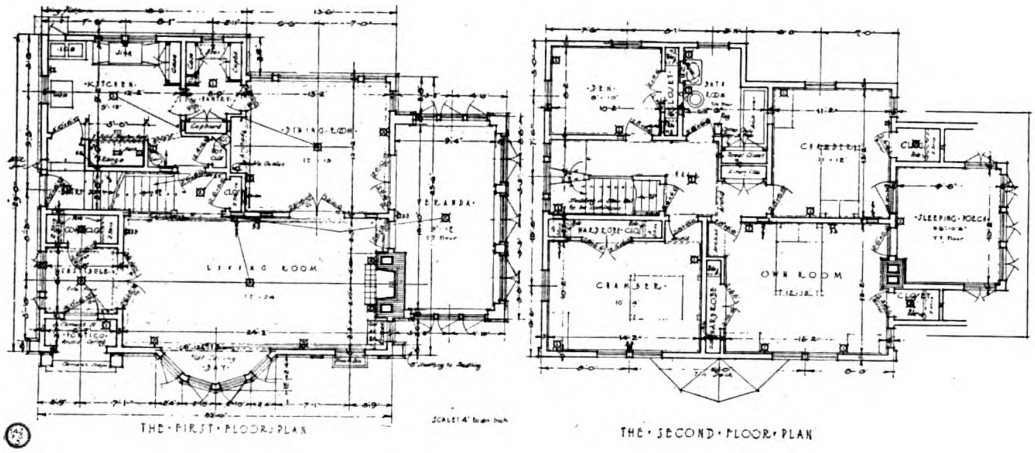

HOUSE OF FREDERIC GODFREY, WAUWETOCA, WIS.
Clare C. Hosmer, Architect

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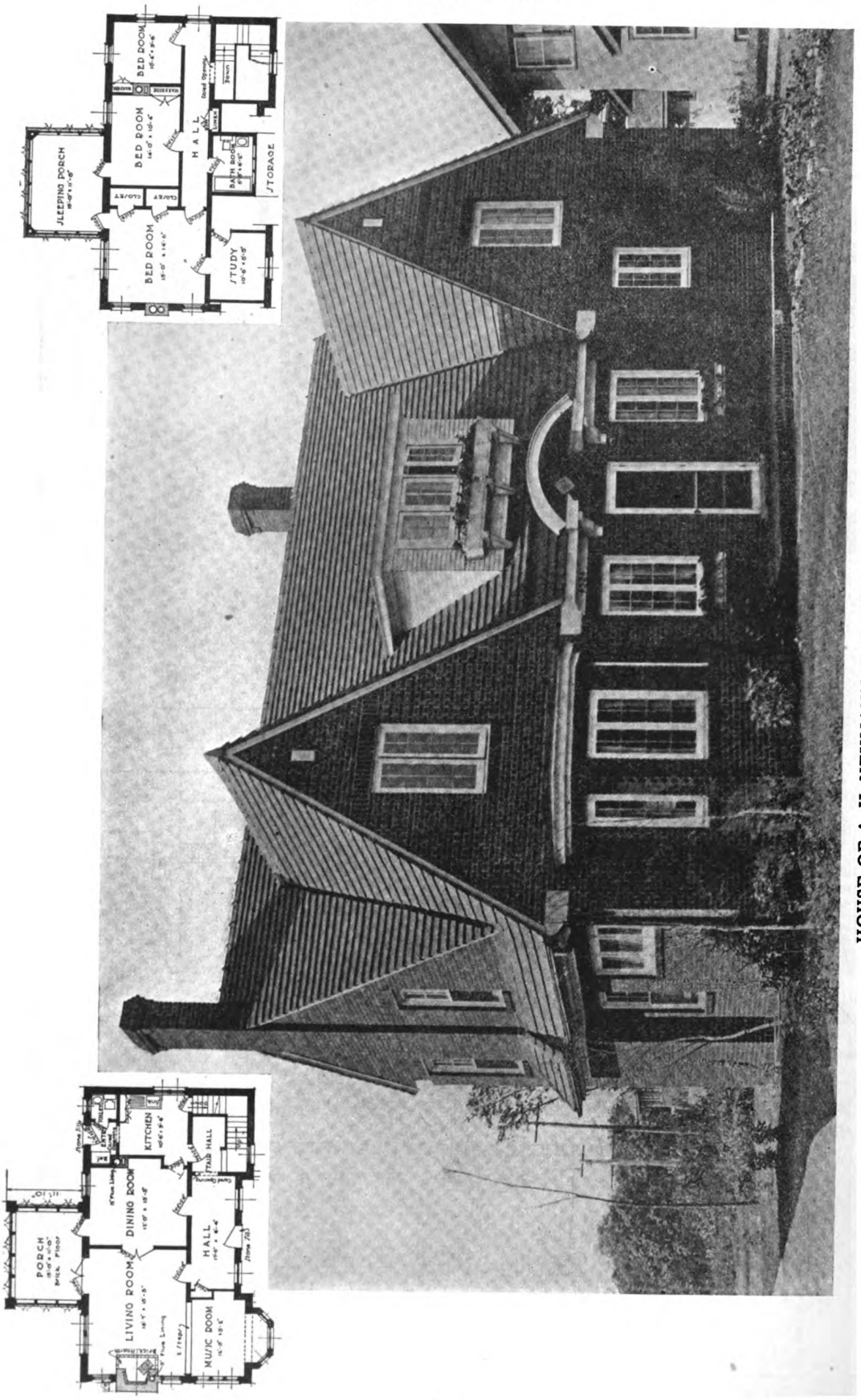

HOUSE OF A. H. NEUMANN, DES MOINES, IOWA
Proudfoot, Bird & Rawson, Architects

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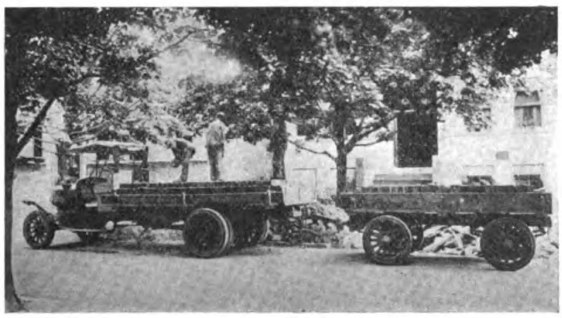
Trailers

(*Continued from page 39.*)

brick wagons are usually built without springs. The total mileage covered in a half day was 36 miles and 4¼ gallons of gasoline were consumed.

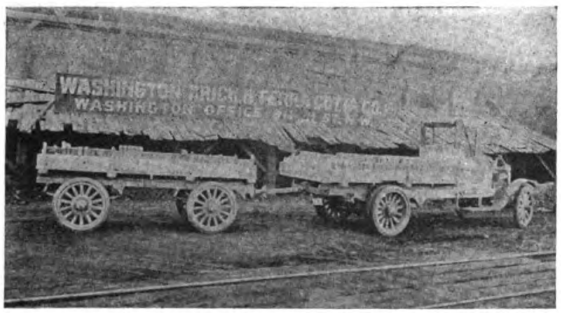
On another occasion the same truck and trailer,



Delivering the goods by truck and trailer

on a trip covering three hours and a quarter and including several stops, hauled a load of 1,350 brick on a gasoline consumption of 3¾ gallons, with a total mileage of 38½ miles. On part of this trip 1,250 enameled brick were transported. No chipping resulted, although these brick, as readers familiar with brick manufacturing know, have a delicate, glassy surface, which makes them extremely subject to injury in transportation, except under the most favorable conditions. The loss due to chipping on a similar trip with a horse team and wagon ran up to 22 per cent.

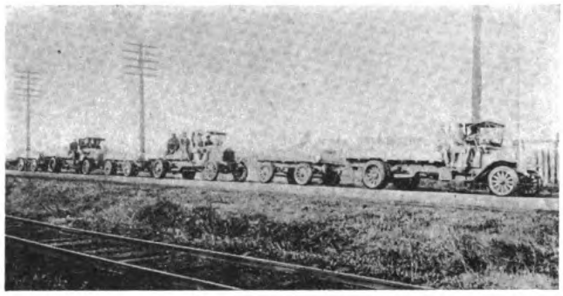
Over Country Roads.—A striking test of the truck and trailer was made over country roads. The car and trailer combination was run from the company's yard to Naperville, Ill., where the unit was used for transporting a load of brick to Lyle, a distance of about four miles. During the afternoon the outfit hauled 6,780 brick, in contrast to a team's haul of 2,000 brick for a complete day's work. A remarkable feature of this performance was that



Another equipment giving good service

there are very heavy hills between Naperville and Lyle; yet the approximate time of each trip was only fifteen minutes. Had a system of three trailers been used, that is, one being loaded and another unloaded while the third was in transit with the truck, the entire carload of 16,000 brick could have been disposed of during the afternoon without difficulty.

Initial Investment Small.—Not only is the cost of haulage greatly reduced when done by trailer in conjunction with automobile, truck or tractor, but the initial investment put into the trailer is considerably less, as a trailer costs only one-fourth to one-third the price of a motor truck of the same load capacity. Although the cost of a one-ton chassis averages about $2,000, the price of a trailer of the same load capacity is, in marked contrast, only from $250 to $650. A two-ton truck averages about $3,000,



Operating a train of trucks and trailers

whereas a trailer or semi-trailer of the same capacity will cost not more than $550 to $1,000. Similarly, a five-ton truck will cost about $5,000, as against $700 to $1,500 for a trailer or semi-trailer of the same load capacity.

The upkeep charge for the trailer is also remarkably small. The low expense for tires has been referred to in a previous article. It is worth mentioning that in most States the law does not require the registration of trailers and therefore no registration fee is necessary; even where registration is called for, the fee is usually only nominal.

Where trailers are used with trucks an increase of 25 per cent. on the premium for collision and liability insurance for the truck is charged by the insurance companies, but this is a small item. The personal property tax on the trailer is of course only one-fourth to one-third that which it would be on a truck of equal load capacity. Nor are expensive garage facilities necessary, for trailers may be kept under an open shed, or even left outdoors if necessary, if properly protected with waterproof covers.

The experience of a firm in the building material line, which has a fleet of ten trailers, is of interest as showing the low cost of repairs. Although

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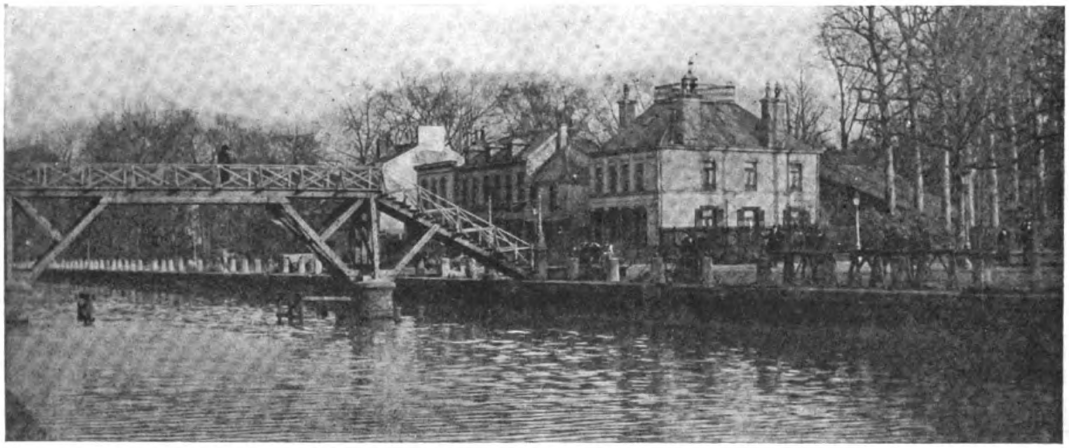
these ten trailers are in constant use, the total cost for repairs for a period of about thirteen months and a half totaled only $16.27 per trailer; in other words, less than $1.20 for each trailer per month. However, it should be noted that these trailers are used under exceptionally favorable road conditions.

Trailers are proving themselves so valuable an adjunct in cutting down transportation costs in the building and construction industries that before long they will be considered an indispensable part of the motor equipment employed by contractors and builders.



Until the Belgian Government is able to replace the beautiful stone bridges blown up by the Germans, temporary footbridges like those shown in the illustration will serve the needs of the people of Lillie
The reopening of the canal on which the city is situated, which was also wrecked by the retiring Teutons, has restored traffic through the inland waterways to pre-war normality

Some Problems in Rebuilding a Martyred Nation

REBUILDING devastated Belgium and northern France entails far different processes than similar operations staged in this country connote. Drawing plans, and excavating for foundations are not the initial steps in the work of reconstructing the martyred nation. Instead, excavating must be done to produce the materials out of which to build, and to clear the site of the debris and ruin heaped there by five years of continuous bombardment and invasion.

To unaccustomed American eyes the necessary preliminaries of clearing the ground of the vast chaotic accumulations of rock, barbed wire, masonry and clutter of every description and stage of decay would seem a hopeless task. But the Belgians attack it gallantly, women and children aiding in the salvaging of whatever presents the slightest prospect of future utility.

Nor do the difficulties of rebuilding end with the preparation of the locations for the new or restored structures. When the workmen arrive to begin the actual construction of the devastated villages their first task must be the provision of shelter for themselves. This, in a country where every available cellar, shell-hole, and dug-out has been avidly seized upon by the returned refugees as a habitation, is no easy matter. As a result, the carpenters, masons and artisans employed to conduct the building operations on a wholesale scale are compelled to sleep under the open skies until haphazard structures can be put up for their accommodation.

Consequently, though rebuilding the devastated area of Belgium and northern France is not within the province nor the policy of the American Red Cross, the need of temporary shelters for the workmen has been so imperative that it has already erect-

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ed at Ypres a large barracks, equipped with wash room, canteen and club rooms, as well as dormitories, while at Gheluvelt another such edifice is now under way. This latter is a permanent structure, built of brick, which at a later day will serve as a school and local dispensary for the community. As yet the Gheluvelt barracks is but half completed, but during the summer months it will be used as a workmen's club, and will be in readiness for the full scope of its work when the intensive construction work begins, a few months thereafter.

Thousands of artisans are expected to be mustered for the wholesale rebuilding of the cities of the martyred nation in the near future, and it is hoped that before the dawn of another year numerous government establishments, modeled after those initiated by the American Red Cross will be ready to receive these armies of reconstruction.

Churches, as well as cities, will be restored to the historic prestige of their storied past as fast as the work of clearing away the debris can be carried on. Already many of these are arising, Phoenix-like from their ruins, and not a few owe their reconstruction to the zeal and devotion of the parish priests.



Churches were destroyed wholesale in the martyrdom of Belgium. As a result one church frequently serves today for the people of a dozen ruined villages.

The ingenuity of Abbe Moestart has rebuilt at Staden, Belgium, a church within a church. With corrugated iron from the battlefield shelters, he improvised a roof against one of the remaining walls of the old church and every Sunday steady streams of people plod over the battered roads in the direction of the church where a little cracked bell, dug out of the debris, announces service.

In the picture Abbe Moestart is seen here showing Capt. C. O. Dennewitz, an American Red Cross worker of Gary, Ind., how he turned the ruins into a house of worship.



This picture is typical of the preliminary stages in building construction in Belgium and Northern France. Before any of the usual steps can be taken, miniature mountains of debris and ruin must be removed.

The illustration shows a returned refugee in Gheluvelt attacking undauntedly the problem of clearing the ground on the site of his former home, preparatory to rebuilding.

For if the church spires of Belgium and northern France were the favorite targets of the German guns their tottering walls today inspire in their clergy a passion for their resurrection that can be satisfied only by accomplishing the seemingly impossible.

A notable instance of this kind is offered in the case of Staden, Belgium, where the ingenuity of the Abbe Moestart has caused a church to rise within a church. Masonry and mortar from the crumbling walls of the former edifice were employed under the good father's direction in rebuilding the little chapel, with sheets of corrugated iron from the trenches serving as a roof. The chapel was pronounced perfect when, as a finishing touch, a little cracked bell, dug out of the chaotic heap, was hung in the top, and restored to its ancient use of calling villagers to prayer.

In the architecture of the Belgian cities beauty goes hand in hand with utility, and until the government is able to replace civic structures on a scale satisfying to the artistic as well as to the practical requirements of the citizens, the bridges destroyed by the Germans will not be permanently replaced. Temporary structures, according to the Belgian viewpoint, are better than permanent eye sores. Their

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immediate requirements, therefore, are being met by such conveniences.

When the German troops evacuated Lille, after four years occupation, they blew up all the bridges and wrecked the little canal on which the historic city is located. The ruined bridges were of stone, in the low, wide arched design which harmonizes so well with the general architectural scheme of the Belgian cities. Instead of replacing these with permanent structures of less noble design and workmanship, the inhabitants of Lille are contenting themselves with simple and inexpensive footbridges.

Re-opening the canal was one of the first civic enterprises undertaken after the retreat of the Germans, and the first boats to pass through the restored waterway were those of the American Red Cross, carrying supplies to the villagers and farmers of the ruined country beyond.

Opportunities for Progressive Builders

By Robert F. Salade

IN practically all of the cities and the larger towns of the United States there is an unusual demand for houses, flats and apartments. During the last five years only a comparatively few individual homes and apartment houses have been built, due to conditions brought about by the great World War, and even at the present time an insufficient number of homes and multi-family houses are being erected to meet the needs of the people. Due to the return of millions of American soldiers, thousands of delayed marriages are taking place, causing, of course, a constantly increasing demand for new homes. But, in many cases, the homes are not to be had "for love or money."

The housing problem is one of the most serious which has ever confronted the people of the United States. The ways and means must be found to furnish every decent American family with a modern, comfortable home. The "tumble-down shack," and the dilapidated tenement house are things of the past. The narrow courts and alleys of the great cities, with rows of old houses closely facing each other, are further evils which soon must be eliminated. In these days the American people want the right kind of dwellings and they are going to have them, cost what it may.

The American builders are in a position to solve the housing problem and they are going to do it!

In addition to erecting thousands of entirely new homes the builders will remodel hundreds of old houses, and they will also change over many large houses into apartments. While it is true that a great deal of this class of reconstruction work has been done by the builders during the last few years, and while it is also a fact that much of this work is being done at the present time, a far greater amount of this same class of reconstruction work will have to be accomplished in the future.

The scarcity of homes in the towns and cities has been responsible for a great deal of remodeling work and for many changes and improvements in old property, which, under normal conditions, may not have been attended to. Before the recent war it was common for one to see "To Let," or "For Sale" signs on old houses badly in need of repairs, which, perhaps, had been standing vacant for long periods of time. Not many of such buildings are now to be seen, but there are some standing in every town and city, and the progressive builder should have no difficulty in persuading the owners to have the property remodeled or at least repaired.

One progressive builder is following a creative business plan which is proving very fruitful in obtaining orders for remodeling homes, repairs, additions and improvement work in general. This plan is simple enough: The builder every day reads over the real estate transfer columns of the newspapers and takes note of the name and address of each party who has bought property. The property in question may be a new home, an old home, a business house, a factory or any other kind of building, and the builder figures that in most instances the building is in need of at least slight repairs. With this in mind the builder first "looks over" the exterior of the property that has just changed owners, and his eye is quick in noting things which should be

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repaired. Frequently, after having made a "close-up" inspection of the property, the builder recognizes the possibilities for remodeling or enlarging the building. The next step leads to a personal interview with the new owner, and the builder then offers his ideas in a clear and convincing way.

Recently a Mr. Williams bought a brick dwelling located on a main street of a certain town for $7,000. The house was only about three years old and it had been kept in an excellent condition. When our friend, the builder, glanced over the front of the structure he could find nothing that seemed to be in need of repairs. He would have suggested an inclosed porch to the new owner had it not been for the fact that the house already possessed one. What, then, could be suggested in the way of changes or improvements? The question was answered after the builder had seen the back part of the house. It was a "straight-up-and-down" back, with no bay window or summer kitchen. Instantly our friend scented business. A few days later he had a talk wtih the owner; explained how the second-story back room could be enlarged by the addition of a bay window, and also boosted the project of a good sized summer kitchen, with the two side walls of brick and the front of glass and wood partitions.

Naturally, the new owner was proud of his recent purchase and was interested in any suggestion which might mean a more useful home. The builder was soon awarded the contract for constructing the bay window and kitchen, and it is safe to say that he never would have received the order had he not gone after it. One of the strongest points in his selling argument was to the effect that with the addition of the summer kitchen the regular kitchen of the house could be used as a breakfast room.

Never before in the history of the United States has there been such a large number of home buyers as during the last two years or so. The "Own Your Home" slogan has been accomplishing good results, but the principal reason why people are buying homes now is because it is simply a case of buying the home one lives in before some real estate "profiteer" buys the home over one's head. Be that as it may, the people in all parts of the country are becoming home owners—more so than ever before—and this means additional business for the builders. Why? Because whenever a man buys an old house the first thing he thinks about is putting the building in better shape. He may be capable of doing odd jobs of repair work, but seldom is he capable of attending to important repair and remodeling work himself. Often the builder may procure this business merely by asking for it. Here again we must emphasize the need of creative salesmanship. Keep your organization going at full capacity.

(*To be continued*)

Safeguarding Water Supply

(*Continued from page 35*)

tercept the grit, sand any foreign material which the overflow might bring into the basin. The reservoir should be of ample capacity to carry a week's supply, should the purse allow, so that emergency of drought or other causes may be readily met. The dimensions which will meet the demands for the average country property cannot be accurately determined, but a basin 12 ft. x 8 ft. with 4 ft. 6 in. depth of water, or 3,250 gals. capacity, will not be found excessive of cost. It will cost less to provide area than depth and the length can easily be extended should this be found necessary. The reservoir should be carefully housed and protected in similar manner and for the same cause, as the spring, and should be extended so as to provide shelter for pumping equipment.

PRESSURE SYSTEM:

Any point demanding water service which may be situated below the level of the reservoir may be supplied by gravity flow, but in many instances this will not be found possible, in which case an elevated tank, or the pneumatic pressure system will have to be employed. The latter consists of a cylindrical steel tank automatically kept filled and under pressure by a small pump and motor on the same bedplate, controlled by pressure in the tank.

ELEVATED TANK

The elevated tank will require pumping equipment which may vary according to the duty demanded, and cost available.

WINDMILL:

The use of the windmill will be found most economical but most unreliable, and for this reason the common form of pumping equipment will be found much more satisfactory.

HYDRAULIC RAM:

The hydraulic ram has given excellent service; it requires little or no attention, is self contained and of little or no operating expense. It should be housed for protection and safety. This form of pumping, however, can only be employed where there may be an abundance of water, as under ordinary circumstances, only one tenth of the water passing through the ram can be raised to a height ten times that of the fall from the source.

The successful solution of the problem of providing a wholesome and copious water supply system for the country estate, and one which will be found efficient, and may be operated at low cost, will be found to depend upon a close study of existing conditions upon the property, and the most economical means of producing results which shall meet all demands.

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Heating Equipment for the Low-cost House

Steam heating, Gravity and Vapor Systems—I

By Charles L. Hubbard, Heating Engineer

THE systems of steam heating commonly employed are known as "low-pressure," "vapor" and "vacuum." These, however, are merely relative terms, the first applying to pressures ranging from 1 to 5 pounds above atmosphere, the second to lower pressures of 1 to 5 ounces, and the third to any pressure below that of the atmosphere. As the latter systems are simply modifications of low-pressure heating, we will take that as a basis and design a plant for the house considered in previous articles, after which some of the special devices employed in vapor and vacuum systems will be taken up.

Changes in Building Construction.—Practically no changes are required in the building plans of the average dwelling house to adapt it to steam heating. The boiler can be placed anywhere in the basement —wherever most convenient— without reference to a central location, as is necessary in case of furnace heating. The position of the chimney does not matter, provided the flue is of the proper size and the top of the stack extends above the ridge and is well away from other roofs. No thickening of partitions is required and practically any room can be reached and heated without reference to its location. Therefore, the building plans may be carried to completion without change when a system of direct steam heating is to be used.

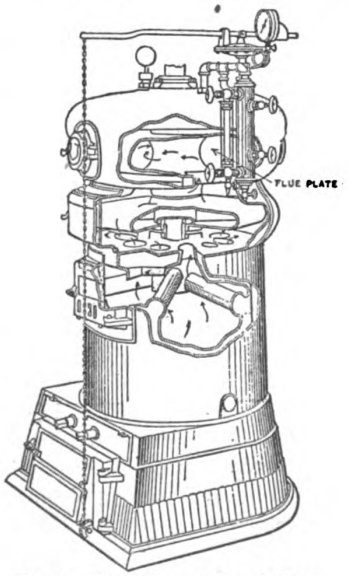

Fig. 1. Round cast iron boiler

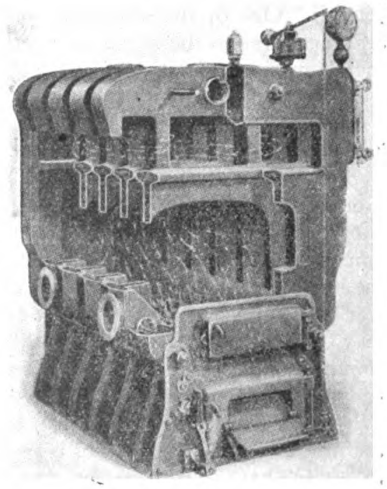

Fig. 2. Sectional boiler

Boiler.—The boilers employed for steam and hot-water heating in dwelling houses are practically the same in principle, the only important difference being the addition of a steam space to the former. For houses of small size, a round cast-iron boiler of the general form shown in Fig. 1 is usually employed. These commonly have fire pots from 15" to 32" in diameter, the exact dimensions varying with different makers; hence, grate areas for standard sizes are best obtained from manufacturers' catalogues. Sectional boilers, of the type shown in Fig. 2, are generally used in larger buildings, where more grate surface is called for. As the combustion is not usually so good in the corner of a rectangular fire pot, it is generally best to employ a round boiler for the smaller sizes.

The method of determining the size of a cast-iron boiler is much the same as for a hot-air furnace, and for standard makes, properly proportionate as to heating surface, is based on the grate area and an assumed rate of combustion. While some boilers, when well cared for, may give a somewhat higher efficiency, it is not well to count on utilizing much more than 7,000 thermal units per pound of coal

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burned for the small and medium sizes. The rate of combustion may be taken about as follows for different grate areas.

RATE OF COMBUSTION FOR CAST-IRON HEATING BOILERS.

Square feet of grate area.	Pounds of coal burned per square feet per hour.
1 to 5	4
6 to 10	5
11 to 15	6
16 to 20	7

The method of determining the size of boiler for a given building is best shown by a practical example.

The heat losses for the building under consideration, as taken from the article on furnace heating (July issue), are as follows:

HEAT LOSSES PER HOUR FROM THE DIFFERENT ROOMS.

	Room	Thermal Units loss per hour.
First Floor	Living Room	17,189
	Hall	2,880
	Dining Room	8,480
	Kitchen	7,160
Second Floor	Large East Bed Room	13,292
	Bath	2,678
	South West Bed Room	7,107
	North West Bed Room	7,415
	Hall	3,535

Total heat loss from the building per hour through walls and windows, as shown by the figures in the last column, is 69,736 thermal units, which, increased 10 per cent. for roof leakage, amounts to 69,736 x 1.1 = 76,710. Assuming, for trial, that the grate surface will not exceed 5 square feet, we will count on a combustion of 4 pounds, which will provide 4 x 7,000 = 28,000 thermal units per square foot of grate per hour, therefore, 76,710 ÷ 28,000 = 274 square feet will be required, which corresponds closely to a round grate 23 inches in diameter.

Sometimes it is desirable to compute the size of boiler from the square feet of radiation which it is to supply.

This may be done by means of the formula, $G = \frac{R}{C \times 28}$, in which G = square feet of grate area required, R = square feet of direct radiation to be supplied, C = pounds of coal burned per square foot of grate per hour.

This formula takes into account the heat radiated from the supply and return piping, and assumes the same boiler efficiency as taken above.

Radiation.—The square feet of direct radiation for steam at 1 pound pressure may be found by dividing the heat loss from the room per hour, in thermal units, by 250. Applying this to the building under consideration, we have the following amounts of radiating surface required (in round numbers) in the different rooms.

SIZE OF RADIATORS

	Room	Square feet of radiation called for	Number of sections of 2 col. rad. 32" high
First Floor	Living Room	70	23
	Hall	12	4
	Dining Room	34	11
	Kitchen	29	9
Second Floor	East Bed Room	54	17
	Bath	11	4
	S. W. Bed Room.	29	9
	N. W. Bed Room.	30	9
	Hall	15	5

As it is impossible to obtain the exact quantity of surface computed, when using standard sizes of radiation, it is customary to use such a number of sections as will give the nearest approach to this, on the side of safety, which should always be larger, unless the difference is very slight. Where an odd number of sections are called for, and this is to be divided into two radiators, it is usually best to add an extra section so as to make the two units of the same size. This has been done in the Living Room and East Bed Room. An extra section has been added to the Bath Room radiator over that computed, as it is usually desirable to warm this room to a slightly higher temperature than the rest of the house.

The computed radiating surface of an entrance hall is generally less than actually required, owing to the excessive leakage around doors; hence it is usually a safe plan to increase this from 50 to 100 per cent. on this account. An excess of heat in the main hall is easily taken care of through open doors into the various rooms. In the present case the computed surface has been increased 100 per cent., and the whole amount for both upper and lower halls placed on the first floor. The appearance of direct radiators may be much improved by using units proportioned to the space they are to occupy. For the sizes generally called for in dwelling house work,

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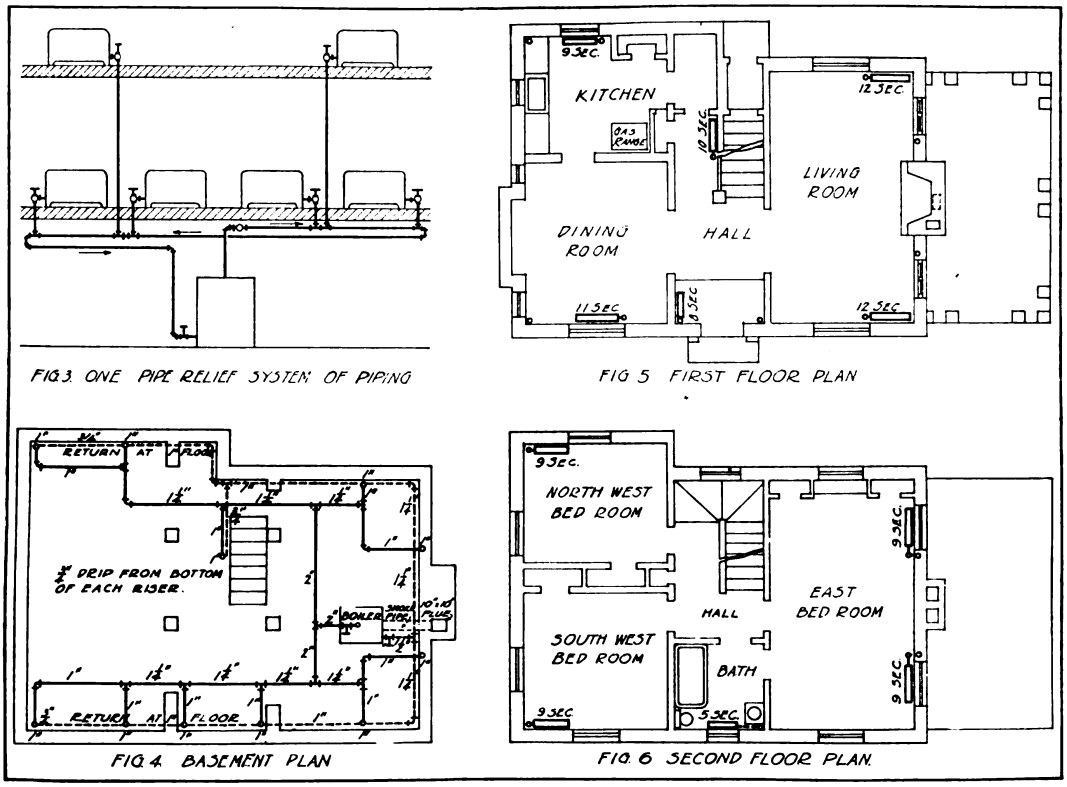

FIG 3. ONE PIPE RELIEF SYSTEM OF PIPING

FIG 5 FIRST FLOOR PLAN

FIG 4. BASEMENT PLAN

FIG 6 SECOND FLOOR PLAN

two-column sections, 30 or 32 inches in height, make up in good proportions, and these have been called for in the present case. In locating the radiators the furniture arrangement should be considered and it is also well, in a general way, to keep the windows free. While it is theoretically correct to place a radiator in the coldest part of a room, it is not essential in rooms of moderate size, as the heat will be well diffused regardless of the location of the radiator.

The finishing of the radiators should always be done by the painters, under the direction of the architect, and not left to the steamfitters helper, as is usually done. While nine out of every ten radiators are finished in gold or silver bronze, and are therefore made the most conspicuous object in the room, they may be practically concealed by painting them a color to harmonize with the general decorations of the room. Quite a pleasing effect may be produced by painting them like the woodwork and tinting the depressions between the raised figures to correspond with the paper. This may be done by painting over with the tint desired, and wiping off while wet with a cloth. An aluminum bronze, painted over with black, and then partially wiped off before it dries, gives an oxidized silver effect which is quite pleasing in some cases.

This, however, is a matter of decoration, and not of heating and may well be left to the architect.

Pipe Connections.—While it is not intended to go into details of steam fitting it may be well to say that the single-pipe system, with sealed returns, is the best adapted to dwelling house work. This reduces the number of risers to the upper floors by one-half and gives only one valve to operate in turning off a radiator. The use of sealed return mains carried below the water line of the boiler insures quietness of action, and should entirely eliminate water hammer.

All pipe connections for first story radiators are kept in the basement, and nothing should show above the floor except the valve. Risers to the upper floors may usually be carried in closets, inconspicuous corners of hallways, etc., so as not to show in the room below. If a riser cannot be concealed it should be carried up in the corner of a room and not against a side wall. While, in general, it is a good idea to have the risers accessible, still it is the joints which are liable to develop leaks and not the straight runs of pipe. Connections between risers and radiators, containing more or less bends, are commonly made in the floor space, hence, there seems to be no reason why risers should not be concealed in partitions if desired, and this arrangement has been made

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use of in some cases in the accompanying layout. When pipes and connections are built in, extra heavy material should be used and the joints tested out by means of hydrostatic pressure before closing in. This is easily done by capping the risers and making a temporary connection between the heating system and city water pressure. Joints made tight under these conditions should last as long as the house, if properly drained. A diagram showing the one-pipe system for both overhead and sealed returns is illustrated in Fig. 3. Pipe sizes for systems of this kind, based on the square feet of radiation to be supplied, are given in the following tables. The first of these is for the basement mains and returns, and the second for the vertical risers, where the steam and condensation are flowing in opposite directions.

PIPE SIZES FOR HORIZONTAL SUPPLIES AND RETURNS.

Square feet of direct radiation	Diameter of steam supply pipe	Diameter of over. return	Diameter of sealed return
60	1	1	¾
120	1¼	1	1
150	1½	1¼	1
400	2	1½	1¼
800	2½	2	1½
1200	3	2½	2
1800	3½	2½	2
2500	4	3	2½

Sizes for Single Pipe Vertical Risers.

Square feet of direct radiation	Diameter of riser	Square feet of direct radiation	Diameter of riser
30	1	130	2
60	1¼	190	2½
80	1½	290	3

Piping Layout.—Referring to Fig. 4, it will be seen that the boiler, in this case, is placed at one end of the basement so as to utilize the flue which the architect has provided. This should be equivalent to a 10"x10" flue and should have an air space around the outer sides. The supply piping should be carried approximately as shown, just below the ceiling, with run-outs to the various risers to give the necessary flexibility for expansion. Each riser should be dripped into a sealed return carried near the floor, well below the water line in the boiler. The boiler should be insulated with plastic covering and the basement steam pipes provided with a good quality of low-pressure sectional covering.

(To be continued)

Decisions of the National Board for Jurisdictional Awards—August Meeting

LOADING AND UNLOADING MATERIALS FOR REINFORCED CONCRETE CONSTRUCTION

[Subject of dispute between the International Hod Carriers, Building and Common Laborers' Union and the International Association of Bridge and Structural Iron Workers with special reference to the loading and unloading of material as applied to reinforced concrete construction.]

Decision—In the matter of the dispute between the Laborers and Iron Workers:

It is the decision of the Board that the loading, unloading, carrying and handling of all rods and material for use in reinforced concrete construction shall be done by the laborers under the supervision of such person as the employer may designate. The hoisting of rods, except when a derrick or outrigger is used, shall be done by laborers, this decision to apply only to the character of work stipulated herein. In such localities where existing agreements provide otherwise, this decision is to become effective at the expiration thereof.

RETOUCHING CONCRETE WORK.

[Subject of dispute between the International Hod Carriers, Building and Common Laborers' Union and the Operative Plasterers and Cement Finishers International Association relative to Defects in Concrete Caused by Leakage, Bulging, Sagging, etc., through Defective or Shifting Forms.]

Decision—In the matter of the dispute between the Laborers and Plasterers and Cement Finishers:

It was decided that where finishing tools are not used or required the work shall be done by the laborer. The fillling of voids or other work requiring patching where finishing tools are required shall be done by the cement finisher.

The next meeting of the Board will be held at Washington, D. C., on November 29, 1920.

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Constructing a Winding Stairway

VI.—Laying Out the Winders

By Richard M. Van Gaasbeek
School of Science and Technology, Pratt Institute, Brooklyn, N. Y.

TO lay out the winders select a length of stock wide enough or glue up two or more pieces to make up the width and draw a line parallel with each edge a distance equal to the projection of the nosing, which is usually the thickness of the tread, shown by the dotted lines, Fig. 28. Referring to Fig. 27, which is a section of the plan, Fig. 7, the riser lines are only represented on the plan, so that if the measurements are taken on this line they must also be applied on a corresponding position on the plank from which the treads are to be cut or ½ inch from the edge in this particular (one-third full size) problem.

To Lay out tread 5 use a thin measuring rod of convenient length and lay on the riser line, Fig. 27, marking the distance A-B. Transfer this distance on the riser line, Fig. 28, A-B. With a pair of dividers or trammel points and A as a center (Fig. 27) set to the radius A-C. With A, Fig. 28, as a center and the same radius strike an arc approximately in the position of C. With B as a center, Fig. 27, set again to the radius of B-E. With B, Fig. 28, as a center and the same radius strike an arc approximately in the position of E; Lay the measuring rod diagonally from A to E, Fig. 27, marking this distance. Lay the measuring rod on the plank, Fig. 28, with one mark on A and move the rod around until the other mark or length on the rod cuts the arc as at E. Connect E-B with a straight line. Lay the measuring rod diagonally from B to C, Fig. 27, marking this distance. Lay the rod on the plank, Fig. 28, with one mark on the letter B and move the rod around until the outer mark or length cuts the arc as at C. Connect E-C with a straight line. With A, Fig. 27, as a center set the dividers to the radius A-D. With A, Fig. 28, as a center and the same radius strike an arc approximately in the position of D. Wtih C, Fig. 27, as a center, set the dividers to the radius C-D. With C, Fig. 28, as a center and the same radius strike an arc cutting the previous arc, locating the point D. Connect A and D and D and C. This gives the exact shape of the face of the tread that is seen. Proper allowance must be made for entering the housing as shown by the dotted lines Fig. 28 and also some allowance for fitting. Along the lines A-D, D-C and B-E allow 5/16 of an inch for housing as shown by the dotted lines; along the line C-E allow at least ¼ inch for fitting, cut on the dotted lines. In laying out, housing and assembling, there is sure to be some variation from the original measurements laid out on the floor, due to the inaccuracy of the mechanic. This is to be expected and does not materially affect the job. By allowing stock for fitting as suggested and placing the tread in position in the strings and marking where the next succeeding riser lines come, any variation can be readily overcome and a neat and tight job will be insured.

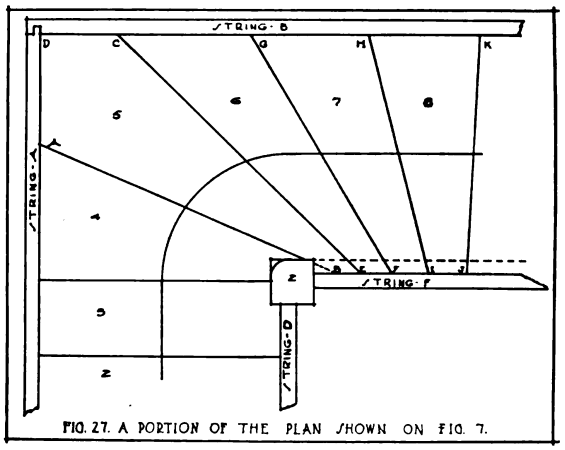

FIG. 27. A PORTION OF THE PLAN SHOWN ON FIG. 7.

To lay out tread 6 use the same measuring rod after planing off the old marks and lay on the riser line, Fig. 27, marking the distance C-E. Transfer this distance on the riser line, Fig. 28, C-E; with a pair of dividers and C as a center, Fig. 27, set to the radius C-G. With C, Fig. 28 as a center and the same radius strike an arc approximately in the position of G; with E as a center, Fig. 27 set again to the radius E-F. With E, Fig. 28 as a center and the same radius strike an arc approximately in the position of F. Lay the measuring rod diagonally

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marking the distance C-F, Fig. 27. Lay the measuring rod on the plank, Fig. 28, with one mark on C and move the rod around until the other mark or length on the rod cuts the arc at F. Connect E-F. Lay the measuring rod diagonally marking the distance E-G, Fig. 27. Lay the measuring rod on the plank Fig. 28 with one mark on E and move the rod around until the other mark or length on the rod cuts the arc at G. Connect C-G and G-F. Along the lines C-G and E-F allow stock for housing and along the line G-F allow stock for fitting as described for tread 5.

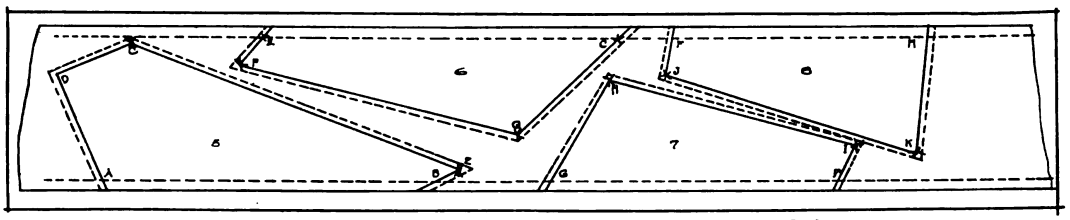

FIG. 28. METHOD OF LAYING OUT THE WINDERS.

To lay out tread 7 use the measuring rod as before planing off all old marks and lay on the riser line, Fig. 27, marking the distance G-F. Transfer this distance on the riser line, Fig. 28, G-F; with a pair of dividers and G as a center, Fig. 27 set to the radius G-H. With G as a center, Fig. 28 and the same radius strike an arc approximately in the position of H; with F as a center, Fig. 27, set again to the radius F-I. With F, Fig. 28, as a center and the same radius strike an arc approximately in the position of I. Lay the measuring rod diagonally marking the distance G-I, Fig. 27. Lay the measuring rod on the plank, Fig. 28, with one mark on G and move the rod around until the other mark or length on the rod cuts the arc as at I. Connect F-I. Lay the measuring rod diagonally marking the distance F-H, Fig. 27. Lay the measuring rod on the plank, Fig. 28, with one mark on F and move the rod around until the other mark or length intersects the arc as at H. Connect G-H and H-I. Along the lines G-H and F-I allow stock for housing and along the line H-I allow stock for fitting as before.

To lay out tread 8 use the measuring rod again planing off the old marks and lay on the riser line, Fig. 27, marking the distance H-I. Transfer this distance on the riser line, Fig. 28, H-I; with a pair of dividers and H as a center, Fig. 27, set to the radius H-K. With H as a center, Fig. 28 and the same radius strike an arc approximately in the position of K. When I as a center, Fig. 27, set again to the radius I-J. With I as a center, Fig. 28, and the same radius strike an arc approximately in the position of J. Lay the measuring rod diagonally marking the distance H-J, Fig. 27. Lay the rod on the plank, Fig. 28, with one mark on H and move the rod around until the other mark or length on

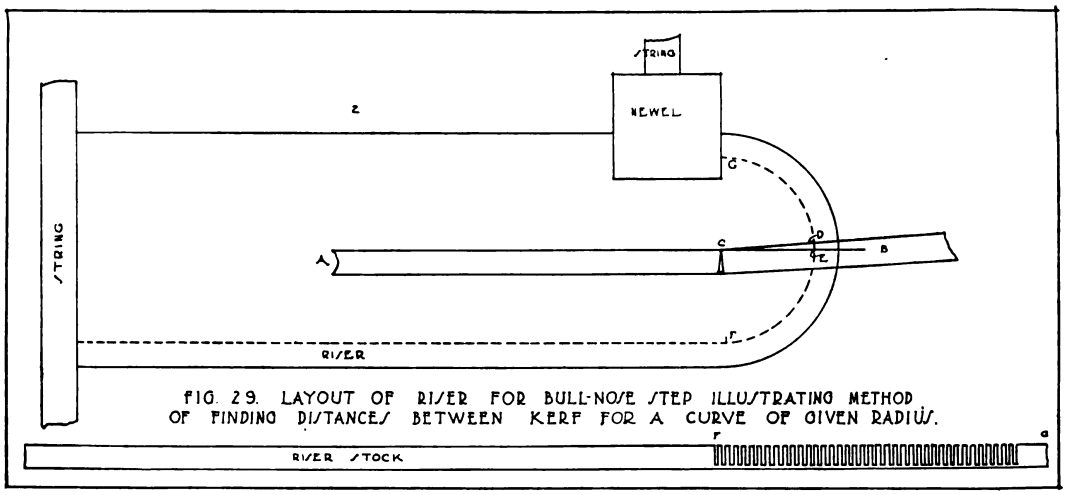

FIG. 29. LAYOUT OF RISER FOR BULL-NOSE STEP ILLUSTRATING METHOD OF FINDING DISTANCES BETWEEN KERF FOR A CURVE OF GIVEN RADIUS.

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the rod cuts the arc as at J. Connect I-J. Lay the measuring rod diagonally marking the distance I-K, Fig. 27. Lay the rod on the plank, Fig. 28, with one mark on I and move the rod around until the other mark cuts the arc as at K. Connect H-K and J-K. Along the lines H-K and I-J allow stock for housing and along the line J-K allow stock for fitting.

Treads 9-10-11 and 12 can be laid out in a similar manner taking the diagonal measurements from the lay-out and transfering the measurements to their relative positions on the stock from which the treads are to be cut. Nose the treads either by machine or nosing plane. Dress the face side by hand and sandpaper, when they will be ready for assembling. The length of the risers may be taken from the lay-out, dressed, sandpapered, ready for assembling. The risers are all straight stock so that no special problem arises in obtaining the lengths.

The lay-out of riser for bull nose step is illustrated in Fig. 29, which gives the method of finding the distance between kerfs for a curve of a given radius. The width of the riser should be equal to the rise less the thickness of the tread or 1½ inch, as the riser rests on the floor. The remaining risers should be 2 inches and rest against the back edge of each tread into which they are nailed. Dress the face of the riser before kerfing to simplify the cleaning of the riser after being bent, which need only require sandpapering. Lay the back edge of the riser on the lay-out and draw a line A-B through the center point C cutting the inside line of the riser. Make one cut with the saw that is to be used in cutting the kerfs, place the stock against the line A-B and bend until the kerf is closed, then mark on the inside line of the riser as at D. Then D-E is the distance from center of kerf to center of kerf. Next bend a thin batten around the curve as F-G to find the distance to be kerfed, and kerf the stock as shown. Stock should be left longer than needed for fastening to form until glue has set after bending.

Next make a rough form out of ⅞-inch stock cut to the inside radius of the riser and screw fast to the riser with the springing point F in line with the first kerf. Steam the riser or use hot water to make it plyable and bend it gradually around the form, screwing it fast at the end until ready to fit. The form should be fastened near the bottom as the top will be strengthened when the tread is fastened in place. Glue small angle blocks against the side of the riser and the form. If it is desired to remove the form, a stout piece of paper can be glued to the back of the riser and bent around the form. After the glue has set, the form can be removed and the riser will retain the required shape. The stock for the tread must be wide enough to show a projection over the face of the riser and the same projection around the curved riser.

(To be concluded.)



HOUSE AT FOREST HILLS, L. I., N. Y.
MOTT B. SCHMIDT, *ARCHITECT.*

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Laying Slate, Asbestos and Asphalt Shingles

By L. S. Bonbrake

Part II.

A PERFECTLY satisfactory roof cannot be laid with shingles even if of superior quality when the main object is to see how quickly and cheaply the roof can be put in place.

Work hurried to the detriment of quality is very harmful to a good product and invariably results in a poor reputation for the roofer.

Give honest work and materials from start to finish, and receive in return the benefit to be derived from a good reputation. The carpenter, or contractor will render a real favor to his customer by soliciting, and executing this character of roofing, all three materials having been tried and tested.

His line of work adopts him to good execution, and having adopted one or all three, he is always prepared for any emergency or specification.

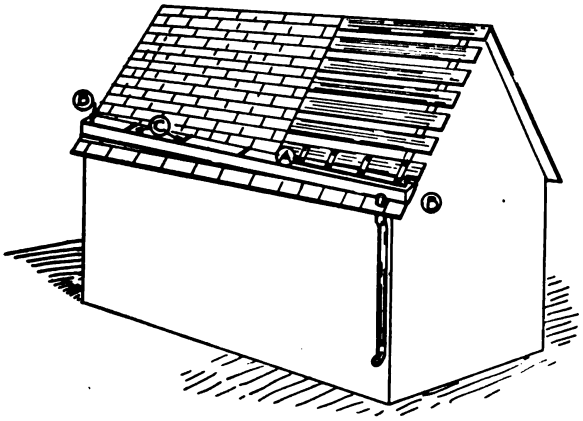

Fig. 6. Method of forming roof gutter

Roof Gutter.—A gutter may be laid in the roof over the cornice by the method employed when laying a wood shingle roof, see Fig. 6. An inch face board or frequently a 2 x 4 in. stud may be nailed from the inner, or its upper side over shingles laid up from the eave, approximately two or three courses, depending upon their size. The pitch for drainage should give an easy flow yet not steep enough to make it appear awkward and unsightly.

Tin, or copper, preferably the latter, are the better materials, and it is, cautioned in this connection to have the metal extend well up the roof, high enough above the front to force water over the facia before it can possibly reach the back edge of the metal and leak into the building in case of drain pipe clogging, freezing, or other causes.

Have a wide open water way by not laying shingles until well above the front line, and do not nail through the lining (metal) until slate or other shingle nail holes have been reached, and as lath are essential for re-starting the roof back of the gutter

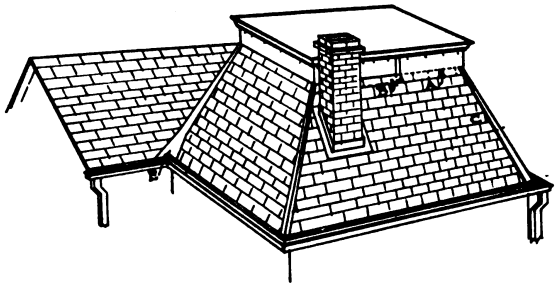

Fig. 7. A roof deck. At A is shown a finish with metal overlapping shingles; at B the metal is under the shingles

they may be held in position as shown at A Fig. 6, and heretofore described.

If tin, or terne plate (its proper name) is used for lining it is suggested that a grade of at least 25 lbs. or more coating be used and thoroughly painted on the under side before laying, also paint the upper section going under the shingles as it cannot be reached afterward.

Soldering should be given special attention, see that the seams that can be, are soldered on both sides, and the solder sweated into the locks thoroughly; merely skinning the solder over a seam, will never stand the expansion of freezing and thawing, the seams may look good, but the cracks will let water in. Extreme care is advised at this particular section, especially when intersected by a valley, as more trouble may result from careless work than anywhere else on the roof, all of which may be avoided by using due diligence.

Dots on the corner of the last row of shingles laid indicate no nails on that side of the shingle, and are a preparation for the continuation of the roof to completion, where under some circumstances it is

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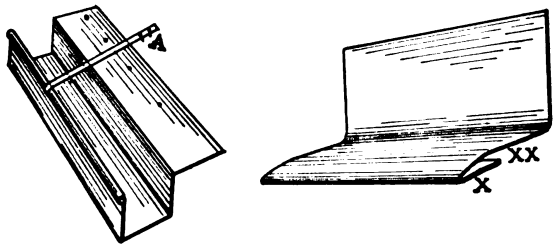
necessary to finish one end of the building from eave to comb.

If not nailed at that corner the shingle may be raised a sufficient height to let the following one slip under half way, when a nail may be driven close up to the butt, and cemented, or driven two on the exposed side where they will be covered by the next shingle.



At left, Fig. 9: Sheet metal gutter. At right, Fig. 8: Deck flashing.

The ends B, B, Fig. 6, of the gutter may be formed out of the metal lining without cutting in, or soldering, by extending the lining past the end of the facia, or stud five or six inches, owing to the height of face.

Shear this extention circular form to the width of, from the front, to B-left, then taper from B. back to meet the gable up the roof.

Place a taper edged board, or even something after the manner of a hatchet stake over the extended end of the metal, press or hammer back and it will crump into two folds (three thicknesses), as it is being formed up; there will be a slight bulge at the bottom, not noticable off the roof, hammer the folds, flat, and trim rounding as shown at B with a curve up the roof to present a finished appearance, neater than when cut straight across the top. The heavy metal strip C may be placed at intervals, nailed on top of the board, or stud, and soldered at its upper end, forming a brace which will add to the stability of the gutter.

Galvanized iron roof gutters may be used, with several artistic fronts to select from—however, if used they should be ordered made with extra wide extensions for laying up the roof.

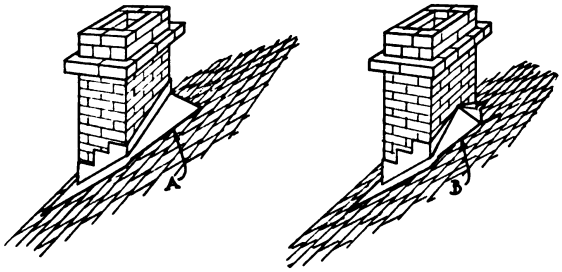


Fig. 11. Chimney flashing. At A is shown a watershed in back of chimney constructed to shed water in one direction, while the method shown at B throws the water both ways

With a tinsmith on the job, these suggestions may be noted in seeing that his work is done properly, taking no chances in having deficient work which would probably be covered over with shingles, thus creating greater trouble, and annoyance than if exposed to the surface where it could be readily located, and remedied.

The Deck.—Usually when on a building stall, the highest part of a dwelling is the deck, and is readily observed from almost any angle; generally located at or near the center of the building it should be constructed so as to give a well defined skyline, and not a flat, unsightly object, with its metal covering on a level with, and lapping down over the shingles, where a raw edge will kink, buckle, and let snow, dust, rain, all kind of foreign substance work into the house attic.

The top of the deck should be raised from four to six inches from the last course of shingles and have the sheeting project a proportionate distance over

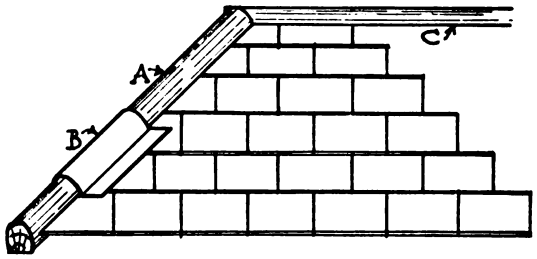


Fig. 10. Ridge roll for hip rafter

the facia to give a proper finish.

The shingles are laid up to, and abutt the facia, as shown at B in the illustration Fig. 7. Finishing shingles may be used to lay over the flashing, obviating metal exposure, the finishers are nailed close up to the deck, and nail heads are covered with colored putty. There are also on the market specially prepared cements that will give better service than ordinary putty. In some localities, and preferably so, the metal flashing is extended down and over the nail heads on top of the finishers as at A, and can be made to lay flat, without kink upon the shingles by giving the bottom edge of the flashing the fold x, and a slight bend xx as shown in Fig. 8.

The top of the flashing may be close nailed, or preferably extended up the facia a distance that will allow a wood strip, or the molding around the deck, to cover it.

E, indicates the valley, enlarged at the bottom, as previously described and illustrated (see Fig. 5, Part 1). The top corner of Fig. 7, comprising the chimney, hip, deck, valley and a comb, all bunched in a very small space must be laid with pains, taking care to insure satisfaction, which can be secured only

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by having no leaks show up under the most trying conditions.

Such a roof section was laid some seventeen years ago with slate, with the help and under the direction of the writer, and has stood the time test without leakage.

The chimney is flashed at the top as shown at A, Fig 11. The copper valley, 20 in. wide, is reinforced at the bottom. The hip rafter and comb board (used in some localities) are raised above the sheeting, and shingles laid snug against them, after which they are covered with the galvanized ridge roll, B, Fig. 10, the deck flashing is shown by Fig. 8 covered on the top edge by molding.

Reinforcement of the valley is necessary on account of the hanging box gutter, the back of which is extended, and the pitch of the gutter given by nailing its back to the sheeting after it has been formed to the pitch of the roof with a proper taper for drainage, as shown by Fig. 9.

A brace "A" may be used when deemed advisable, to give the front of the gutter stability; notches in the lath at the eave may be made for the roof straps, or front braces if of a thickness requiring same. Estimates and description of the various forms of box, and roof gutters may be secured from any of the numerous sheet metal works.

The Chimney.—It will be noticed that the chimneys shown by Fig. 11, have water tables at their upper sides with the butts of the shingles well up the roof in order to avoid all danger caused by the many changes of temperature in winter weather.

The chimney to the right, (B), shows an additional protection by means of a double V division which will give quick, and thorough drainage, throwing the water both ways from its center, and allow no chance for dead water behind the chimney caused by a slight sinking of the roof.

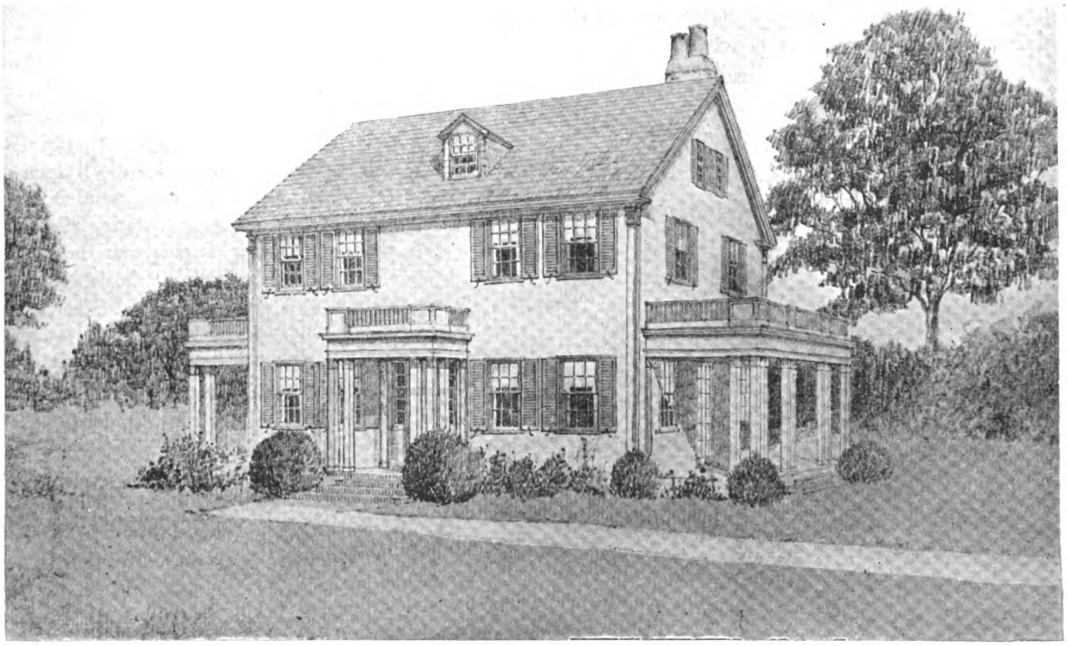
At the back of the left chimney (A) a tapering wood strip should be used under the metal for draining the water to the side desired; this will also prevent water from standing if the sheeting should sag.

All chimneys should be counterflashed by sawing into the mortar at the first seam above the flash, and inserting the metal an inch where it can be wedged by a wood plug, or metal spival, then extend down over flange against chimney to near the bottom.

The sides will have at least three steps on an ordinary chimney, sawed in for the counter-flashing, each overlapping the other, and there are turned down over the copper, or the shingles, flashed against the chimney, and under each shingle of the roof abutting the chimney. The sawed in grooves are then filled with special roofing cement.

All scuttle hole frames, skylights, or other obstructions on the side of a roof should be provided with one or the other of the drainage strips, A or B, as best suits the location, as they may save considerable trouble and annoyance.

(To be continued.)



HOUSE AT FOREST HILLS, L. I., N. Y.
GEORGE GILBERT, *ARCHITECT*

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"Kinks" from a Carpenter's Diary

Some Random Remarks on the Scraper, Plane and Hand Clamp

By Ray W. Wood

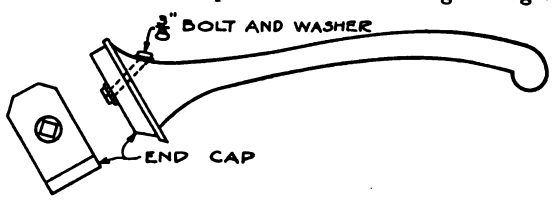
A TOOL the carpenter does not use very regularly is the cabinet scraper, yet it is very useful for finishing hardwood, when a good job is to be done. The saw steel scraper can be obtained in most any hardware store in sizes ranging from 2 x 4 in. to 4 x 6 in. The 2½ x 5 in. makes a convenient size for all-around use. Such a scraper is very useful, takes up very little room in the kit and every carpenter should have at least one.

A good serviceable scraper handle similar to the one illustrated is easily made. In fact there are more of this kind made and used in woodworking shops than any other style. The exact shape is entirely arbitrary as the user can shape the handle to fit his hand. It is best to make the handle out of clear well seasoned hardwood, such as beach or birch, and in length from ten to twelve inches including the cap; ¾ of an inch thick is sufficient for the cap. A ⅜ inch bolt and washer is used to hold cap piece and scraper tight to handle head. The hole in scraper is drilled or punched through, this being carefunlly done so as not to split the steel. A free hand outline marked on the stock choosen is quickly sawed out on the band or scroll saw. When one of these machines is not available then a small panel or keyhole saw will answer, followed with a wood rasp. If one has the leisure, sand paper and a coat of varnish will give the handle an added nicety of detail.

IN order to do good finishing the workman must have a set of sharp planes. The older "heads" still stick to their wooden ones, where the cutter is adjusted and set by gently tapping cutter and cap wedge with a hammer. Now-a-days the improved type of adjustment by wheel and lever, and with cap and lever cap are the ones most largely purchased. This style is made in both wood or iron; either kind will do good work.

I have heard interesting discussions among carpenters as to the best plane (wood or iron) for every day use. Two of the foremost reasons advanced against iron planes are: they are heavier and break easier than wooden ones. When we consider that the twenty-four inch iron jointer is only three and one-fourth pounds heavier than the same length wooden one, and about the same weight as a longer wooden one, the slight difference in weight is hardly noticed; as to breaking, anything will break if handled carelessly. Ask a carpenter which is the best, a wooden or iron plane, and the chances are he hasn't a ready answer. I don't know the reason for this, except that, as I have found out from experience, if one does not have a set of both kinds, combination of both kinds is satisfactory.

The iron smooth plane nine inches long having a



Hand scraper handle

two inch cutter is far ahead of any wooden one I have ever seen (I think no one will dispute me in this). For quick adjustment, always true bottom and ease in handling the iron smooth plane is in a class by itself. As to the jack plane this is a matter of personal taste. It is true that the wooden plane is better adapted for soft wood, equally so is the iron one for hardwood. I confess I have never owned a fore plane, or seen many actually used. I have read of their being used for both jack and jointer, but it appears to me much time would be needlessly wasted in adjusting and honing the cutter.

I have a wooden jointer twenty-six inches long and for soft wood it is excellent; however, tough oak, maple, beech and some of the resinous hard pine stock whose surface is like glass has to be jointed, on such wood the iron jointer shines.

It seems to me that a twenty-two inch iron jointer is the handiest for the journeyman carpenter, who generally desires a hand chest with as few tools as possible. An iron plane of that size is admirable for all kinds of work in any wood. They are very handy in jointing thin stuff to a straight edge laid flat on the bench, also for trueing bottoms of wooden planes. For the young carpenter who needs and is about to buy a set of planes, I'd advise him to get nothing but the iron smooth plane nine inches long, and if he gets a block plane, get one of low angle style of cutter, not less than six inches long.

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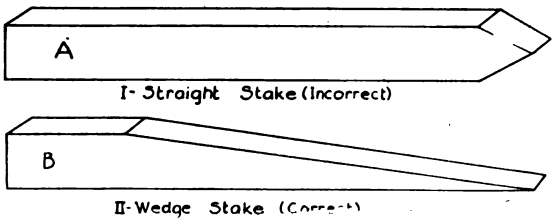
I am sure that if the carpenter realizes the value of a carriage maker's hand clamp he would never be without one on any job. They are made of malleable iron in varied sizes, are quick acting and will stand rough usage. For holding a board on the bench to smooth plane, fastening a staging arm to a porch column any place where nailing would mar the woodwork one of these clamps with six or seven inch opening is just the checker.

A Wedged Marking Stake

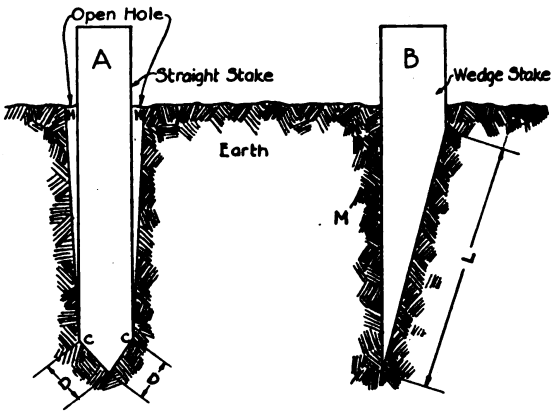
THERE is a right way and a wrong way to do almost everything. This axiom may, so experience has shown, be applied in the making of the marking stakes which are used by surveyors, builders, architects, and, generally, by all people who have to do with outdoor construction and engineering. As will be shown, a wedge stake formed as at *B*, Fig. 1, is much preferable to one of the usual straight type illustrated at *A*. The "wedge" stake is much more difficult of withdrawal than is one of the "straight" type, hence, it is much more likely to remain at the point where it was driven into the earth than is a straight stake. This feature is of considerable economic importance, because a great deal of time may be sacrificed or money spent uselessly because of stakes which have pulled out and must be relocated and because of the mistakes that may be due to lost stakes.

As illustrated in Fig. 2, when a straight stake is driven, the hole which it makes in the earth is as



large—or larger—at the surface of the earth *HH* as it is at the lower end of the stake *CC*.. Hence, the soil into which the stake was forced does not exert any material adhesion against the sides of the stick. Apparently, the only surfaces of the stick which are in firm contact with the earth are at the wedge end of the stick, as shown at *DD*. Furthermore, it frequently occurs that, when a stake is driven, it "trembles" as it goes down so that the cavity which it makes for itself in the earth is actually larger at the top than at the bottom. In other words, there is often an open hole (shown exaggerated at *HH* in the illustration) around the stick at the surface of the ground.

Now, if instead of being of equal thickness for practically its entire length, the stake is cut to form a long wedge, as shown at *B*, then all of the surface of the two sides of the stake, shown at *L* and *M*, will be in firm contact with the earth and the resistance to withdrawal will be very materially increased. A trial will prove that, while a stake sharpened as at *A* can be easily withdrawn, it may be difficut, if not impossible, to extract one sharpened as at *B*. A wedge-shaped stake will often break off but, in many cases, it cannot be pulled from its hole. Where stakes are driven in streets or other thoroughfares subject to traffic the wedge stake is by all means the preferable type, because, while its top



may be accidentally broken off, the lower end will usually remain in the earth so that the point designated by the stick can readily be relocated without its being necessary to make additional measurements. The straight or *A* type stakes are often knocked entirely out of the earth by traffic, hence, their locations are "lost." To determine the relative advantages of the two types, 100 straight stakes were driven in a certain job and also 100 wedge stakes under identical conditions. The stakes were driven in a street subject to considerable traffic. Thirteen of the straight stakes were lost, while only three of the wedge stakes were lost, making the percentage of straight stakes lost 13 per cent. against 3 per cent. of the wedge stakes lost.

C. L. WILLIS.

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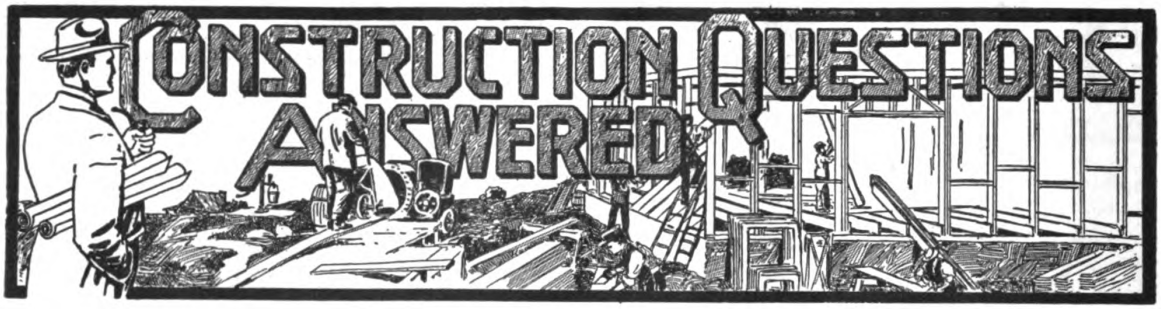

Cuts for Roof Rafters

From J. O. F., N. J.—I enclose a rough drawing and list of three questions which I would feel very thankful to you for answering. The cut asked in question 2 (the one across the edge or back of the rafter) gives me a good deal of trouble. I have been told it is an angle of 45 deg. I cannot understand how this can be so when the angle AFE is a right angle and the side EF greater than the side AF. My problem is this:

A house 24 ft. square is to be roofed with a hip roof having a two-thirds pitch, the corner rafters and four center rafters meeting at a point in the center. The accompanying figure ABC represents one of the hips.

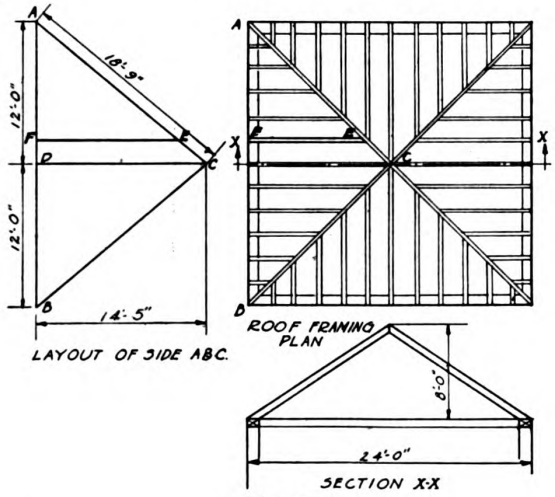

Fig. 1.

AB represents the wall plate. AC and CB represent two corner rafters. CD represents one center rafter; and EF represents one of the shorter rafters.

(1) What is the plumb cut (what angle) on the rafter EF?

(2) What is the angle at which the rafter EF must be cut across the back so as to fit exactly to the corner rafter AC?

(3) What would both these cuts (what angles) be if the pitch of roof was five-eighths and three-quarters respectively?

Answer—The figures that you submit show that the run of the common rafter is 12 ft. or one-half the span of the building and the rise is 8 ft. This is not a two-thirds pitch roof as you state, if it were, the total rise would be 16 ft. This particular problem is one-third pitch as the rafters rise in 8 in. in every foot of run.

Question 1. From the practical point of view of mechanic, there is no need for knowing the angles in degrees of the various plumb and level cuts. There are only three lines considerd in framing a roof, that is, a level line, a plumb line and a diagonal line—the run, a level line; the rise, a plumb line; the pitch, a diagonal line. In this particular problem, the rise being 8 ft. and the run 12 ft., reduce these figures to the rise in inches per foot and lay out the plumb and level cuts

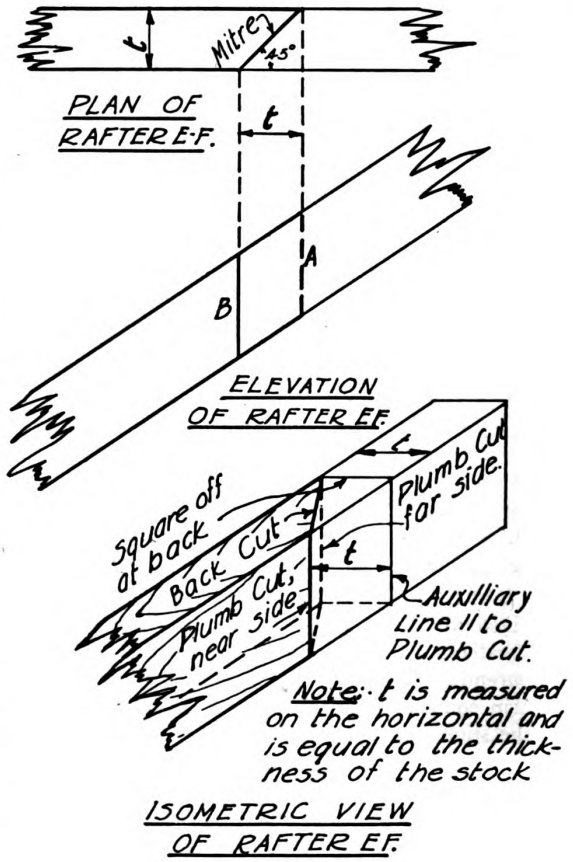

Fig. 2.

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with the steel square. The following formula may be used to find, R, the rise in inches per foot:

$$R = \frac{\text{Rise}}{\text{Run}} \times 12 \text{ or } \frac{8}{12} \times \frac{12}{1} = 8 \text{ in.;}$$

in other words, the rafter rises 8 in. in every foot of run. Use the figure 8 in. rise on the tongue and 12 in. run on the blade of the square. Mark on the tongue for the plumb cut and on the blade for the level cut. Set a bevel square to this plumb cut which can be used for laying out all plumb cuts for common, jack and cripple rafters. This bevel will change as soon as the pitch of the roof is changed.

Question 2. In this problem the hip rafter crosses the plate at an angle of 45 deg. or a miter. The common and jack rafters should be square with the plate and intersect with the hip rafters at an angle of 45 deg. The top cut of the jack rafter is a true miter, laid out on a level line, but this same bevel cannot be applied on the top edge of the rafter for as soon as it is raised into position, the top edge becomes the pitch of the roof and throws the miter off. This cut can be laid out with the steel square by using the length (bridge measure of the run and rise) on the blade and the run on the tongue, mark on the length for the top cut. A simple way to get this cut and one that is easily remembered is shown in the illustration herewith. Produce a plumb line A any where on the side of the rafter and square across the top edge of the rafter, Parallel to this plumb line produce another line B a distance equal to the thickness of the stock to be used, connect these two lines on the top edge as shown for the miter cut. The bevel square can be set to this angle and used in laying out all miter cuts for jack and cripple rafters on this particular roof.

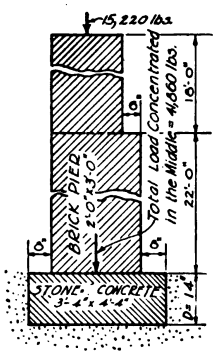
Question 3. For roofs of five-eighths and three-quarters pitches the cuts would be found as previously described. These are steep pitches and not commonly used. A five-eighths pitch roof rises 15 in. in every foot of run and a three-quarters pitch roof rises 18 in. in every foot of run. Substitute these figures in place of the 8 in. rise used in our problem, using the same run 12 in. which remains constant for all roofs of equal pitches. R. M. VanG.

To Determine Area and Thickness of Footings

From J. S. A., N. C.—I assume that when in doubt, I may just appeal to you for help. I have looked this subject up in books and find nothing but dissertations on the subject, with nothing tangible and useful when in a hurry.

The problem is this: I want to find the footing for a pier 40 ft. high carrying a load of 41,860 lbs. I want to find (a) bearing surface (soil resistance 4T), (b) depth of footing D. (c) Is there any rule regulating the cross section of pier in relation to its height? (d) How can depth and bearing surface of wall footing be quickly and accurately determined?

Answer—The problem you present is a simple one and can be solved in this manner. Total load on pier at footing level equals 41,860 lbs. or, allowing for weight of footing say 21½ tons on the soil. Since you state the soil is good for a bearing value of 4 tons per sq. ft., the necessary area of the footing would be 21.5 divided by 4 equals 5.4 sq. ft. Since the section of the pier is 2x3 or 6 sq. ft., a concrete footing the same area as the pier would be sufficient and all that would be necessary would be a slab to distribute the load evenly over the ground area. However, this is not considered good practice, and even where no spread footings would appear necessary from calculations, it would be well to make the footing from 3 to 6 inches wider all around than the size of the pier.



Inasmuch as the problem in point does not bring out the method of arriving at the thickness of footing, etc., I will assume, for illustration, that instead of the soil being good for 4 tons per square foot, it is only good for 1½ tons. The area required under such conditions for the same load would be 21.5 ÷ 1.5 = 14.33 sq. ft.

If this is an isolated pier, the footing should be spread 8 in. all around, making the dimensions of the footing 3' 4" x 4' 4", with an area of 14.4 sq. ft.

So far as the thickness is concerned, this is usually determined by the rule that a line from the base of the wall, making an angle of 60 deg. with the horizontal, would be the slope of fracture in a masonry footing. If you draw a 60 deg. triangle, you will note that the relations between the sides are as follows: the shorter or horizontal leg 1, the hypothenuse 2 and the vertical leg the square root of 3 or 1.73. Therefore, if we assume that the shorter leg represents the offset of the footing, and the longer leg the thickness, we find that the thickness will always be equal to approximately 1¾ times the offset. In the problem, we find an offset of 8 inches is necessary; therefore, the thickness would be 8 x 1¾ = 14 in. When the required thickness is over 16 inches, it is customary to step up the footing about every 8 inches. When the footing is reinforced by steel, this rule does not hold, and much shallower footings can be used. Reinforced footings, however, are not commonly used except where heavy loads are encountered.

Plans of $8,000 Apartment House

From S. V. P.—I have some prospective customers for apartment houses. One is for a house for a lot 50 x 70, which cost $8,000. To fit an apartment house to so small a lot, have it suit the location and at a price to which you can add $8,000 for lot and still make it a paying investment is no small task. Can you suggest a solution? Thanks.

Answer.—The task you set before us is indeed a difficult one. The problem is rendered still more complicated by the small amount of meager information we have to go by. However, we have taken the liberty of assuming conditions as they exist in your locality and have arrived at a solution, in fact, two solutions, which will, we think, meet with your approval.

For the money you desire to spend you can have but two stories, providing accommodations for two families on each floor. Two schemes are here presented for your consideration. In scheme A provision is made for five rooms and bath; while in scheme B six rooms and bath are made available. Both types are built in semi-detached units, with spacious courts and yard, which afford an abundance of direct light and ventilation to every room in the suite. In scheme A the courts extend from front to rear of lot, on either side of the building; while in scheme B they extend but half way the depth of the building, toward the rear.

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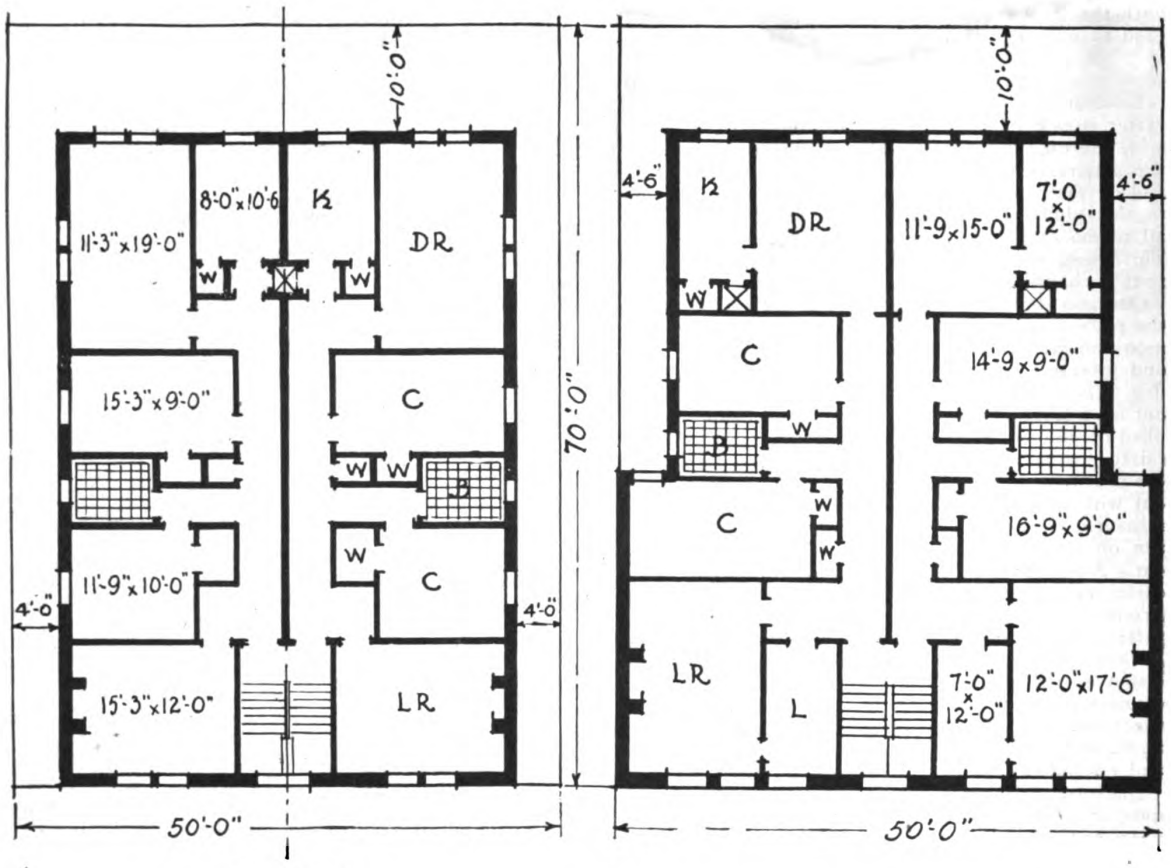
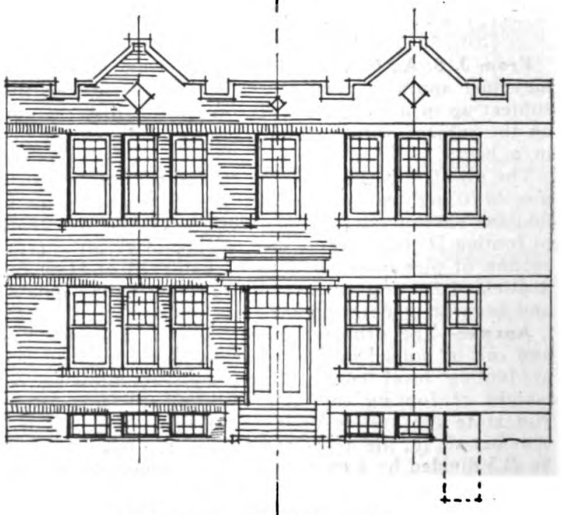


Scheme "A."

SCHEME "B"



~ FRONT ELEVATION ~

It might be stated in this connection that the size of courts here shown, as well as the size and disposition of rooms, stairs, etc., all conform to the most stringent tenement regulations of a city of the first magnitude. They will, therefore, certainly apply to a locality such as the one in which our correspondent proposes to erect his building.

The width of the courts may be made smaller and the depth of the yard may be decreased, but to do so at the expense of healthful surroundings is not advisable. Foresighted builders have come to the realization that to occupy every available square foot of area permitted by law lessens the profit on the investment by increasing the cost of the construction. Modern architects, therefore, concentrate upon producing plans that give the greatest amount of light, ventilation and comfort, rather than the larger number of rooms to the suite, as in the old-fashioned type of tenement house.

But to return to the consideration of our plans. In scheme B the court is wider than in scheme A for the very obvious reason, as was noted before, that it extends only half the depth of the building. The advantages resulting from such an arrangement are, 1, more commodious front room, and 2, the addition of an extra room, namely, a library, adjoining the living room.

In both schemes ample closet space is provided—one closet for each bedroom, one linen closet in the hall and one pantry closet in the kitchen. Nor have we failed to install that necessary adjunct to every modern apartment, viz., a dumb-waiter. In scheme A only one

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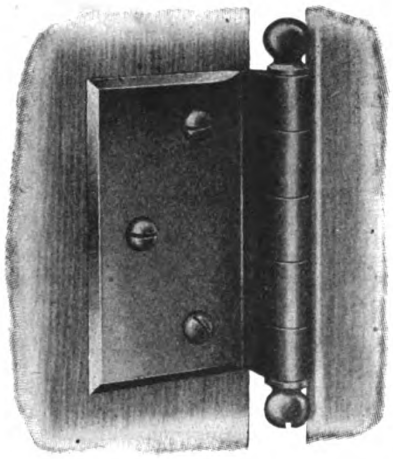

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Doors that are improperly hung soon sag and loosen, giving constant trouble and causing rapid deterioration.

Much of this trouble is due to the use of inferior butts and hinges. Then, too, the builder who uses such fittings loses a great deal of time in installation. And time is always money on work of this kind.

The National No. 450 Half Surface Butt is fast becoming a favorite with progressive builders as they find it not only strong, well made and durable, but also a real economy in *saving at least half the time ordinarily required for hanging doors.*

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dumb-waiter shaft is needed for the four families, while in scheme B two are required.

Special attention is directed to the ideal location of the bathroom, between two chambers, readily and quickly accessible from every room in the suite.

No fire-escapes are required for either type of building. But in scheme B a fire passage would have to be provided to give entrance to and exit from the yard. In scheme A the entrance to the yard is directly through the court.

The facade is a simple combination of architectural details. The effective treatment of the terra cotta coping on the owner in fee of his own apartment and shares in the fixed charges, such as taxes, water rents, interest on mortgage, heating, etc., proportionately with the other tenants. The apartments may be paid for in a lump sum or on the instalment plan, a certain proportion of the monthly payments going toward interest on the unpaid balance and the remainder being applied to the principal.

From the point of view of the builder, this has the advantage of moving his realty more rapidly and surely, since there are far more prospective small purchasers than large ones. The money coming in from such sales furnishes him constantly with further funds for continued building and keeps cutting down his share of operating expenses in the apartments so sold. It creates, too, an intangible element of good will in having a large and growing number of people who are actual owners of property in his section. For the tenant, it offers a plan of buying an apartment at payments only slightly in advance of the usual rentals with the knowledge that eventually he will own his own home.

—A. B. G.

Work for a Woodworking Shop

Quite some time ago an inquiry was received from C. P. Walters & Co., of Centerville, Md., who operated a woodworking shop, relative to securing the right kind of work. We publish below further information on the subject sent in by one of our subscribers.

From R. W. W.—Being interested in the problem that confronts C. P. Walters & Son, I am glad to offer in a synoptical way a few pointers which may help them out of their dilemma. Hundreds of other building firms have heretofore found themselves in similar positions as Messrs. Walters, and have solved their obstacles in various methods.

There are numerous articles just waiting to be manufactured, but the trouble is as Messrs. Walters have mentioned, "impractical." To start something and grow with it, it must **be practical.** Capital and advertising have a lot to do in successfully manufacturing and marketing commodities, but not all, for remember the adage, "If ye make mouse traps a little better even in the woods, the public will wear a pathway hither."

I knew one general contractor, located in a country town. About eight months of the year he kept a dozen men busy, the remaining months the crew was idle. This man had a small carpenter shop. He had a gasoline engine, pony planer, rip-saw and hollow-chisel-mortiser. One day in December while tinkering around the shop, the idea struck him, to make a baby swing as a present for his daughter-in-law. He made the swing and a lot more that winter, making them out of scraps, and there was no trouble to sell them all at a profit. He started making porch swings. He soon had orders for more than he could make, so he took on the men to help him. During the spring before permanent building operations started the little shop was busy making swings, and the last I heard of this man he was still making swings at a profit.

There's a firm in the south that started manufacturing cedar chests in a small way. Today their business is established.

Right here I suggest: Try to get in contact with some large concern like Larkin & Co., soap makers. Such concerns offer articles made wholly or part of wood as premiums to their customers; use the articles in large quantities, and they might serve as a medium to market your product. Often in the dull months, country planing mills fill orders for these concerns.

Here is another instance: In a town less than a thousand inhabitants where the one and only industry was a stave mill making cooperage stock. When the elm in that vicinity was pretty well cleaned up the firm moved their mill to pastures new. All they left behind was a pile mountain high of odds and ends, material they considered burning. Finally a man wanted it. They sold it to him **very** reasonably.

The man carted it away to a little 2 by 4 shop where the only machine he possessed was a rip-saw. On the saw he sized the stuff, and turned most of it into bushel crates. He made some of the crates collapsible. The farmers were eager to buy, and I forget just how many hundred crates this man made and sold.

Of course this is an instance when the business was not permanent, but without much trouble couldn't it be made so? You say: "Your town is in an agricultural community, has two fruit and vegetable canneries." Bushel crates are strictly practical and find a ready market in such communities provided you can get the material, which ought not to be a very serious handicap as the crates can be made mostly of scrap stuff.

But here's my trump card. I'm going to spring it now, for the benefit of Messrs. Walters & Son or anyone else interested. Listen! Cattaraugus is a town of two thousand inhabitants, located fifty miles from Buffalo, N. Y. Setter Bros. have their veneer factory at Cattaraugus. All summer their big trucks have been hauling logs, and always their yards contain a jamb of logs. I knew "Lon." Setter and his brother when they started in business a few years ago in a very modest way. Today! Well, I shall not dwell on the magnitude of their up-to-date plant.

You've seen the little sticks butchers use to jab in chunks of meat, and candy manufacturers use with "lolly pops." Of course you have. Well, the Setter's started turning out these sticks as a side line. It wasn't long before the side line threatened to become the main line. They turn them out on jig spindle machines by the million, and ship them in burlap bags. There seems to always be a demand for the sticks, and the beauty of it is they are turned out of material which would otherwise go in the scrap pile.

Editorial Note

The object of this department of BUILDING AGE is to supply to its readers the fullest and most reliable information on vexatious problems. Readers are invited to submit their difficulties, a solution of which, as far as can be reached, will appear in the earliest possible issue.

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"Enameled Woodwork"

THAT'S what everyone wants now whether it is new work or old. Do you know the secret of an enameled job is in the under-coat? It's like the foundation of a building—everything depends upon it.

Johnson's PerfecTone Under-coat is a perfect foundation—it is elastic, durable, non-porous, has great covering power, works freely under the brush and dries hard in from 18 to 24 hours.

Johnson's PerfecTone Under-coat will not run, sag, lap, chip, check, crack nor peel. It has wonderful smoothness and opacity—and will not absorb the enamel.

JOHNSON'S PERFECTONE ENAMEL and UNDER-COAT

Johnson's PerfecTone Enamel is exactly right for the expert finisher and will always give perfect results for the unskilled workman. It works freely under the brush and dries hard in from 18 to 24 hours.

Johnson's PerfecTone Enamel is very elastic—it will not fade—chip—check—crack or peel. The stock shades of Johnson's PerfecTone Under-coat and Enamel are White, Ivory and French Gray.

Won't you try Johnson's PerfecTone Under-coat and Enamel at our expense, so that you can see for yourself what beautiful effects may be procured? Use the attached coupon.

S. C. JOHNSON & SON, Racine, Wis., U. S. A.
"The Wood Finishing Authorities"
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Without any obligation to me, I am willing to try Johnson's PerfecTone Under-coat and Enamel. Please send me a pint of each Free and Postpaid. The best Dealer to carry your line of

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New Catalogs of Interest to the Trade

These catalogs may be secured direct from the manufactuer. If you prefer, write the date of this issue and the numbers of any catalogs on a postal and mail it to "Building Age," 243 West 39th Street, New York City, The catalogs will be sent you without charge or obligation.

277. White Pine in Home-Building. White Pine Bureau, St. Paul, Minn.—Handsomely illustrated booklet describing fully the qualities, availability and cost of White Pine. Descriptions accompany each house illustrated. An interesting article is contained, pointing out some of the important aspects of financing the purchase and building of a home.

278. Alpha Aids. Alpha Portland Cement Company, Easton, Pa.—No. 21 of this house organ deals mainly with everlasting concrete barns, containing a valuable article on concrete dairy barns. Some useful details of dairy barn construction are shown. A fully illustrated booklet accompanying this edition of Alph Aids treats of the adaptability of concrete for steps or stairs.

279. The Sharp Rotary Ash Receiver. The Sharp Rotary Ash Receiver Company, Binghamton, N. Y.—Book containing photographs of all types of buildings in which the Sharp Rotary Ash Receivers have been installed. Testimonials from the residents of these buildings are given. Illustrations of the different types of ash receivers are shown.

280. Smith Simplex Paving Mixer. T. L. Smith Company, Chicago, Ill.—Bulletin No. 409-A fully illustrates and describes the construction and operation of this paving mixer. Derrick equipment is also treated in this bulletin.

281. Square D Safety Switches. Square D Company, Detroit, Mich. Catalog No. 25 fully illustrates and describes the safety switches, steel enclosed industrial control switches, service entrance switches, motor starters, compensator type switches, plug receptacles, iron clad switches, meter protective trim, and a complete line of accessories manufactured by this company. Prices are given. Valuable data on electrical safety equipment is included.

282. The G & G Telescopic Hoist. Gills & Geoghegan, New York Ctiy.—Illustrated literature describing the various models of telescopic hoists manufactured by this company. Removing ashes by means of this equipment can be employed in practically all types of buildings.

283. "Be-Ver" Colored Cork and Rubber Composition Tiling. Beaver Tile & Specialty Company, New York City.—Illustrated booklet showing the various colors and designs in which these products are manufactured. Samples are furnished.

284. The Delco-Light Water System. Delco-Light Company, Dayton, Ohio.—Illustrated boklet describing how the inconvenience of pumping water for use on the farm can be eliminated by installing the Delco-Light water system, which is a silent automatic electric pump, self-starting and self-stopping. By means of this equipment, water can be had in all parts of the farm home merely at the turn of a faucet.

285. Character Paints for Mill and Factory. The Debevoise Company, Brooklyn, N. Y.—Illustrated booklet describing a system for definitely designating all of the various equipment in factory, mill or power plant. A color chart bearing the different colors of the Debevoise system and their respective connotations is shown. Mention is also made of other paints manufactured by this company.

286. Comfort with Economy in Heating. Richardson & Boynton Company, New York City.—51-page book going thoroughly into the subject of the heating system for the house. The four methods of heating, namely, by warm air, steam, vapor-vacuum-pressure, and by hot water, as well as the merits of each, are described. Numerous illustrations accompany the text.

287. The Kenney Shower. The Curtainless Shower Company, New York City.—Illustrated folder describing the two models of the Kenney shower manufactured, namely, the Congress and the De luxe models. The Kenney shower, with its converging streams, it is claimed, is far superior to the overhead type of shower. Photographs of buildings equipped with these showers are reproduced.

288. Permanent Protection. The Peerless Screen Company, Westbrook, Maine.—Catalog describing and illustrating the Peerless brand of window screens, porch screens and screen doors and the various styles in which these are manufactured.

289. Dampproofing Walls Above and Below Grade. The Hydrex Felt & Engineering Company, New York City.—Illustrated pamphlet describing two methods of dampproofing walls, one method being used principally above grade and the other below grade. Methods of acid-proofing and waterproofing floors is also described. Illustrations show method of application of the various Hydrex products.

290. Handbook of Hollow Building Tile Construction. The Hollow Building Tile Association, Chicago, Ill.—Extensive handbook representing the best methods and most recent development of modern engineering practice in connection with hollow building tile construction and fireproofing. This book is replete with illustrations of hollow building tile, and describes the many uses where it can be employed to advantage.

291. Housing Plans for Cities. The Southern Pine Association, New Orleans, La.—Booklet going thoroughly into the housing problem, and suggesting a plan for the financing of home building through Building and Loan Associations. A considerable portion of this booklet is devoted to the subject of industrial housing plans. Under the heading "Cities Make Elbow Room" the specific activities of various cities throughout the country are described.

292. Ivory Keene's Cement. United States Gypsum Company, Chicago, Ill.—An illustrated folder describing this cement which is a gypsum product and which,

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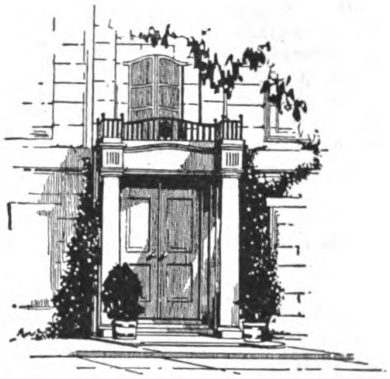
Architectural Harmony



WIELDING his baton, the orchestra leader brings each instrument into perfect harmony. A discord from the smallest piccolo spoils the musical rendition.

The Architect wields his pencil with similar results. He brings harmony out of a myriad of units. The smallest detail carelessly selected spoils the architectural masterpiece.

The hinge is a detail. But hinge selection is important! A creaking, squeaking hinge ruins architectural perfection—cheapens expensive workmanship and presents a discord where perfect harmony should prevail.

For fifty years McKinney Hinges and Butts have set a standard for Architects and Builders who take pride in the buildings they create. The name McKinney in a specification guarantees the client hinge satisfaction for life.

There is a McKinney Hinge or Butt, of proper size and design, to match any architectural plan—perfectly. If the McKinney illustrated catalog is not in your files we will gladly forward you a copy of the latest edition. You will find it valuable in making careful hinge selections, matching artistic surroundings and meeting unusual hinge demands.

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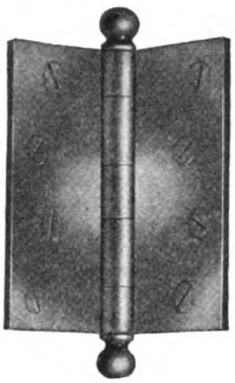

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it is stated, resists fire. Several testimonial letters are reproduced.

293. Heat for Your Home and Plenty of It.—Vesuvious Engineering Company, New York City.—Illustrated folder describing the operation of the Vesuvious gas-fired heating unit for hot water or steam heating.

294. Instruction on How to Use Briklath. Composite Metal Lath Company, Chicago, Ill.—Illustrated book describing this product, which may be used for thin wall construction; as a plastering surface for concrete; outside stucco work and all positions where mojsture may be encountered and danger from rust is present; for fireproofing steel columns, wooden beams and similar construction. Lathing and plastering specifications are included, as are also construction details.

295. Imported French Caen Stone Cement. Palmer Lime & Cement Company, New York City.—Catalog with specifications for the use of this Caen stone, which is again obtainable in the United States, will be furnished on request.

296. Vent the System and Avoid Trouble. Monash-Younker Company, New York City.—Booklet illustrating and describing the Monash valves for low pressure gravity heating systems for use in apartments, schools, offices, residences, public buildings, etc.

297. Best Practice in Hollow Metal Doors and Trim. Dahlstrom Metallic Door Company, Jamestown, N. Y. —Illustrated folder describing the Dahlstrom products which include all necessary interior trim, such as doors and trim, partitions, window sash and frames, casings, picture mouldings, wainscoting, and the like. A few standard and special styles, types and details are illustrated.

298. Estimating Cost of Double Wall Concrete Construction. Van Guilder Double Wall Company, Inc., Rochester, N. Y.—Instruction Book No. 36 points out the salient things which should be considered when using the Van Guilder system. Directions for using the Van Guilder double wall machines are also given. Illustrations accompany the text.

299. Novo Reliable Power. Novo Engine Company, Lansing, Mich.—Bulletins No. 11, 12, 13, 14, 15, 16, and 18 illustrate and describe the Novo line of hoisting outfits, rip and swing cut-off saw rings and combination woodworkers, diaphragm and centrifugal pumping outfits, high pressure pumping outfits, air compressor outfits, Pyramid and Century force pumping outfits and Novo engines respectively.

300. Suggestions for Fire-Resistant and Anti-Slip Tread Surfaces. American Abrasive Metals Company, New York City.—Illustrated book describing "Feralun" stair treads, floor and sidewalk inserts, door saddles, floor plates, trench covers, drainage gratings, expanion joint cover plates, coal-hole and man-hole covers, etc.

301. The Bank Builder. A. Moorman & Company, St. Paul, Minn.—July issue of house organ contains some interesting articles, the leading one being on beating the high cost of building, in which suggestions are made for the enlargement of bank quarters by the use of scientific arrangement and proper allotment of space without going to the expense of erecting a new building. Illustrations of bank exteriors and interiors accompany the text.

302. The Sanitation of Swimming Pools. Wallace & Tiernan Company, Inc., New York City.—Technical publication No. 21 illustrates and describes the W & T apparatus for use in connection with swimming pool sanitation. A list of some W & T installations is given.

303. Buffalo Fan System of Heating, Ventilating and Humidifying. Buffalo Forge Company, Buffalo, N. Y.—Catalog 700 resolves itself into a comprehensive handbook on heating, ventilating and humidifying for public buildings, industrial plants, etc. Illustrations, tables and charts accompany the text.

304. Alpha Aids. Alpha Portland Cement Company, Easton, Pa.—No. 22 of this house organ contains some useful information on the subject of concrete, the leading article dealing with the decorative possibilities of concrete. Another article relating to the building of a concrete ice house gives some valuable data. This book is extensively illustrated.

305. Delco-Light Electricity. Delco-Light Company, Dayton, Ohio.—47-page pamphlet containing some valuable data on the subject of electricity, such as the different electrical terms and their meanings, proper size wire to use, etc. Magnetism and ignition are topics that are given considerable mention. Several pages are devoted to questions and answers, which, together with the illustrations shown, help to make the text clear.

306. Stratton Air Separator. The Griscom-Russell Company, New York City.—Bulletin No. 1111 describes and illustrates the construction and operation of this air separator, which is used for the removal of water from compressed air. A partial list of users of the Stratton air separators is given.

307. Standardized Metal Caging for Fireproof Buildings. Mitchell-Tappen Company, New York City.—Bulletin No. 14 illustrates and describes this metal caging. Typical structures protected with this caging are reproduced. Directions for applying this material are included, as also are prices.

308. Rocbond Stone-tone Stucco. The Rocbond Company, Van Wert, Ohio.—Book containing numerous photographs of houses on which Rocbond Stone-tone stucco was used. Letters from satisfied customers are reproduced. Specifications for Rocbond Stucco are given.

309. Better Roofs at Lower Cost. Howell, Field & Goddard, Inc., Long Island City, N. Y.—Broadside illustrating and describing the Mabie 6 in 1 shingle attachment, a new development in the roofing trade. It is claimed that a saving of $5.00 on every square of asphalt shingle roof is effected by means of this device. Method of laying is given.

310. Better Electric Lighting on the Farm. Benjamin Electric Mfg. Company, New York City.—Bulletin 18 points out the advantages of using electricity on the farm. Benjamin weatherproof outdoor fixtures, electric farm signals, etc., are described and illustrated and their prices listed.

311. Clinton Mortar Colors. Clinton Metallic Paint Company, Clinton, N. Y.—Illustrated booklet describing these mortar colors which are made in a variety of shades, all of which are made both in dry form and in pulp or paste form. Instructions for mixing mortar colors are given. Several buildings in which Clinton Mortar colors have been used exclusively are shown. Samples of the different shades in which these mortar colors are manufactured are also shown.

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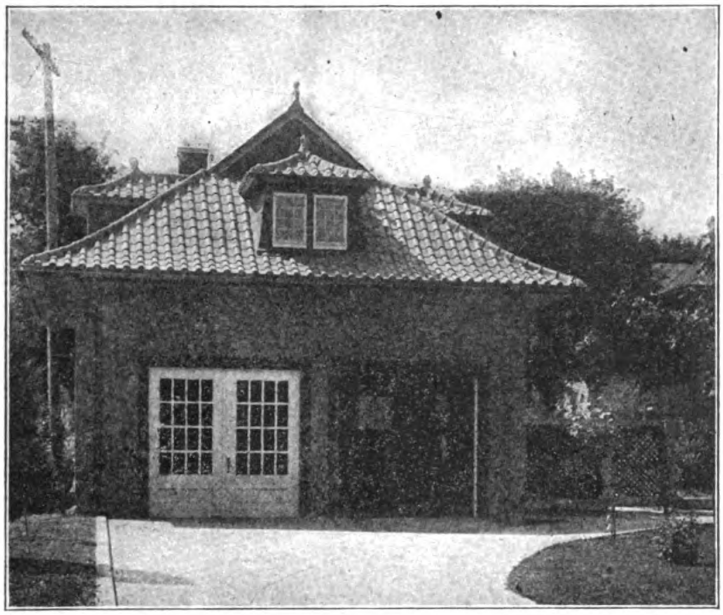
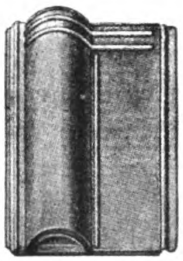
"TITE-LOCK" TRADE MARK

Spanish Metal Tile





Is the Tile Worth While

It's the tile that will not chip or crack. It doesn't require the expensive roof support of other tile, because it isn't so heavy. There is nothing more artistic or massive appearing, however, than "TITELOCK" Spanish Metal Tile. It is more durable than other tile, is fire and lightning proof and reduces insurance cost approximately 10 per cent.

"TITELOCK" Spanish Metal Tile is adapted to the best class of residences, garages, churches, schools and public buildings.

Made of I. C. or I. X. Tin, painted or galvanized. The galvanized tile is galvanized after formed. Also made of "TITE-COAT" Galvanized Steel.

"TITELOCK" Spanish Metal Tile is the most durable tile made. The initial cost is less, the life of the tile is longer, and expense of repairs nothing. Try "TITELOCK" Spanish Metal Tile.

Safety Roof Circular Sent on Application

MILWAUKEE CORRUGATING COMPANY
MILWAUKEE, WIS.
Branch at Kansas City, Mo.
Minneapolis Sales Office: Lumber Exchange

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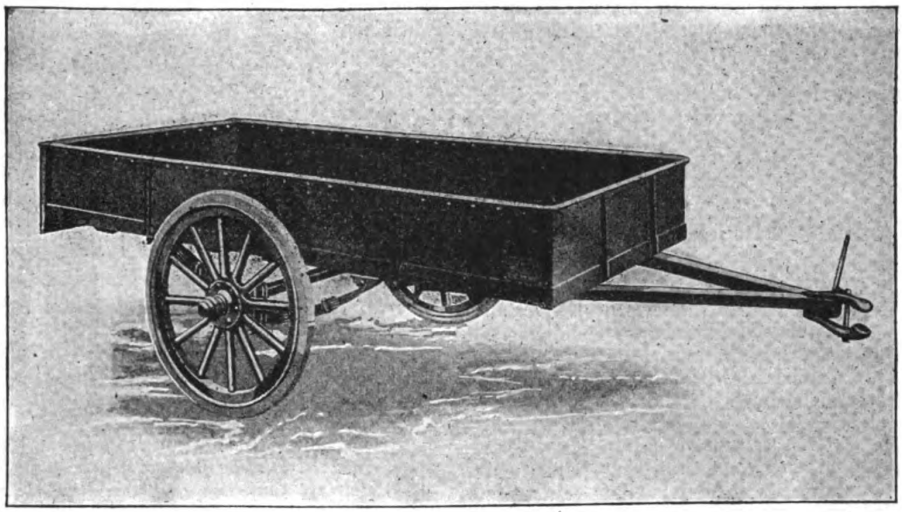
CONTRACTOR'S HANDY AUTO TRAILER

SPEED — ECONOMY — STRENGTH



Capacity—2,000 pounds. Body—8 feet long, 46 inches wide, 12 inches high. Body and under frame built of open hearth steel. Axles—1½ inch square bed, special high carbon steel. Springs—Semi-elliptic, oil tempered and double heat treated. Bearings—Roller. Wheels—1½ inch spoke, artillery type, second growth hickory. Tires—32-2, solid rubber. Weight—534 lbs. Other models with gates at front; also extension tongue which permits carrying lumber, poles, ladders, etc., 30 feet long.

Write for Catalog A

ALL STEEL TRAILERS — EVERY TYPE — 1 TO 10 TONS CAPACITY

ROGERS BROTHERS COMPANY **Albion, Penna.**

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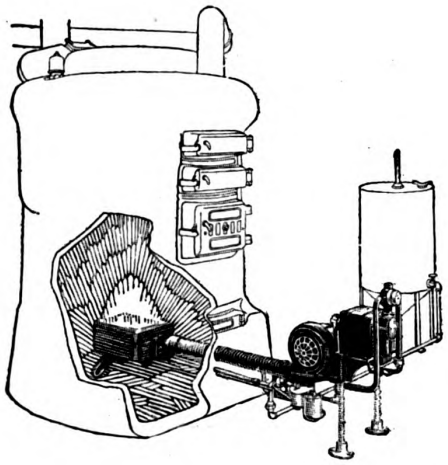
New Goods of Interest to Builders

Fuel Oil Burner for House Heating

An even, intense heat without ashes, smoke or similar inconveniences is now available for house-heating plants. Every home owner who wants to eliminate the ash carrying job will "warm up" to "Nokol" when the contractor explains that it is also automatic in operation.

"Nokol," an oil-burning apparatus for residence heating plants, is put on the market by The Steam Corporation (division of Amalgamated Machinery Corporation), Chicago, Ill. Its principal parts are a thermostat centrally



located, and connected with an electrical control box attached to a blower or an atomizer, a combustion chamber housing a constantly burning pilot light and an oil storage tank. The installation requirements are a heating plant in good condition, steam, hot-water, vapor vacuum or warm-air type, 110-volt direct alternating current to run blower and gas supply line for pilot light.

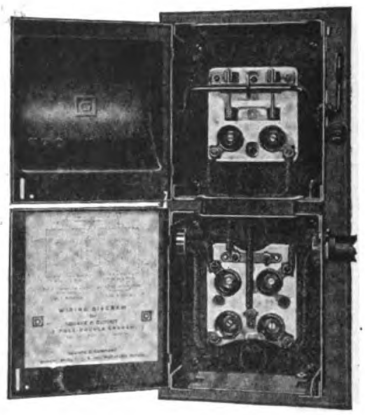
This apparatus burns kerosene, and some other fuel oils, depending upon the locality in which they are installed. The accompanying cut shows the method of installation in a heating boiler.

New Safety Enclosed Cut-out

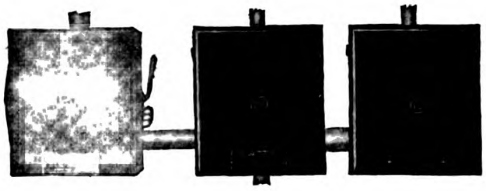
For some time there has been an insistent demand on the part of the contractors for a standardized Enclosed Cut-Out for use in connection with Square-D Switches. Heretofore when a cut-out was needed, the contractor had to secure a cut-out and place it in a metal box, or leave it exposed. This method proved unsatisfactory, since it was impossible for the average contractor to carry a stock of two different types of cut-outs and a stock of metal boxes; his time was too valuable to be spent in making equipment that might better have been manufactured complete; he did not care to have his reputation as a careful workman spoiled by an unsightly job.

So what he demanded was a cut-out box completely assembled ready for immediate installation. An enclosed cut-out that could be easily connected with Square-D Switches—that would give the appearance of a neat job—that when used in connection with Square-D Switches would completely enclose the entire circuit, thus removing the last electrical fire and accident hazard in the building—a standard cut-out for all occasions.

It is in response to this insistent demand on the part of contractors for standardized electrical equipment that the Square-D Company of Detroit has manufactured and put on the market an enclosed branch circuit cut-out adapted for use in connection with Square-D Switches.



The double branch cut-out is arranged for two wire distribution from either two or three-wire service. The box is



equipped with a latch so that it may be locked or sealed shut and is provided with knock-outs so that distributing circuits may be carried out in the most convenient manner.

A Screw which Holds

The Stine Screw Holes Company, Waterbury, Conn., manufacture a screw hole that remains intact no matter how often the screw may be placed or removed. These are



made for either wood or machine screws of all sizes. The head is placed to drive the hole without injury by a hammer, and is then removed, leaving a permanent hole.

A Diamond Pattern Asphalt Shingle

A new asphalt shingle, known as the Monarch Radiant shingle, possessing many meritorious features, has recently been placed on the market by the Stowell Mfg. Company, Jersey City, N. J. The shingle is slate surfaced, and most simple to lay, thus reducing the cost of finished roof. They may be laid over either the usual base or may be placed directly over old wood shingles, which need not be removed, provided they are not rotted. Due to the method of fastening, they are non-curling.

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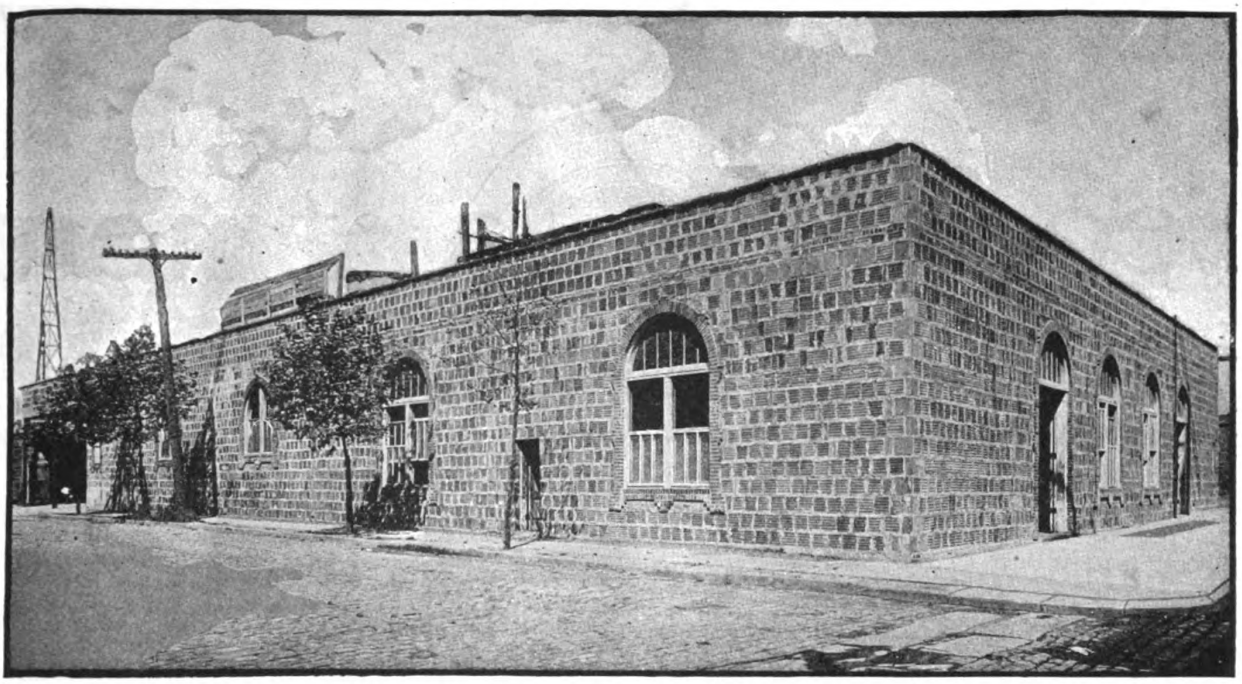

An ice plant of Hollow Tile ready for the stucco finish

A Low Cost Method *for Industrial or Business Buildings*



Hollow Tile Garage Plans, $2.00

Your building material or lumber dealer can supply you with a complete set of working drawings, specifications and bills of material for this permanent, fire-resistive garage for $2.00 a set. If more convenient, order from this Association and give us your dealer's name. This garage design is No. 1097.

COSTS are the vital factor in building today. The low cost of Hollow Tile is an important element favoring its use, although one must also keep in mind that it affords high grade, permanent construction.

For business or industrial enterprises, the cost of erecting and maintaining a building reflects directly on profits and plays an important part in determining the success of the venture.

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Hollow Tile is burned clay, made in large units with two or more air cells. The size of the units permits rapid laying at a low labor cost. The everlasting burned clay defies the action of time, and resists fire. Its permanence greatly reduces depreciation and upkeep expenses. The air cells insulate against temperature changes, maintaining coolness in summer and warmth in winter.

Become familiar with Hollow Tile construction methods without delay, as it is rapidly becoming a most popular way to build. Our Service Department will gladly assist you with any problems. Write for our "Manual of Hollow Building Tile" explaining every element in the use of this material. Address Department 1910.

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THE HOLLOW BUILDING TILE ASSOCIATION

REPRESENTING AMERICA'S LEADING MANUFACTURERS

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Legal Department

The Law of Building Restrictions—and when Is a House a Two Story One?

From W. H. F., N. J.—What constitutes a two-story house for a single family home? My deed contains a clause providing that a dwelling-house constructed on my lot "shall not be less than two stories in height and cellar underneath." I plan to build a house of bungalow type with cellar 7′ 6″ clear; first floor, 8′ 6″, and second floor, 8′.

(A blueprint showing side elevation of bungalow is presented.)

The second floor is to be finished the same as the first, and will contain a hall, two bedrooms, tiled bathroom, sleeping porch, and an attic for storage. Builders and others say that I will not violate the building restriction, but the corporation from which I bought the lot say that I must change my plans or stop work.

Answer.—We are of the opinion that you are in the right, as supported by the views of the builders. But the controversy, if carried into the courts, would permit a quibble on the part of attorneys for the corporation under a claim that you purpose building not a two-story house, but only a story and a half one. On the whole, however, if the company is carefully advised, I do not believe that they would go to the extent of bringing an injunction suit unless for the purpose of harrassing you.

The field for quibble is opened by the circumstance that there appears to be no direct pronouncement by any court of high authority as to just what constitutes a "story" in a dwelling house. But it is our view that a bit of research will put the question beyond reasonable ground for dispute and solve it in your favor.

In the first place any doubt as to the meaning of the word "story" must be resolved in your favor. "Restrictive covenants are to be strictly construed against the person seeking to enforce them, and all doubts must be resolved in favor of natural rights and a free use of property, and against restrictions. Hence, ordinarily, the construction will also be most favorable to the grantee. . . . Nor will a restriction be enlarged or extended by construction, even to accomplish what it may be thought the parties would have desired had a situation which later developed been foreseen by them at the time when the restriction was written. So where the character of buildings prohibited is specified in detail buildings of any kind not expressly excluded may be erected. . . . Further, where the language of the restriction is clear the parties will be confined to the meaning of the language which they have employed. . . . Words used are to be taken in their ordinary and popular sense unless they have acquired a peculiar or special meaning in the particular relation in which they appear," etc. (18 Corpus Juris, 387-388.)

There is nothing in the facts before us to show that the word "stories" was used in any other sense in the deed than as defined by the dictionaries. Therefore it should be given that meaning.

Century Dictionary says that a "story" is "a stage or floor of a building; hence a subdivision of the height of a house; a **set of rooms on the same level or floor.**"

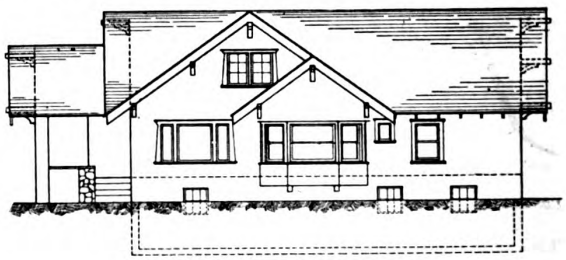

Fig. 1.

No dictionary makes uniformity of height of walls of rooms on a level an essential to constitute it a story.

That the courts are inclined to follow dictionary definitions in these matters is shown by the few cases in which appellate courts have been called upon to deal with the meaning of the word "story."

In the case of Lagler vs. Bye, 42 Indiana Appellate Court Reports, 592, there was under consideration a statute requiring builders to install temporary flooring for the safety of workmen in constructing buildings "three stories in height or more." The court said: "The definition of the word 'story,' which we think is of most general acceptance, is 'a set of rooms on the same floor or level; a floor or the space between two floors.'—Webster's Dictionary. **A story is therefore a horizontal, physical division of a house."** This judicial definition fits the case presented to us.

In the case of Cleverly vs. Mosely, 148 Mass., 280, the question was whether a certain house had been properly described as being one, the first two stories of which were of stone and the third of wood. It appeared that there was a basement projecting five or six feet above ground, and that it had windows about

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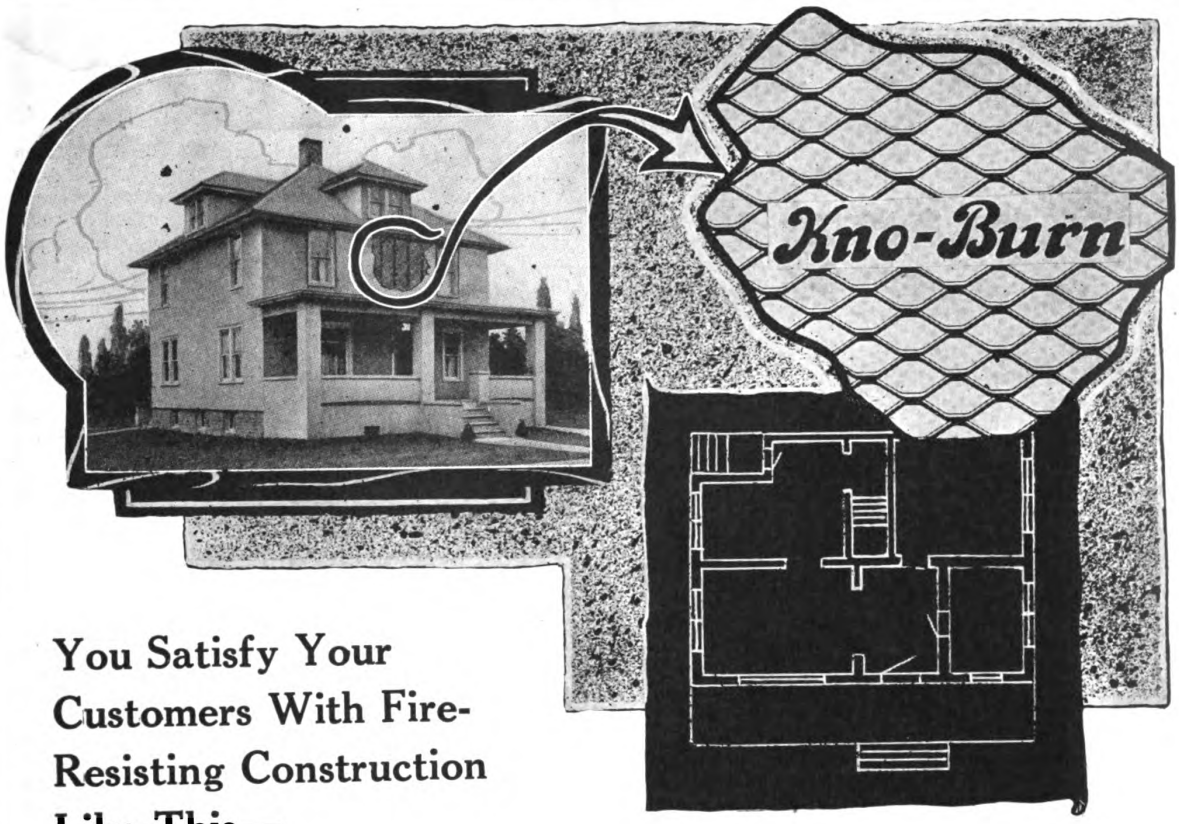

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This is the kind of work you *like* to do—strong—durable—permanent—fire-safe. "Metal lath stops fires—prevents cracks."

Every year an equivalent of 11,000 $6,000 homes are ***burned up***. Last year more than 70% of the fires occurred in residences and more than 23,000 lives were lost. An appalling loss! Some day, if not just now, your clients are going to ask you to build fire-safe homes, nothing less will satisfy them.

There is already a strong sentiment growing in this direction. October 3rd to 9th is Fire-Prevention Week, also Metal Lath Week. One object of this is to urge people to build for safety—for protection, so as to stop this enormous life and property loss, by using fire-resisting materials, such as KNO-BURN Metal Lath.

Kno-Burn

METAL LATH

Kno-Burn Metal Lath is a fire-preventative—an economical construction material. Used extensively throughout the country by contractors and builders as a base for exterior stucco and interior plaster.

Send for our book "Fireproof Construction," no obligation. You will find it a big help.

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one-half the size of ordinary windows. The Massachusetts Supreme Judicial Court said:

"If the lower part of it was called a basement it was according to the definitions of lexicographers and the common understanding of the word—a story of the building."

That the upper floor of a house, although even not furnished for living purposes, may constitute a "story" is shown by the Universal Dictionary's definition of a garret-story as "the uppermost story of a house."

That it is generally understood that a basement and attic constitute stories when not otherwise specified is shown by the language of the deed involved in the case of Keening vs. Ayling, 126 Mass., 404. There the clause was that "no buildings which may be erected on said lot shall be less than three stories in height, exclusive of the basement and attic." There the draftsman of the deed plainly understood that unless basement and attic were expressly excluded they might be counted as "stories." So, too, the person who drew the deed now before us guarded against the possibility of a misunderstanding as to a cellar being counted as a "story" by specially mentioning the cellar.

I find but one New Jersey case at all touching the question—Tenement House Board vs. Schlechter, 83 New Jersey Law Reports, 88—and it is not squarely decisive of the question before us. The question there involved was whether a basement should be counted as a story in determining whether a building was more than three stories high and therefore subject to the provisions of a fire-escape law. The court noted that the law did not define what should constitute a story, but that the statute defined a basement as a story not more than one-half below the level of the grade. Another section defined a cellar as a story more than one-half below the level of the curb, but provided that it should not count as a story in computing the height of a building under the fire-escape law. This case is merely cited as showing that the New Jersey Legislature has given a broad interpretation to the word "story."

One more appellate court decision is worth citing. It is that announced by the Massachusetts Supreme Judicial Court in the case of Smith vs. Bradley, 154 Mass., 227. It was decided that a restrictive covenant in a deed against erecting a building that should have an L more than two stories high did not forbid a building four stories high without any L. The following language of the court is here pertinent:

"Restrictions of the character of those which we are considering are to be interpreted fairly and reasonably, and according to the apparent purpose of protection or advantage to the several estates which they are intended to secure or promote. . . . While they are not to be narrowly construed, they are not to be unduly enlarged. . . . It is possible that, if the original grantor had anticipated the erection of a building like that which the defendant is about to put up, it would have inserted in its deeds some restriction to meet it. It is also possible that it did anticipate it, and the restrictions which the deed contains embody all that the original grantor thought wise to insert."

It it appears that in the city where W. H. F. lives there is a custom of fire insurance agents to treat houses of the type he purposes to build as a "two-story" house that will help his position somewhat. The law editor of THE BUILDING AGE is advised that in the city in which he lives insurance agents treat a house with two floors and studding at least 16 feet long as a two-story house, especially when the upper floor is finished for living purposes.

There would be nothing to prevent W. H. F. from building a square frame house of old-fashioned type, with a flat roof reaching no higher than this roof will reach. And I cannot see where he is deprived of equal rights to construct an up-to-date bungalow with rooms finished upstairs. If it was intended to deprive him of that right the intention fails for lack of clear expression. Summer does not lose its character as such by a few chilly days, and a "story" does not lose its character as such by reason of having rooms with somewhat irregular walls.

Ownership of Materials on Premises

A contract was made between an owner and a contractor for the erection of a building. The contract contained a provision that if the contractor defaulted the owner could enter and take all materials on the ground and use them in the completion of the building. The contractor sublet a part of the work to another, who shipped the material he expected to use to his own order to be delivered on the premises, and it was delivered. Before the subcontractor used the material, the original contractor defaulted, and the owner took possession of the materials of the subcontractor and used them to complete the original contract. The only evidence of transfer of title to the contractor was the delivery of the material on the ground in the manner above set out, and the fact that the subcontractor had charged on his books of account the amount of the entire contract price to the contractor.

Under these circumstances the New Jersey Court of Errors and Appeals holds in the case of Jacobi vs. Board of Education of Morristown, 109 Atlantic Reporter, 345, that the facts did not permit an inference that the subcontractor had passed the title to the materials to the principal contractor, so as to subject them to the terms of the principal contract and entitle the owner to take possession of them.

Validity of Damage Clause in Building Contract

Although the courts throughout the country seem to recognize the rule of law that provision in a building contract for assessment of a daily penalty against the builder for delay in performance of his agreement will not be enforced where the actual damage is manifestly less than the sum of the penalty, it was lately held by the Texas Court of Civil Appeals in the case of Wright vs. McAdams Lumber Company, 218 Southwestern Reporter, 571, that provision for payment of $5 a day for delay in completing a dwelling, garage and barn costing $8,750 was valid and enforceable.

In this connection it is interesting to also note the decision of the Michigan Supreme Court in the case of Board of Education of City of Sault Ste. Marie vs. Chaussee, 177 Northwestern Reporter, 975, that when performance of a construction contract is prevented by the owner such contract damages cannot be recovered for delay, and where the delay is due to the fault of both parties the court will not attempt to apportion damages.

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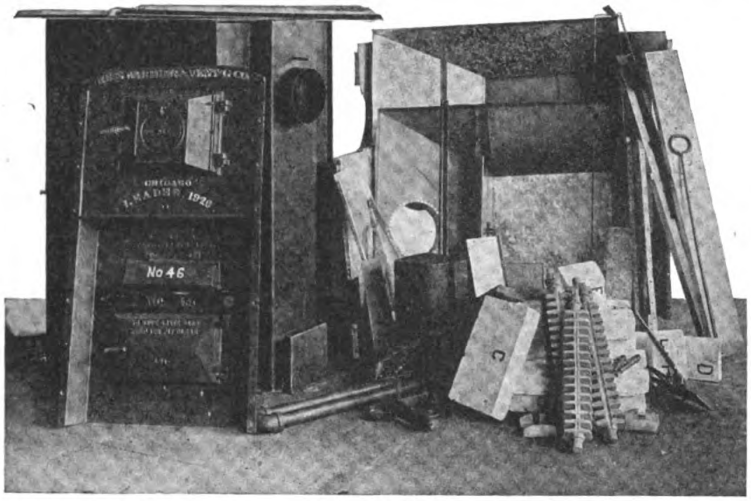
The Hess Welded Steel Pipeless Furnace



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You can install it yourself with a few simple tools and when you have completed it, it looks like the furnace shown in the lower cut. WE MAKE PIPE FURNACES ALSO.

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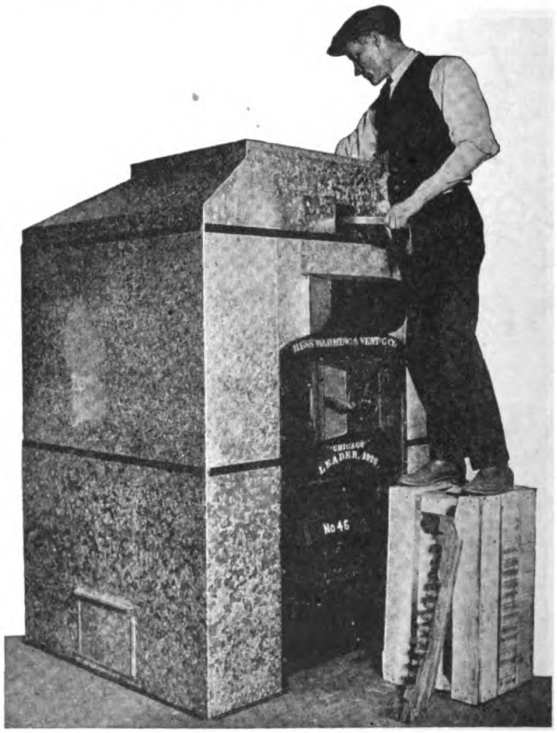

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This Mixer will put you in position to do all kinds and classes of concrete work. It will enable you to work faster, do more work, do bigger work, do better work—and will help you build up a permanent and substantial business.

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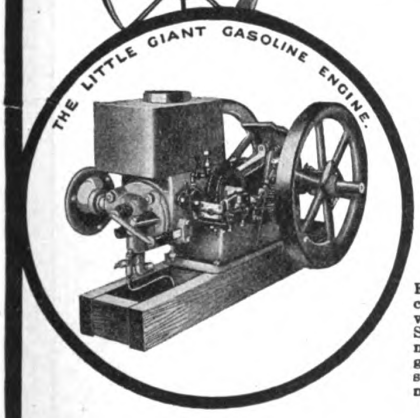

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With this wonderful machine and two men you can do as much work as you formerly did with six men. And you can do it easier, quicker and better, producing an absolutely uniform batch every time. It will mix 4½ to 5½ cubic feet per batch—can be speeded up to a batch every minute—over 2,000 cubic feet per day. It is the most practical and efficient mixer made—scientifically constructed of the best materials—light in weight, portable, simple and durable. Backed by the Aloe iron-clad guarantee to give the utmost service and satisfaction.

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Fitted with 2½ horse-power four cycle, horizontal gasoline engine with high-grade Webster magneto. Simple, powerful, reliable, economical—requires only two gallons gasoline a day. Protected by all-steel housing. Two doors at rear make it easy to get at.

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So confident are we the Magic Mixer will please you in every way we will gladly send it to you for 10 DAYS FREE TRIAL on payment of only $25.00. Take it out on your jobs—put it to the most severe tests. Then, if you can be induced to part with it again ship it back at our expense—and we will promptly return your money without a word.

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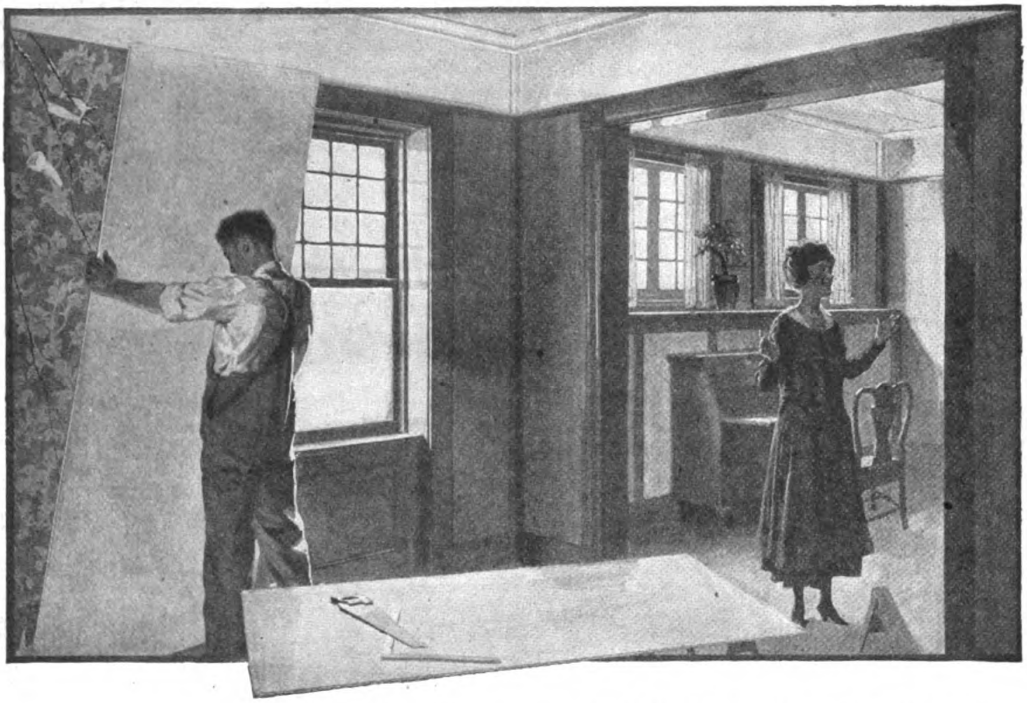

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Black Rock is both attractive and distinctive. Its moisture-repellent black center is a quality feature that's quickly recognized. It is surface-sealed and sized on front and back; no priming coat is necessary before painting; it cannot crack; it resists climatic conditions to the extreme. Black Rock Wallboard is for sale nearby. Let us tell you the dealer's name.



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DUPLEX TRUCKS

BUILT FOR BUSINESS



IN a run from Los Angeles to El Centro via San Diego with a 3060 pound load, it made 267 miles in 8 hours 26 minutes—an average speed of 34 miles per hour. It went the full distance without a stop and the speed limit was observed in all towns in transit.

Another Limited running from New Orleans to Baton Rouge, 124.6 miles, carrying 3750 pounds, made the distance in 6 hours, 55 minutes running time.



The Only Motor Truck With All These New Features In It

Read These Features—Think What They Mean—And You Will Agree That Here Is a Truck That Must Be a Wonderfully Good Investment

YOU know what's the need of the hour in trucks. If you have been a truck user for any length of time you have probably had some experiences that have given you an entirely new angle on motor trucks and their value.

You don't need to be told of the shortcomings of the old truck standards, but you probably are tremendously interested in learning about the real features of a truck that you can depend on.

It is on this basis of honest value to you and to every other user that the Duplex Limited is made and sold.

Do you know that the Duplex Limited is probably the fastest and most rugged truck of its size and capacity in America.

Do not make the mistake of thinking that this truck is merely a speed truck. It isn't—its a strong, rugged truck built to carry 3000 to 5000 pounds and it gets its speed from motor power—not gear ratio.

Built and designed for pneumatic tires—standard tread—it takes roads as they come and averages express train speed. It has probably the most perfect balance ever developed in a truck. Friction is saved everywhere possible by using ball bearings throughout. Scientific tests show that it takes 29 times less power to move a given load when ball bearings are used as against any other type. This wonderful balance and almost frictionless running makes a big saving in gasoline.

You get further saving in gasoline because the truck has complete electric equipment, including starter. That means that the driver *will* shut off the motor when the truck is idle and he will save you from 2 to 4 gallons a day that way alone.

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This eliminates at one stroke the greatest single source of radiator leakage and consequent motor damage from overheating.

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See the Duplex dealer near you—he will give you any demonstration you want and let the truck speak for itself. He is a responsible man—he will not exaggerate and he stands ready to back up, as we do, every truck that bears the name "Duplex." Get the facts about the Duplex Limited.

Write us direct for details about the two wonderful runs of the Limited and also for free copy of "DUPLEX DOINGS," the Truck Users' Magazine.

For heavy duty, the Duplex 4-Wheel Drive is everywhere admitted to be in a class by itself. Power in every wheel, 3½ tons capacity—it keeps going as long as the wheels touch ground and for heavy work is without question the most economical truck in America.

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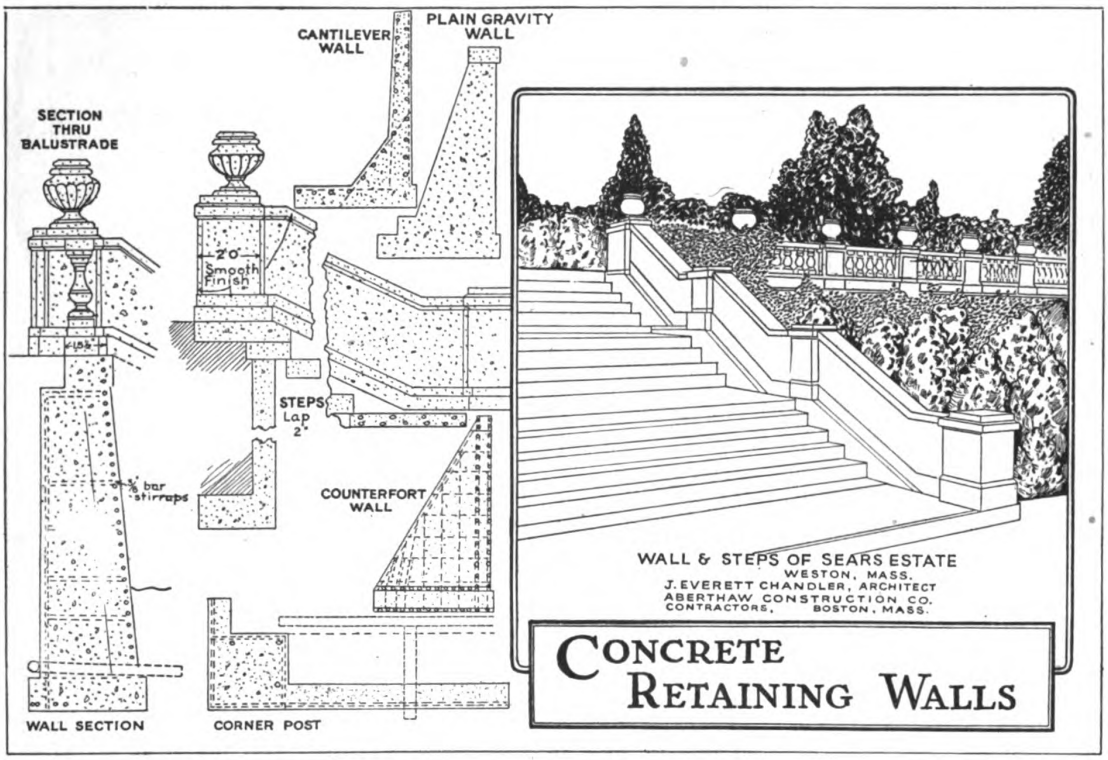
Get these Practical ALPHA service sheets on Concrete Construction



The above illustrations give an idea of the practical suggestions offered by the ALPHA Blueprint Service Sheets and Special Bulletins, which cover the following concrete improvements:

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Walkways and Driveways	Small Dam	Barn and Silo	Piers for Small Boats
Concrete Roads	Milk House	Corn Crib	Garden Furniture
Bridges and Culverts	Ice House	Storage House	Greenhouse
Foundation and Hatchway	Manure Pit	Smoke House	Coal Pocket
Gutter and Curb	Septic Tank	Hog House	Post and Walls
Storage Cellar	Oil Storage Tank	Poultry House	Walls, Sills and Lintels
Small Warehouses	Tennis Court	Dipping Vat	Garages and Runways
Overcoating of Old Dwellings		Porch, Cellar and Stable Floors	Winter Concreting

If you live east of the Mississippi, ask for the ALPHA handbook on concrete construction, a free copy of the Sheet or Bulletin that interests you most and for a copy of ALPHA AIDS, our magazine. We are obliged to ask those living out of our sales territory to send 50 cents to cover printing and mailing expense. Mention BUILDING AGE.

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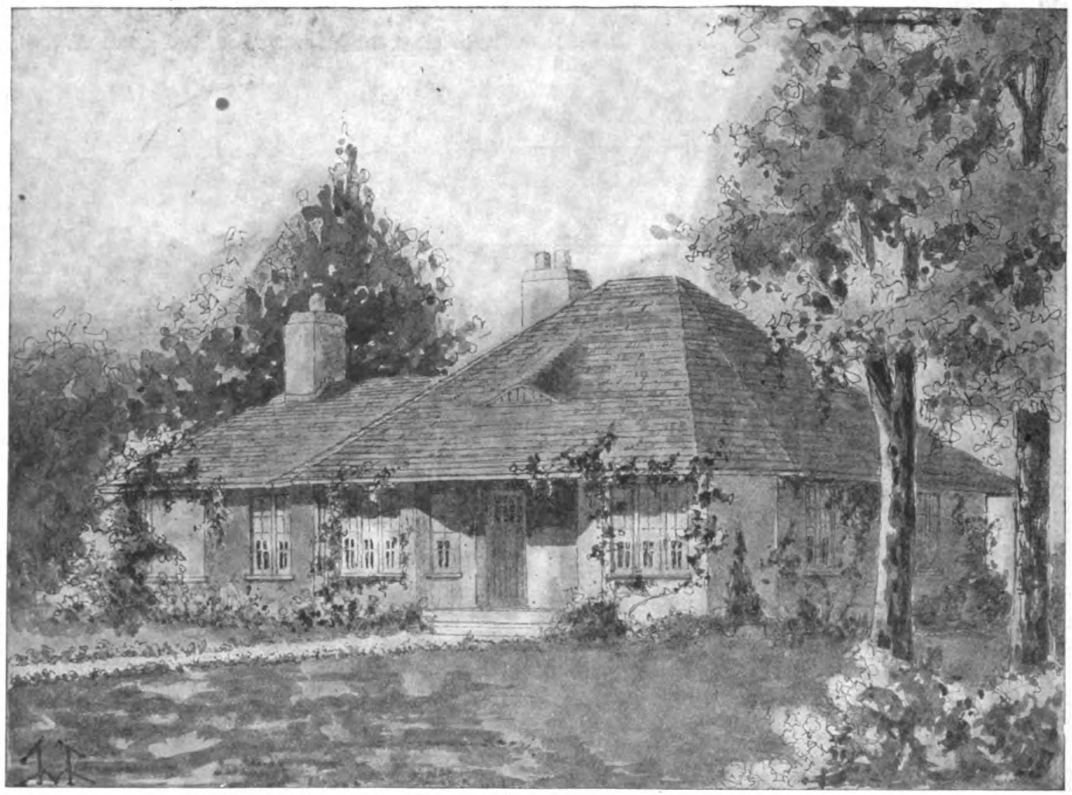
For the woman who does her own work



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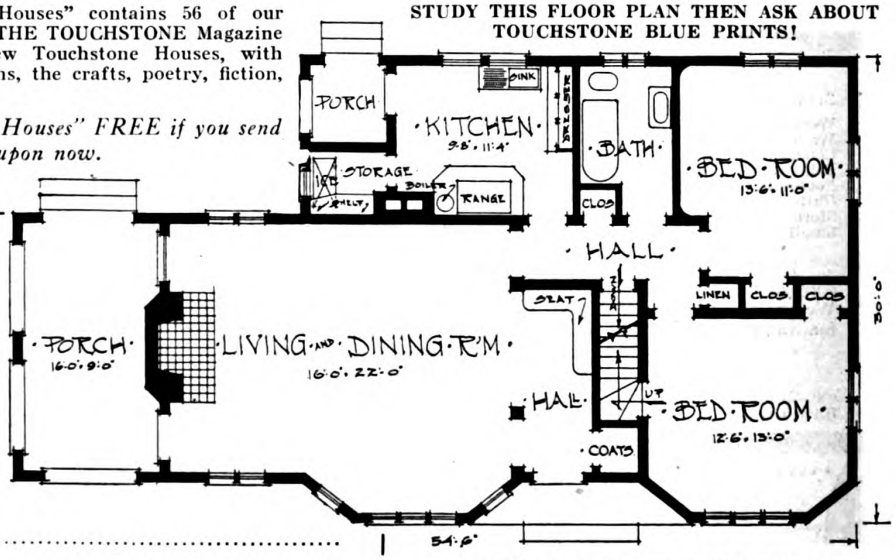

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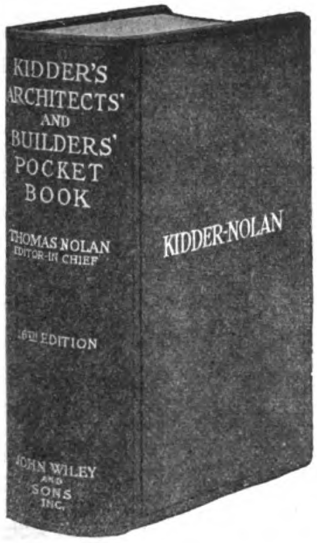

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This New Kidder is divided into three sections: *Part I,* which contains 90 pages, explains the practical application of arithmetic, geometry and trigonometry. This data has been carefully checked and much of the matter rearranged. *Part II,* with its 1,324 pages, treats the materials of construction and strength and stability of structures. All the matter in the 28 chapters included in this section are special essays by experts. Reinforced Concrete Mill and Factory Construction is one of the new subjects given in this edition. *Part III* contains 358 pages of miscellaneous data and much new matter has been added, such as extended tables of specific gravities, weights of substances, architectural acoustics, waterproofing for foundations, the new quantity system of estimating, etc. One of the most important changes is the recalculation of the tables and problems relating to unit stresses, especially those for the different woods. These were changed to conform to the latest engineering practice. The derivation of many of the formulas used has been explained, and numerous cross references enable the reader to use the New Kidder as a text book for certain parts of the mechanics of materials as well as a handbook for office work. The tables of the properties of structural shapes, of safe loads for columns, beams and girders have been revised and many new tables added.

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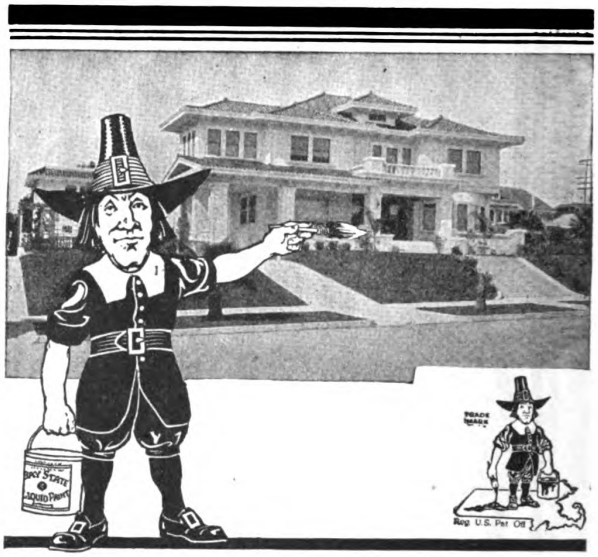

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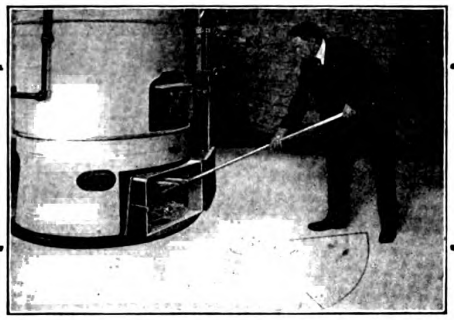

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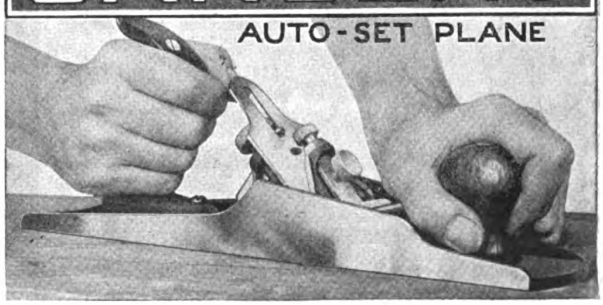

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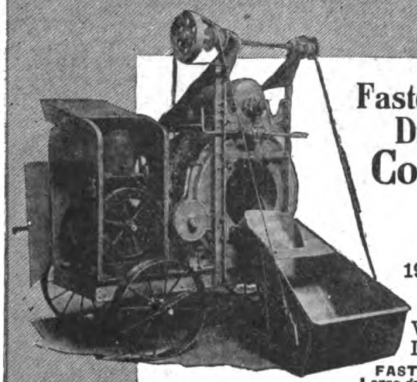

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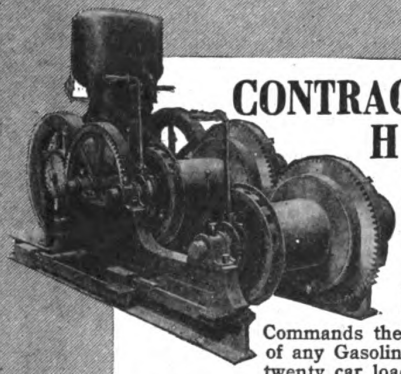

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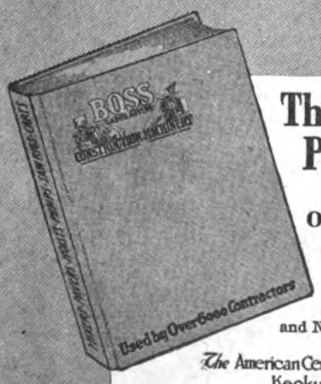

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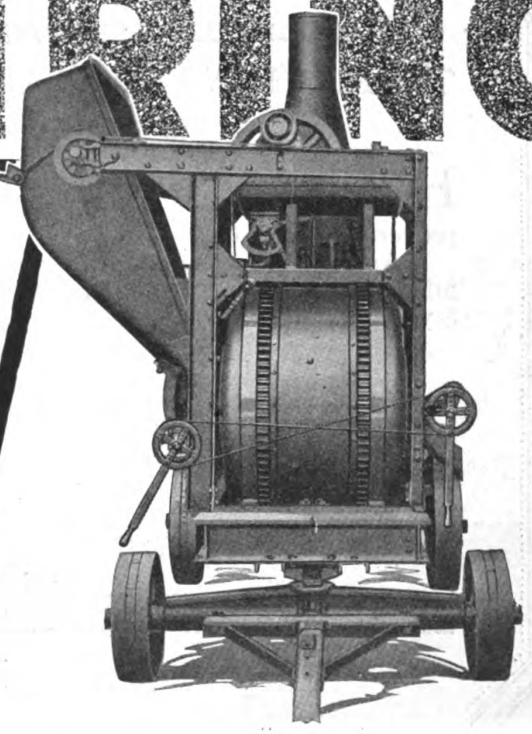

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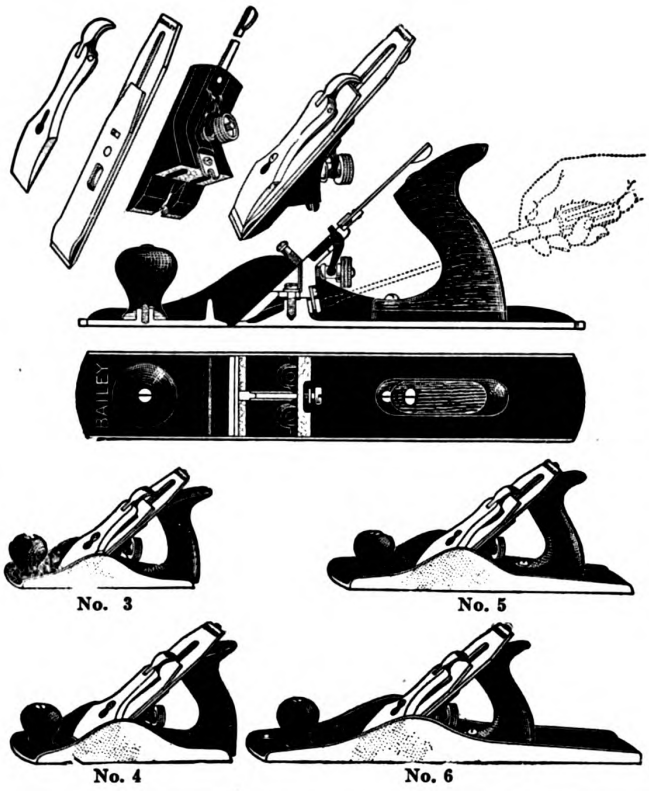

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The handle and knob are made of highly finished, thoroughly seasoned rosewood.

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With this hardware you can use
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Better Ventilation and Better
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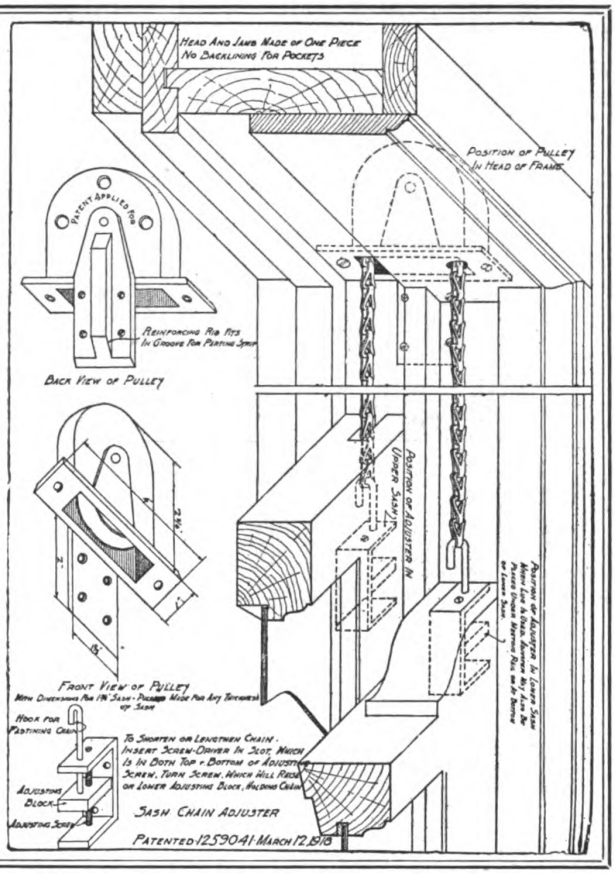

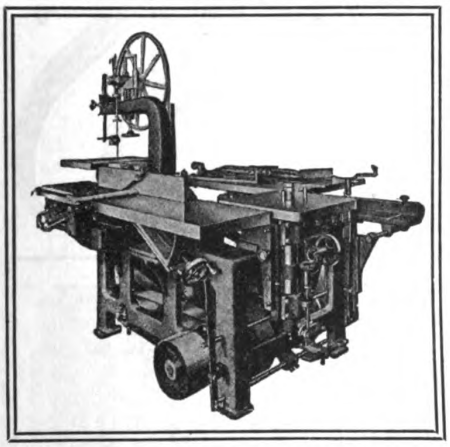

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Eliminates the loss of time and money involved in sawing, shaping and boring by hand.

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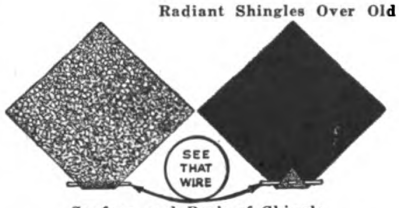
Exclusive Features You Require



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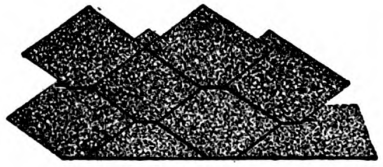
Impossible to curl
Under any condition.
Less nails than any other shingle. Looks same on old wood shingles as new roofs.



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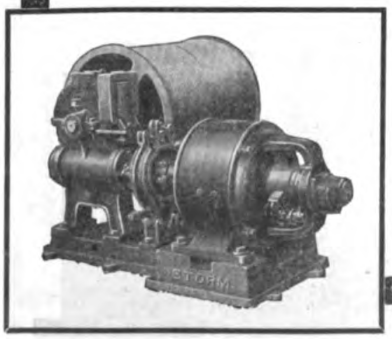

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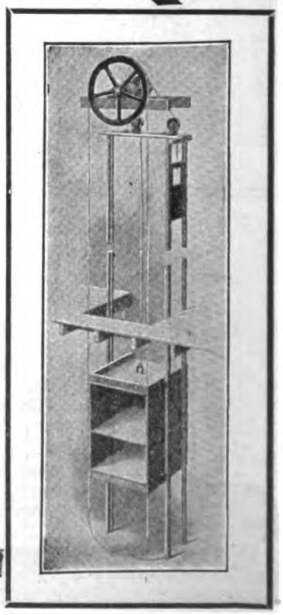

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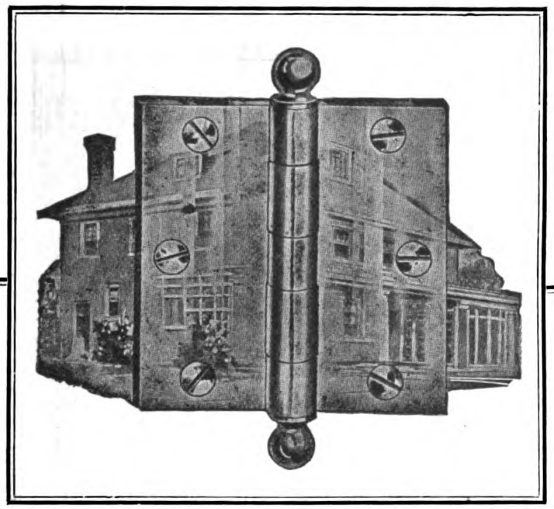

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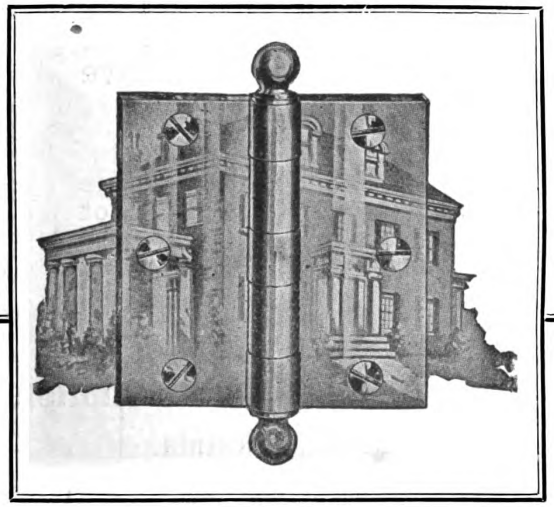



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The *material* from which it is made, the fact that the pulp is *chemically cleansed* and that the *fibre lengths* give the finished product that *natural reinforcement* that is lacking in ground wood boards, is in itself a guarantee of the superiority of Fiberlic for *strong, permanent, economical* and *sanitary construction.*

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for building reinforced concrete
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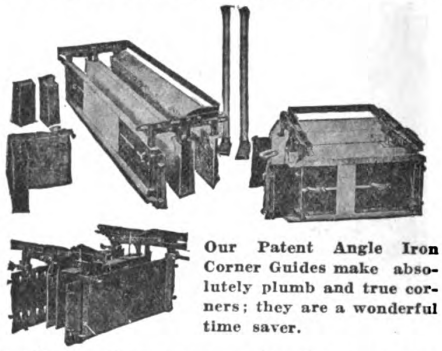

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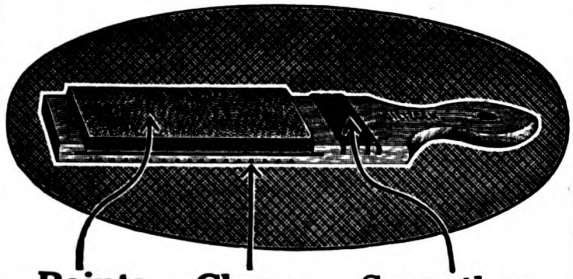

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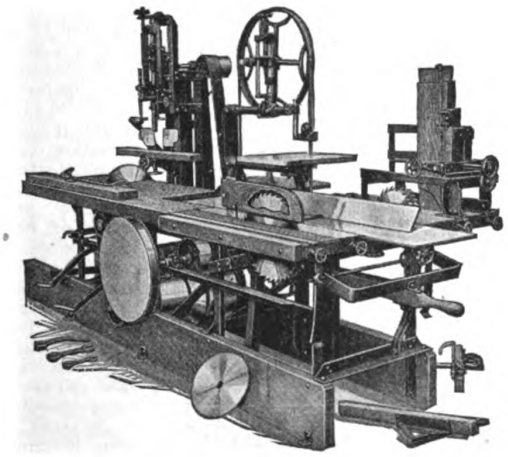

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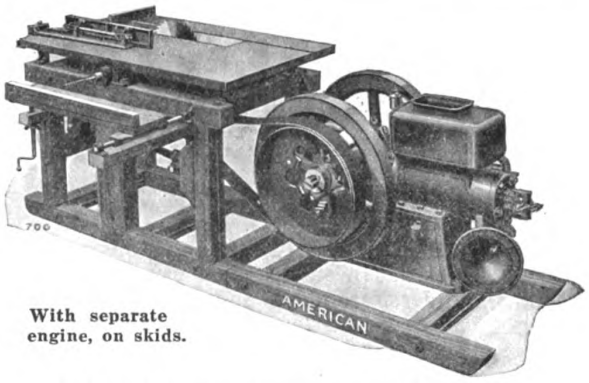

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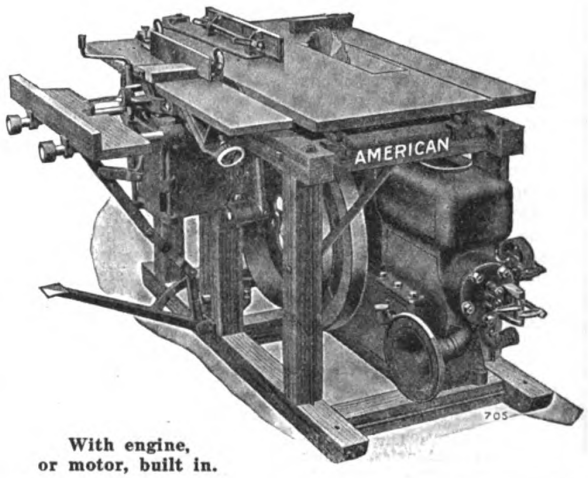

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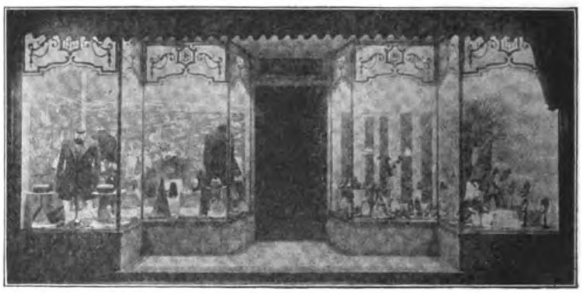

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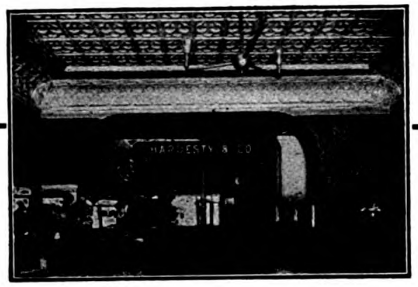

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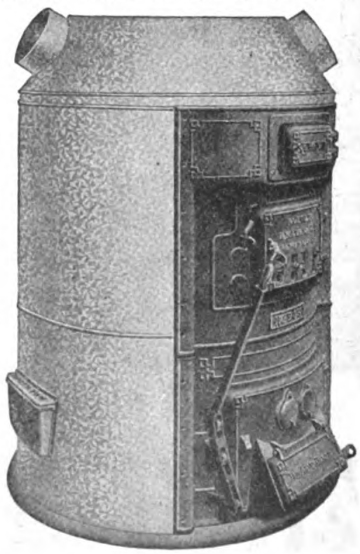

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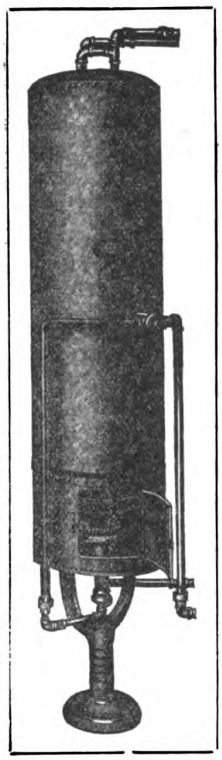

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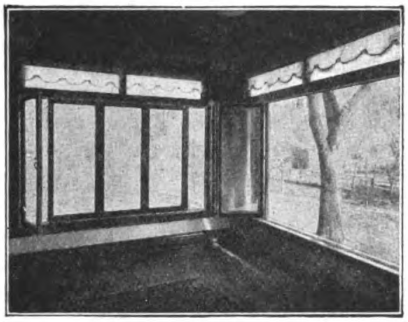

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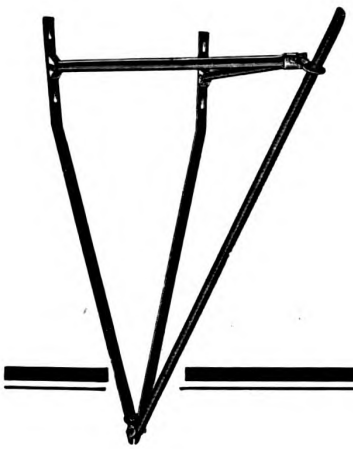

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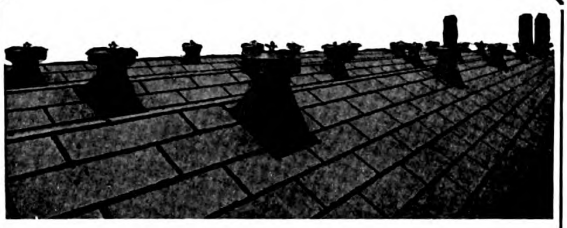

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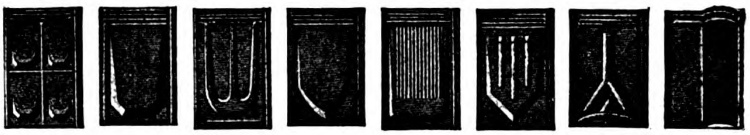

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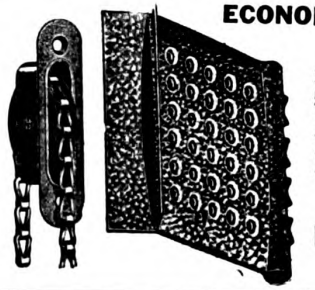

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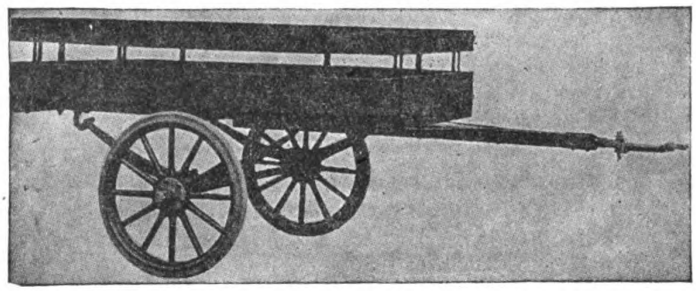

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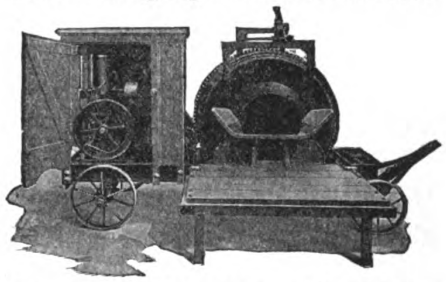

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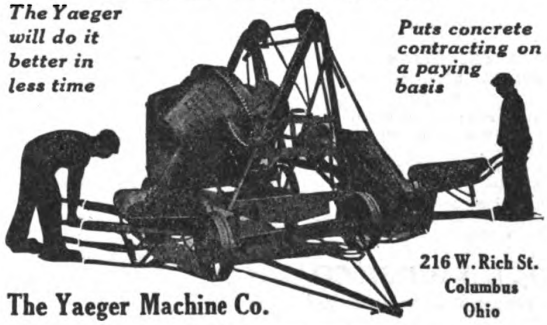

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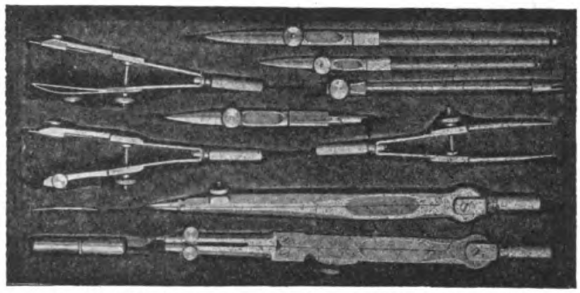

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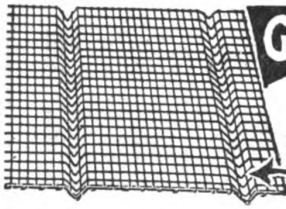

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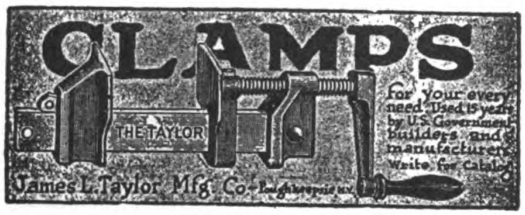

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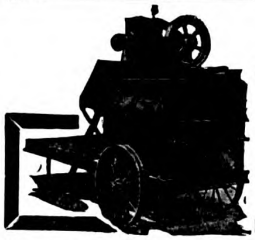

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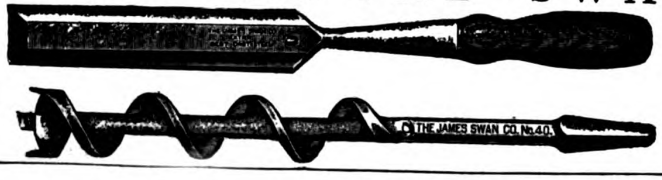

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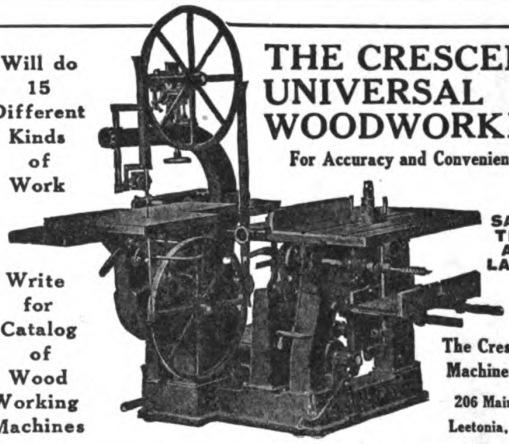

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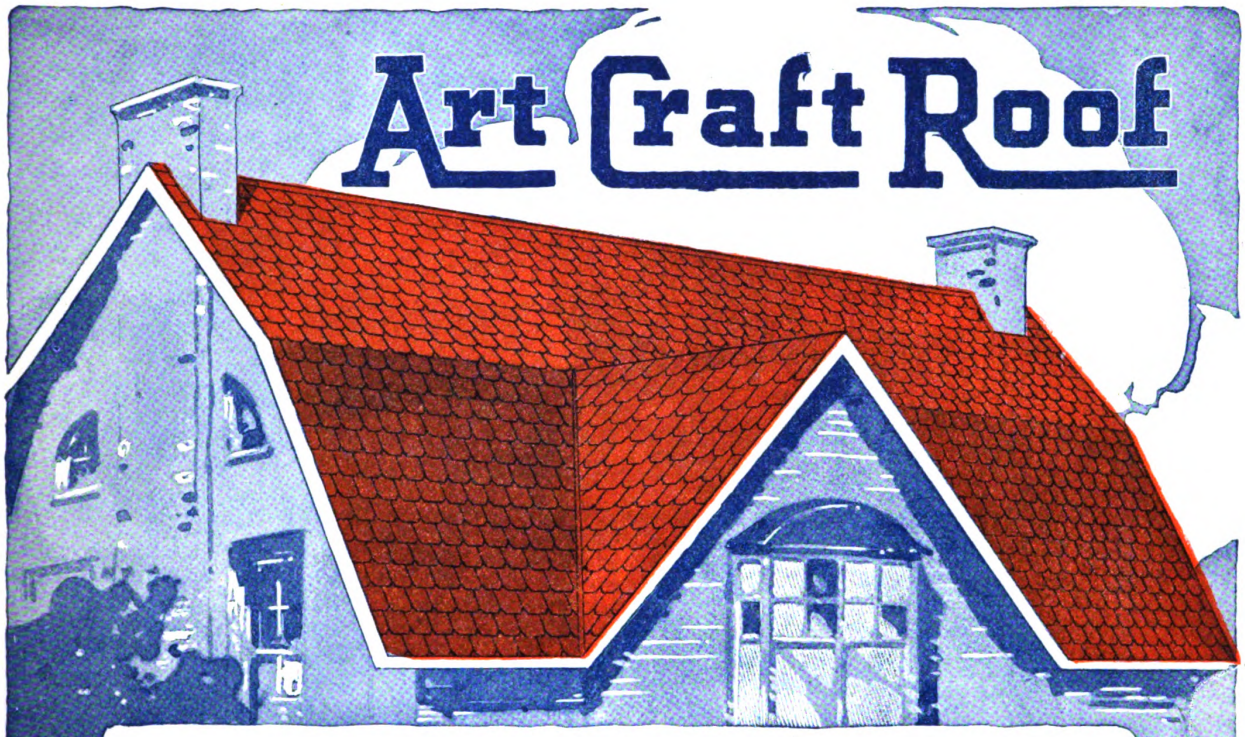

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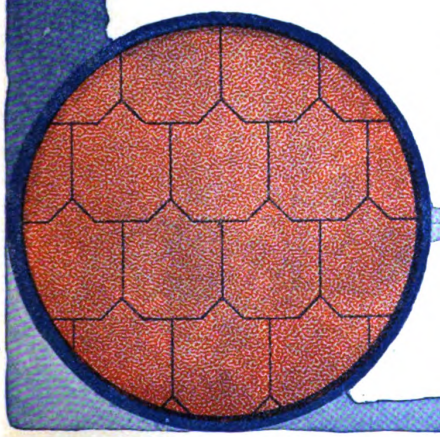

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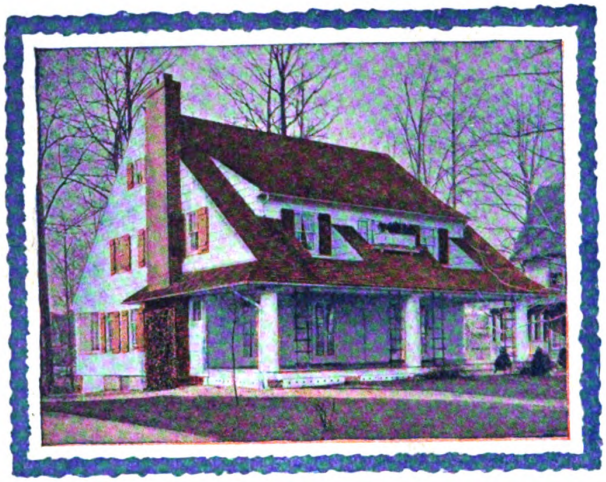

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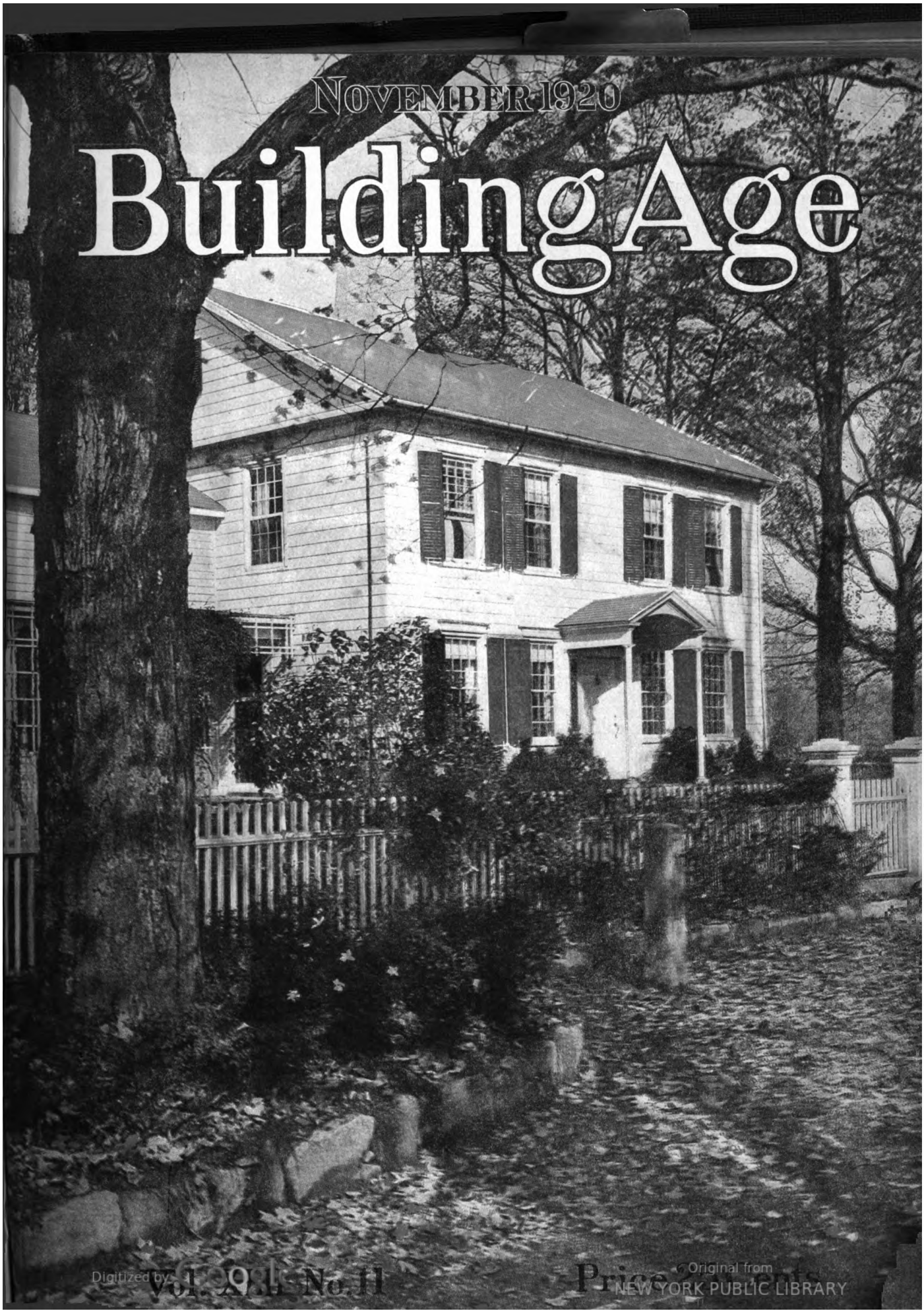

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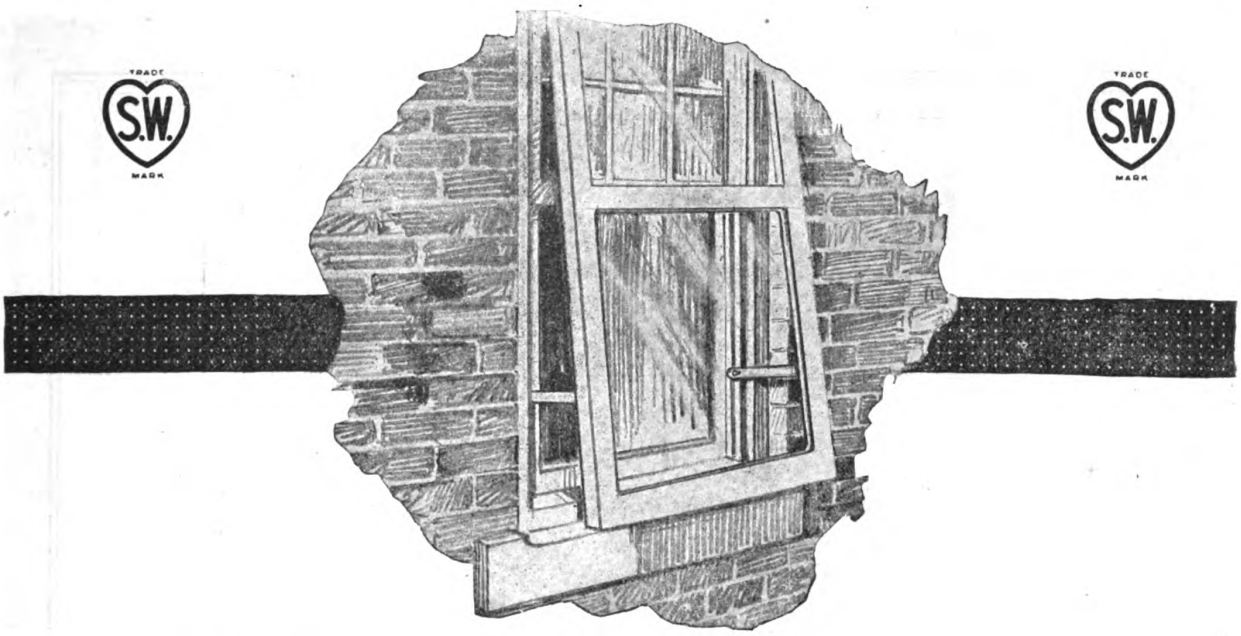

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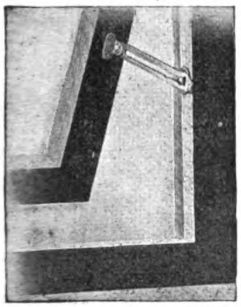

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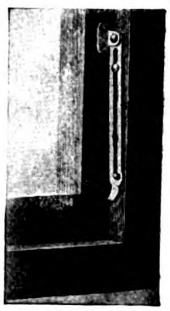

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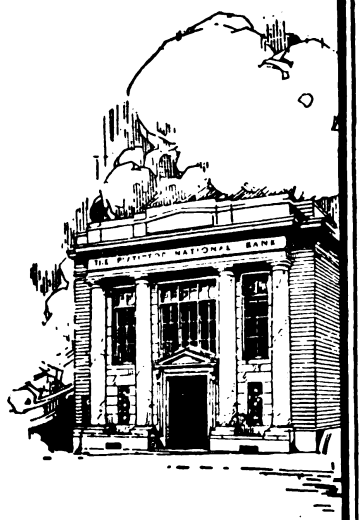

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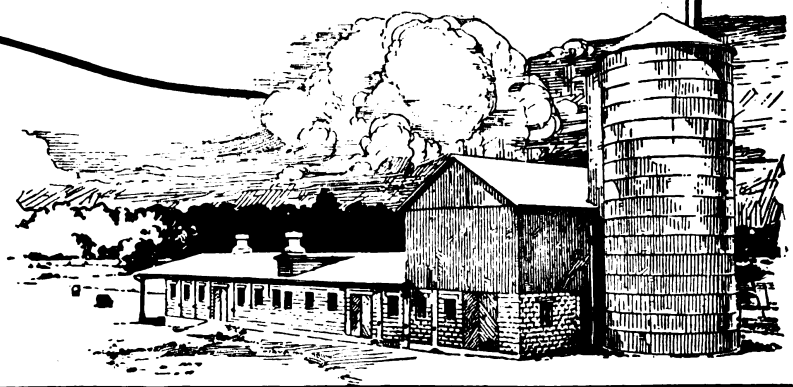

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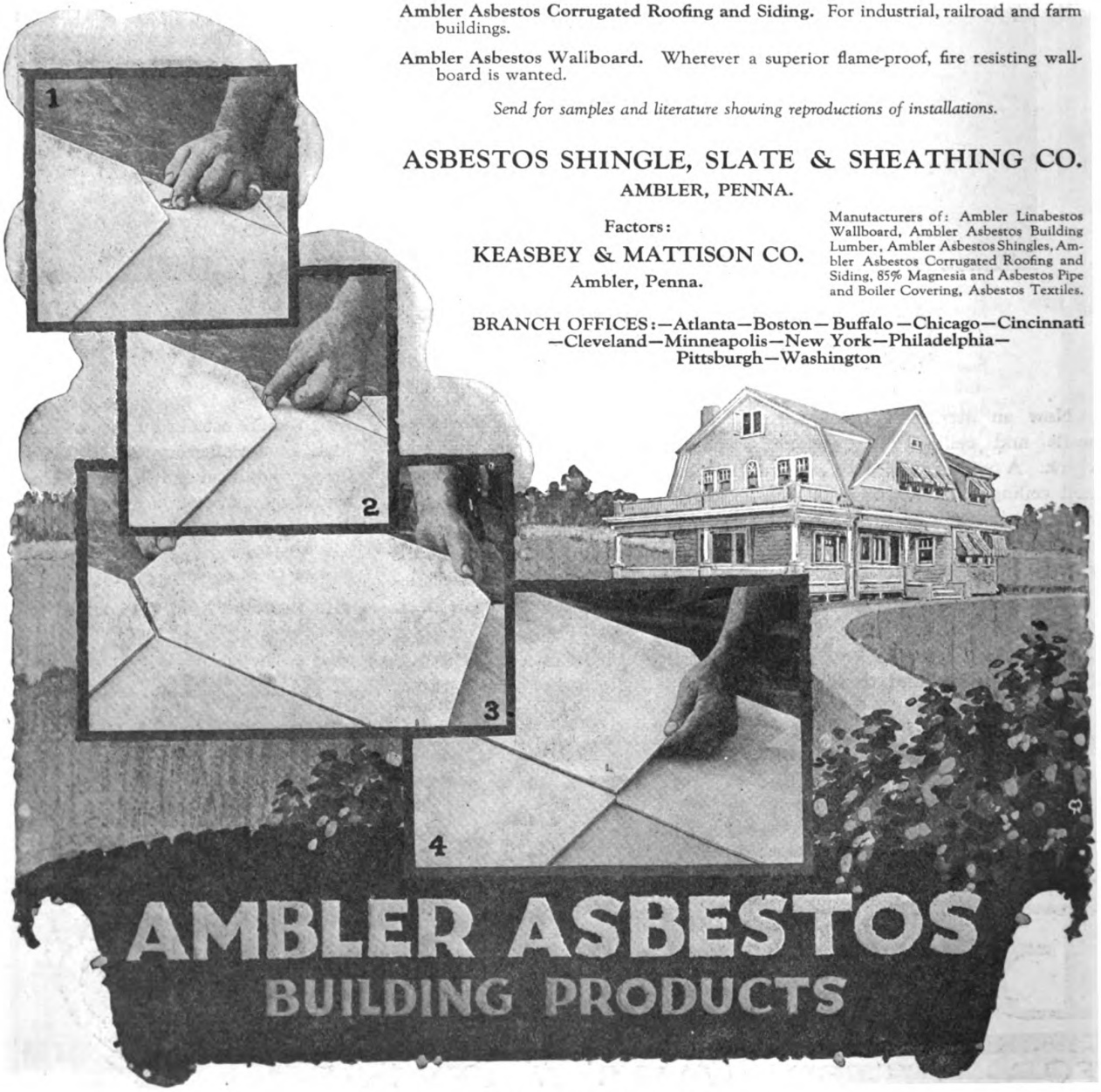

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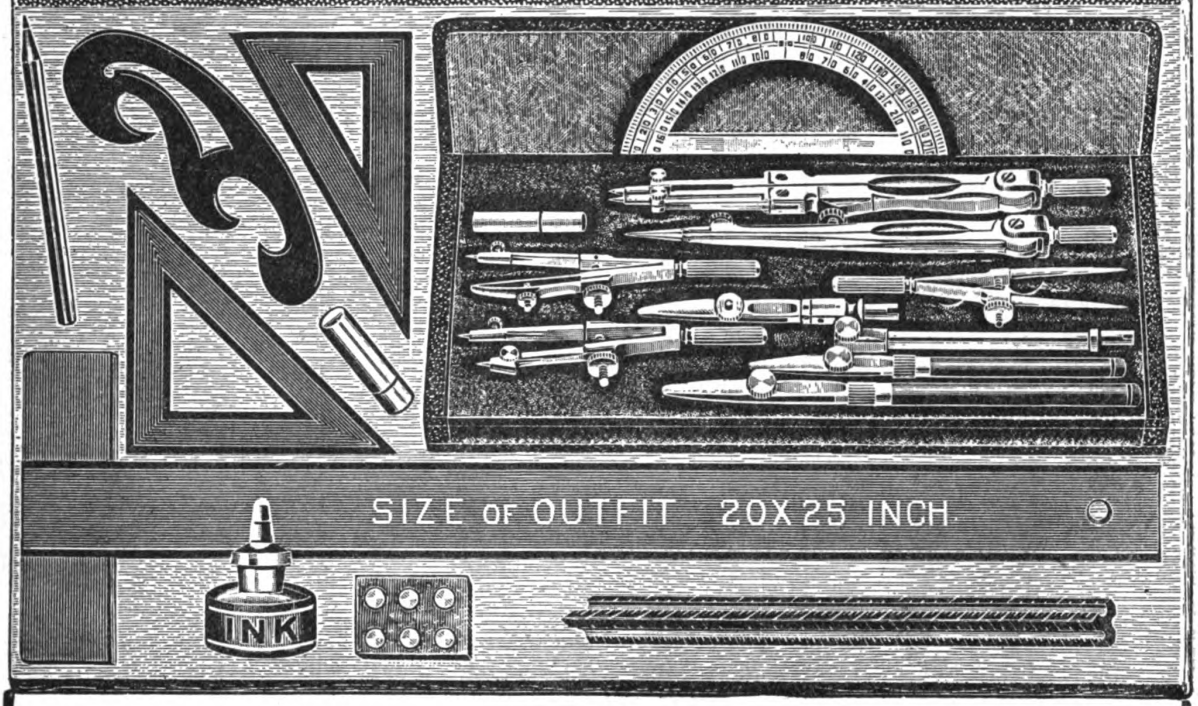

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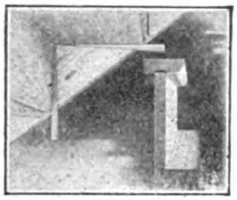





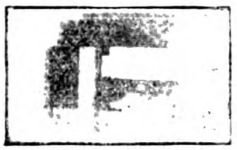

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You like to make money building good houses. You want their owners to go around boasting how reasonable your bids were, yet what good houses you built for them. This means that you can overlook no chance to buy that material which saves you time and labor on the job.

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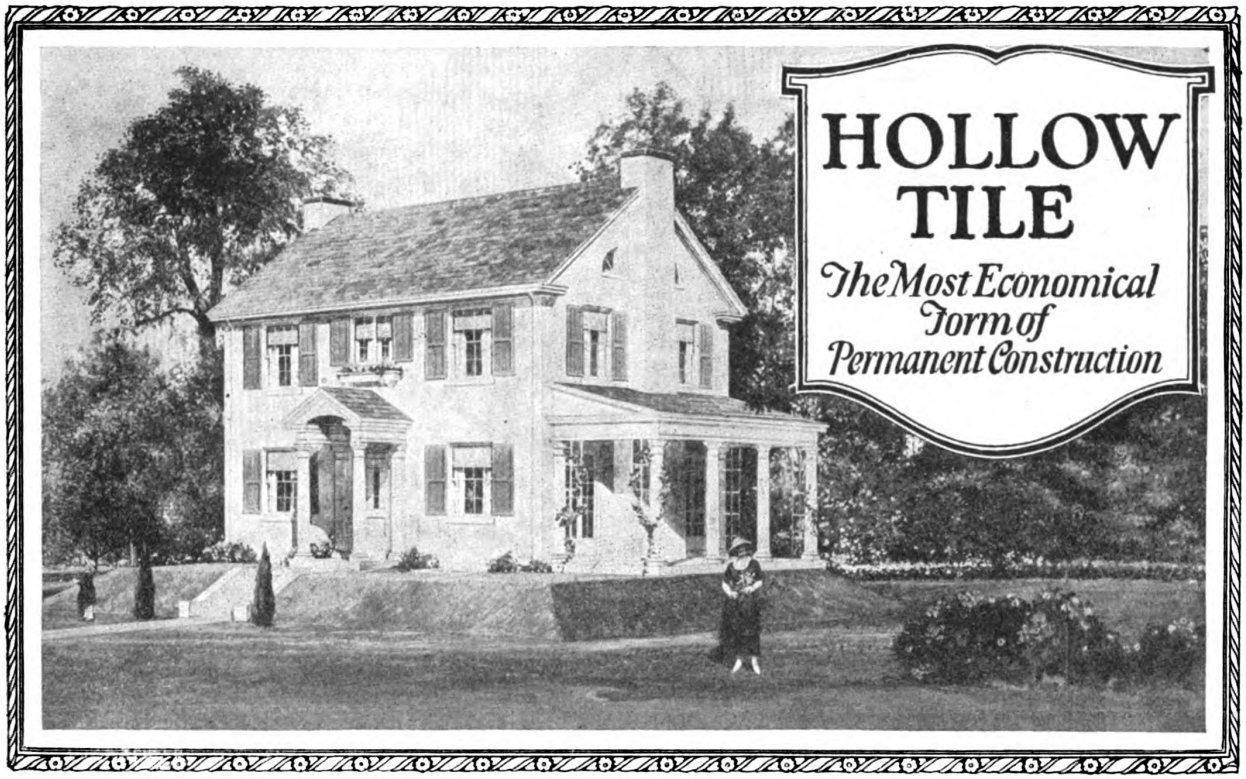

Build from these plans

Contractors and Builders can secure Working drawings Specifications Bills of materials of this home

EVERY contractor and builder should invest in a set of plans for this excellent colonial house. They will help to secure the contract for at least one home and probably more. The plans are complete, and correct in every respect. Any contractor can follow them without trouble.

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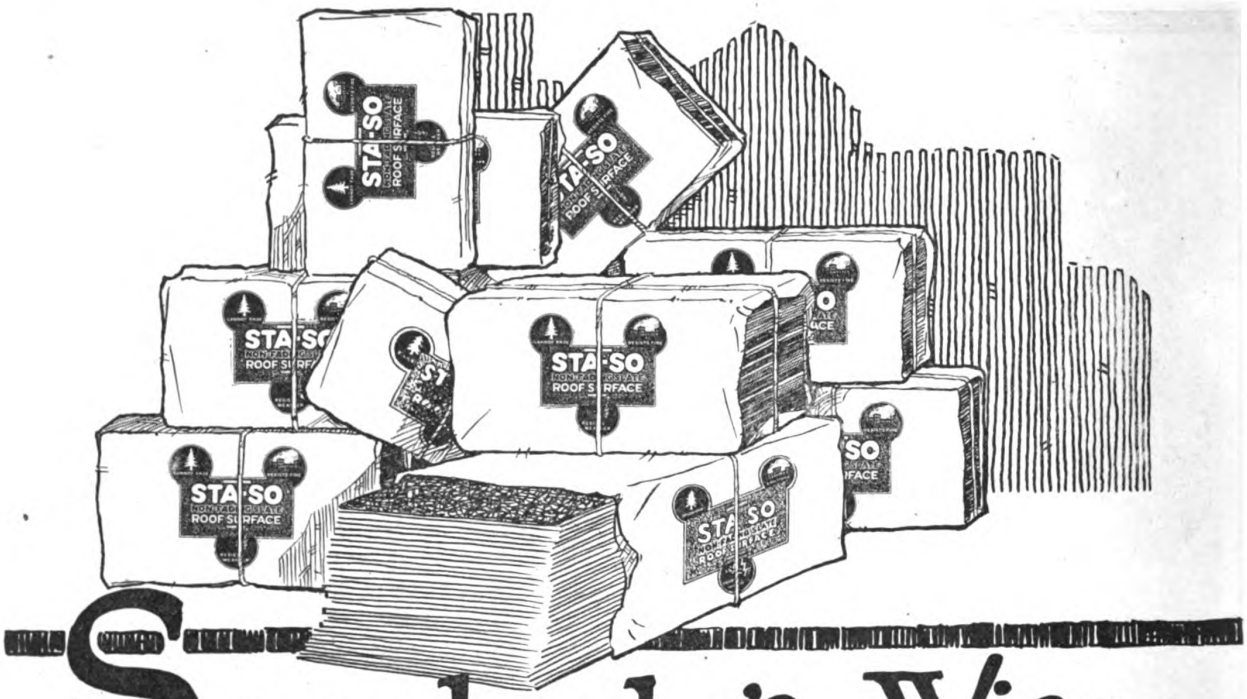

Somebody's Wise

AND that's the dealer who is getting this shipment of slate-surfaced shingles. For notice—*each bundle bears the Sta-so label.*

This dealer is protected—his customers are protected—the Sta-so label protects both of them from slates that fade or imitation slates that trade on the reputation of genuine, non-fading Sta-so laminated slate.

The Sta-so label guarantees to dealer and consumer the unique granular texture of genuine Sta-so; guarantees the genuine rich color tones of deep Indian red or cool sage green—*colors that defy even the sun to fade them.*

If you're a wise builder or contractor, you will protect your customers and yourself, by insisting that the Sta-so label appear on bundles and rolls of slate-surfaced roofing which you buy from the manufacturers listed at the left.

Amalgamated Roofing Co. Chicago, Ill.
Barber Asphalt Paving Co. Phila., Pa.
Barrett Co. . . New York, N. Y.
Beckman-Dawson Rfg. Co. Chicago, Ill.
Bird & Son, Ltd. Hamilton, Ont., Can.
Bird & Son, Inc. East Walpole, Mass.
Philip Carey Mfg. Co. Cincinnati, Ohio
Flintkote Co. . . . . Boston, Mass.
Ford Rfg. Products Co. St. Louis, Mo.
The Heppes Rfg. Division
The Richardson Co. . Chicago, Ill.
Keystone Roofing Mfg. Co. York, Pa.
McHenry Millhouse Mfg. Co.
South Bend, Ind.
National Asbestos Mfg. Co.
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National Rfg. Co. Tonawanda, N. Y.
B. F. Nelson Mfg. Co. Minneapolis, Minn.
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Grand Rapids, Mich.
Richardson Co. . Cincinnati, Ohio
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Standard Paint Co. New York, N. Y.
Usona Mfg. Co. . . . Aurora, Ill.
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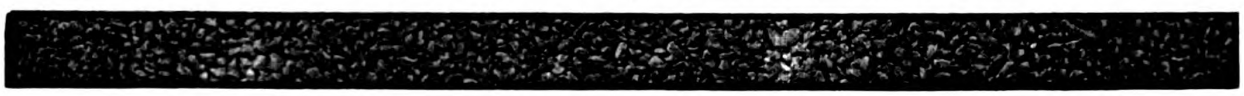
Below: Photographic reproduction showing texture of roofing surfaced with Sta-so laminated slate



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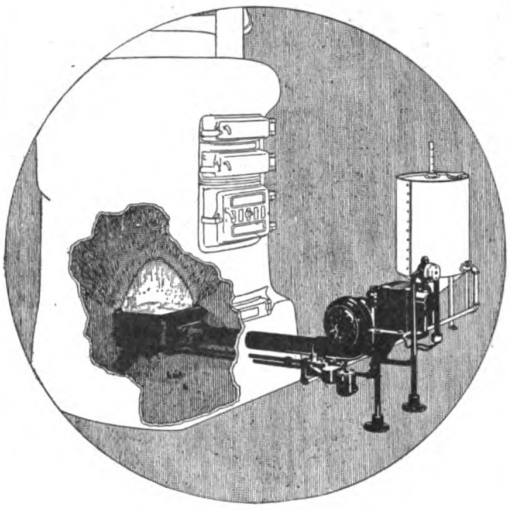

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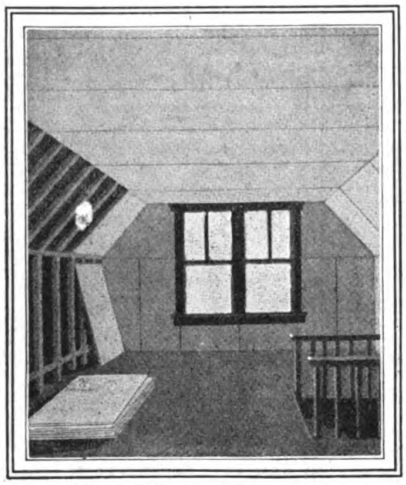
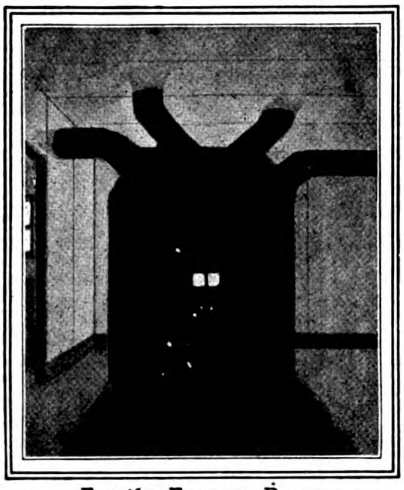
For the Garage



For the Attic



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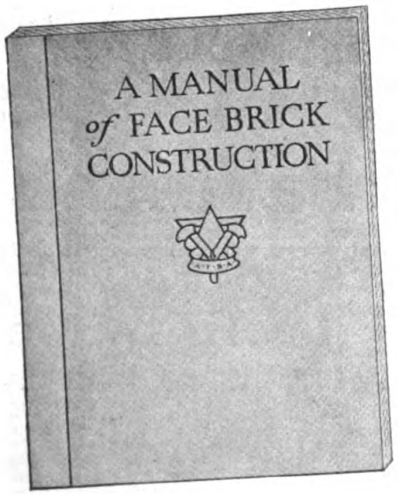

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Sketch the framing for a mansard roof.

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Sketch and explain the method used in bisecting a given angle.

What are the various styles of sky-lights?

What are the methods of testing cement?

Sketch the method of using brick filling as a fire stop.

What are some of the common defects to be noted in the inspection of cut stone?

What are the methods of laying a tile floor?

Give a sketch of the horizontal section through the jamb of an interior door frame.

When a house is to be unoccupied in cold weather, what should be done to prevent the traps from freezing?

Which do you prefer, a high or low tank, to supply a water closet?

Give a short description of how to estimate stone work on buildings.

Give a description of the different kinds of roofing.

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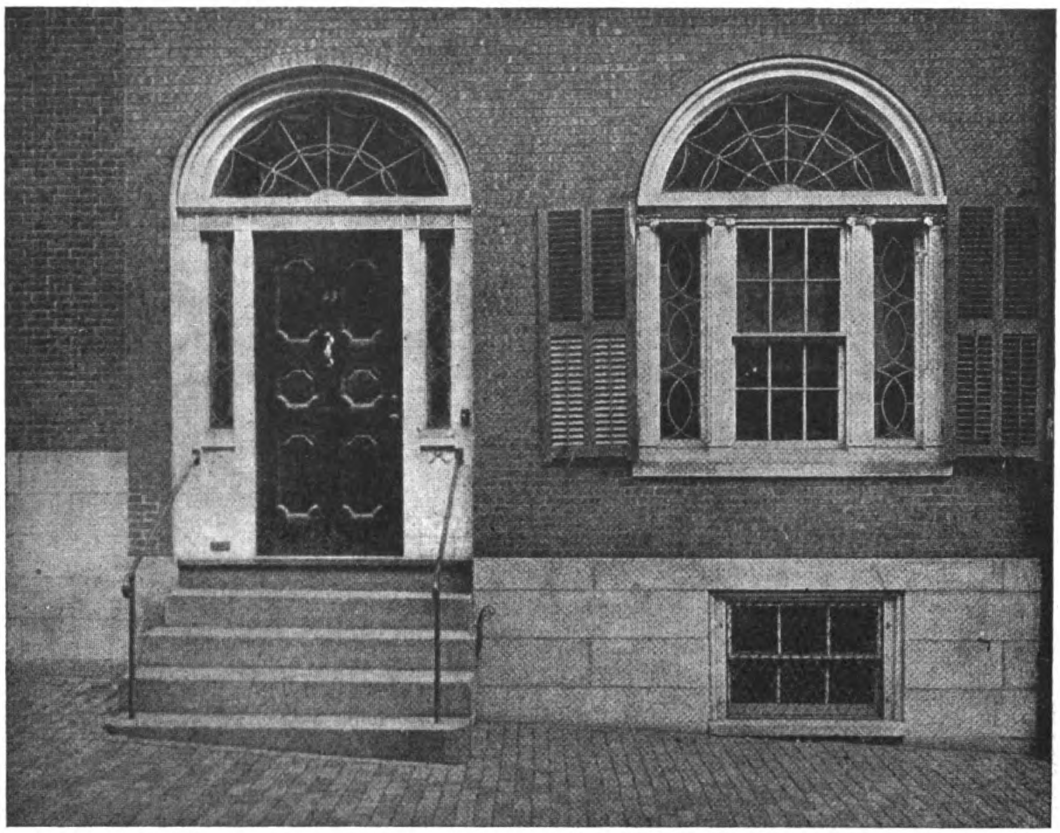
BUILDING AGE

NEW YORK, NOVEMBER, 1920



A doorway and window on Beacon Hill, Boston, Mass.

Shutters and Blinds

WHEN the pioneers in this country built their log cabins in the clearings they had made, they early learned that if they were to be prepared to resist the attacks of predatory bands of Indians, they must provide some stout and efficient means to close the window openings. These shutters, as they are today called, were made of heavy planks hewed with an adze and these rough boards were held together with equally stout battens. For hinges and locks, very often it became necessary where iron or the means to forge it were not available, to make wooden pintles and latches. These cumbersome shutters were as stoutly built as the very walls themselves. Later when the increase in population created settlements that have today become large towns or small cities, the necessity for heavy shutters ceased. But the rigor of winters and the hot suns of summer made it necessary that shutters be placed, but merely to provide elements of comfort, and only incidentally to keep out a possible burglar.

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CORBIT HOUSE, ODESSA,
DEL. BUILT 1772

FROM SKETCHES BY
DWIGHT JAMES BAUM,
Architect

D. J. B.

DR. BILDERBECK'S HOUSE, SALEM, MASS.

D.J.B.

CUT-OUTS

WESTOVER, IN VIRGINIA.
BUILT 1737

EXAMPLES OF EARLY
COLONIAL SHUTTERS AND
BLINDS

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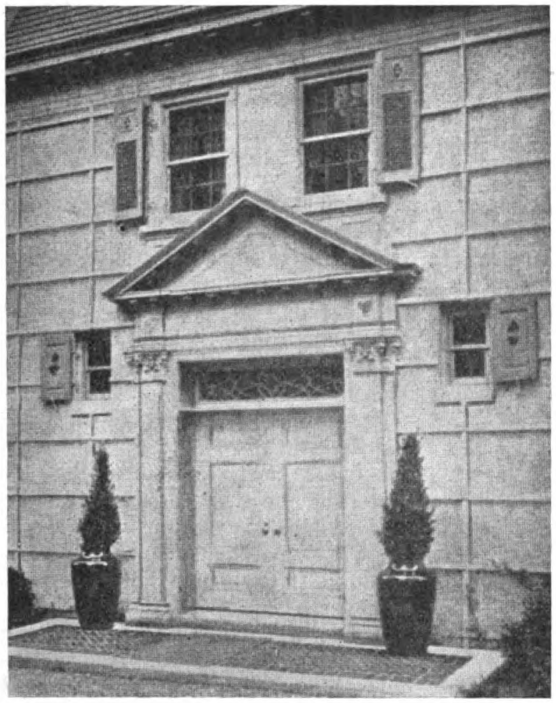


Aymer Embury, II, Architect

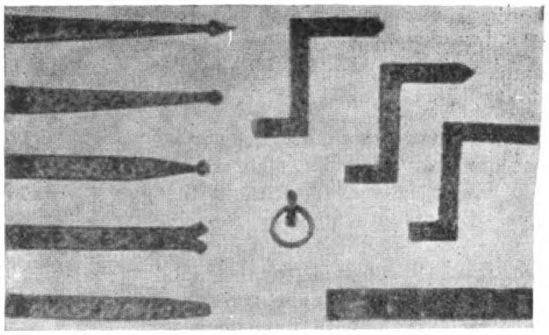
Shutters today show a very fine development and have become important and desirable features of the modern house. Many different types have been evolved, and these are the result of forms to meet climatic conditions, these forms being given certain embellishment of design as would fit them to become properly accessory to the house on which they were placed.

In a previous article on porches and doorways, reference was made to the proper proportioning of



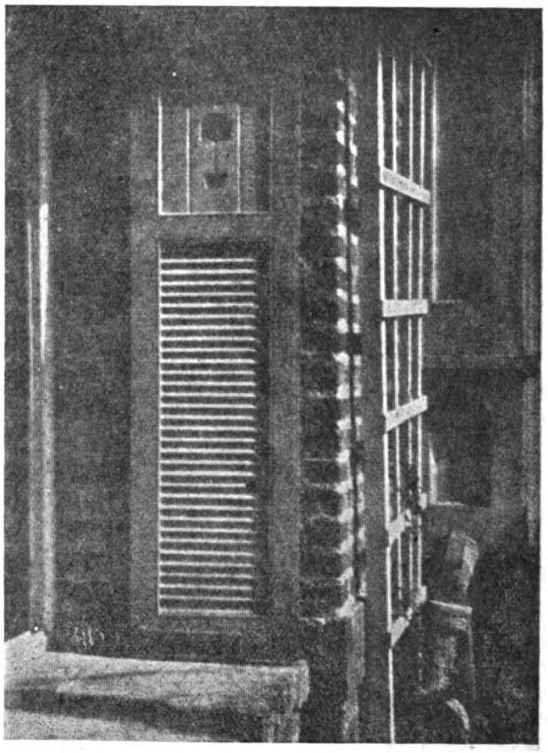
Holdfasts

window and door. When the proportion of windows is correct, the shutters naturally will fall in to like correct proportioning, but it will be very often possible in cases where window openings have not been carefully proportioned, to design the shutters so as partially to correct such errors, and even to overcome them entirely. Here is also an opportunity for the modern builder to seek out and secure alteration jobs. He can re-shutter a house in a manner that will change its entire aspect, and just as a man may trim his beard or a woman arrange her hair, set up a great improvement.



Some designs for hinges

The "tight-shutter," tight because it was necessary to leave no opening where a missile might find entrance, becoming no longer necessary, openings were cut to admit light and air. These openings have become very important artistic motives in the



Combination of early form of fixed slats and modern cut-out
Dwight James Baum, Architect

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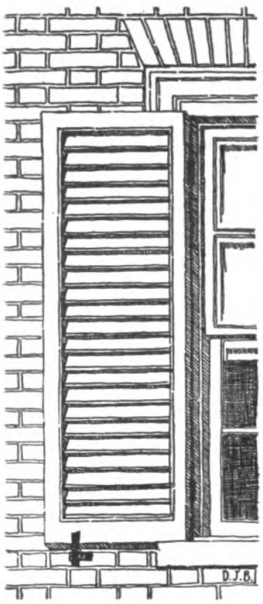
designing of shutters. Crescents, circles, the card suits, diamonds, clubs, etc., and in many instances some quite complicated designs.

Then in more moderate climates at least one-half of each shutter was fitted with a lattice, and later with a series of slats operated by a single member. Today the term shutter is more properly applied to the solid wooden type or those at least half solid, while those with movable slats are more correctly known as blinds. Supplementing the artistically designed openings of shutters is the hardware, to which equally good artistic thought has been given. This hardware ranges from the concealed type through many different motives of strap hinges and latches.

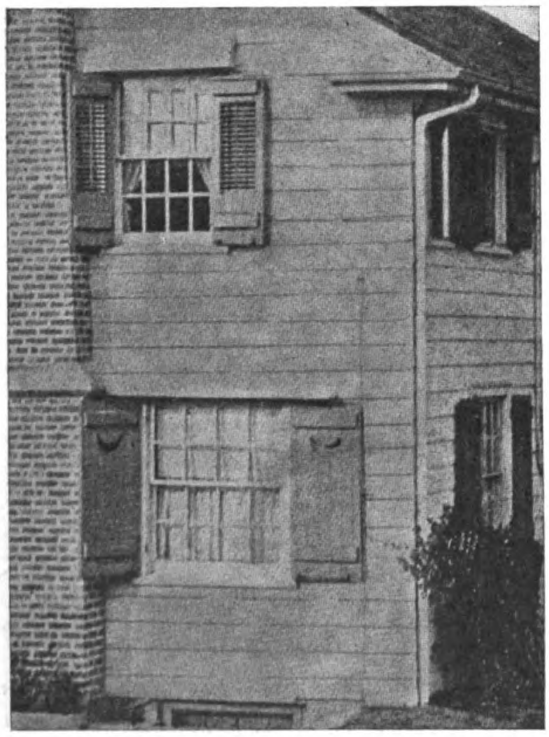
Like the transom and sidelight grilles referred to in our October issue, this hardware is always best when hand-forged. At present labor costs hand-forged hardware is not possible for the low-cost house, but many of the larger manufacturers have created patterns that will be a good substitute for hand-forged hardware.



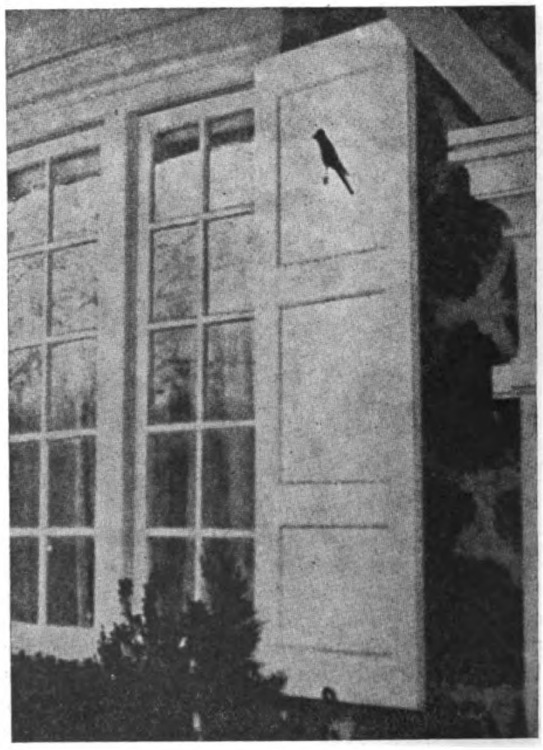
Bartlett House, Newburyport, Mass. Built 1812

It should be strictly borne in mind by the builder who seeks to re-shutter an old house or provide those for new ones that he must rigidly adhere to all the proprieties of period style in designing shutters, their cut openings or their hardware. It would be unfortunate if a house that suggested a half timber effect should be shuttered with designs that represented perhaps some Dutch or French Colonial type. These proprieties must be carefully considered.

Painting is another means of spoiling the effect of good shutter construction. Poets and prose writers have rung the changes of their fancy in describing the beauties of a good white Colonial house with its green shutters. It must not be understood that green will be the only color desirable, but it is necessary that the color of the shutters, and of the window frames, be so carefully selected as to relate harmoniously to the entire building.



Arthur W. Renwick, Architect



Dwight James Baum, Architect

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Water Supply System in Garage Basement

By J. Albert Deyo

ALMOST satisfactory method of solving the important question of water supply in country residences is the installation of a private system in the garage or garage basement. The accompanying illustrations show the home of Everett L. Brown at Red Bank, New Jersey, and the garage where the system of water supply is installed, together with a drawing of the system itself.

The advantages of such a location are many, while objections are practically absent. By locating the well in the basement, it is possible to place the pump directly over it, obviating the necessity of a separate pump house, with the attendant disadvantages of cost of erection and heating. If a manhole or other opening is provided over the well, it is entirely practical to remove the lower cylinder for inspection or repair, without extra inconvenience, and at minimum cost.

As the chauffeur usually is given the charge of caring for the plant, the location, from this point of view, is ideal. While caring for the cars it is a simple matter for him to give the water system all the attention it needs, without interfering with his



Garage of Everett L. Brown, in the basement of which water supply system is installed

other work. The pump is less apt to suffer from lack of attention, when so located, than if it were placed, as is comonly the practice, in a separate pump house or in the basement of the residence.

While the best pumps are practically noiseless, there is always more or less sound, especially when the motor first starts or in the case of an engine driven plant, when the engine is running. As the garage is usually located at least a few feet from the main house this disadvantage is entirely overcome by the method here suggested.

In planning a home of this type, space in the



House of Everett L. Brown, Red Bank, N. J.
Ernest A. Arend, Architect

basement is many times at a premium and as a system of this kind requires a room at least twenty feet by twelve feet, it is frequently much more convenient to arrange for this in the garage. The logical place for the storage of oil and gasoline is also in the garage, and by confining all of the machinery to this one building the odor and inconvenience may be kept there and away from the main house which is very desirable.

While it was not found advisable to do so in this case, it is many times practical to include the heating furnace or boiler in the garage, near the water supply system. This is especially practical if the method of heating is steam or hot water. All dust from coal or ashes is thus effectively banished from the home, without loss of efficiency.

By properly protecting the heating pipes between the garage and the house there is practically no loss of heat in transmission. A good insulating material around the pipes will absolutely protect them and, as they are laid below frost line, they will need no attention for an indefinite period of time. Municipal heating plants convey steam for many blocks and still the companies are able to give very satisfactory service. In practically all large buildings and insti-

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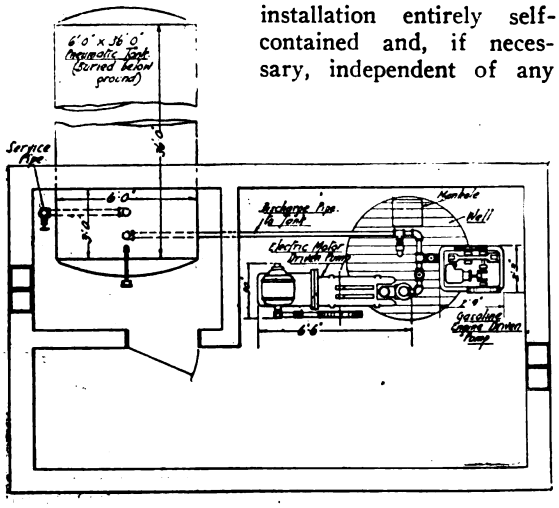
tutions, where land is not so valuable as to make such a scheme prohibitive, heating plants are placed in separate buildings.

The size of the water supply system depends entirely on the service which it is expected to give. In some instances the main source of supply is secured from public service mains and the private system is only used for soft or cistern water. In other cases the well furnishes all of the water and in still other installations both soft and hard water are furnished by private plants.

In the case of the house illustrated, the private system of water supply was depended upon to furnish all the water used on the place from the well. In order to make the installation entirely self-contained and, if necessary, independent of any



Plan of garage basement, showing installation of water supply system

other service, a motor-driven pump was installed for general use to furnish the ordinary supply, but an engine-driven pumping unit was installed with the tank, in case of emergency. As the entire buildings are dependent for fire protection upon this water system, it will be readily seen that this is a wise provision. Even should there be a fire which burned off the electric wires and thus put the motor out of commission, the water system would still be able to furnish water, by means of the auxiliary gasoline engine.

As this installation is somewhat unusual but still a highly practical and desirable one, a description will undoubtedly prove of interest. The pneumatic tank, in which the water is stored under pressure, is 6 feet in diameter by 36 feet long. It is buried under ground, at a depth protecting it from frost and at the same time insuring water of an even temperature the year round, regardless of weather conditions. One end of the tank extends through the basement wall, 3 feet into the garage space. On this end of the tank are mounted both the water and pressure gauge and a glance at them indicates the amount of water left in the tank and the pressure.

A tank of this size has a total capacity of 7,610 gallons, but as it is one-third filled with air, to provide the necessary cushion, the actual water storage or working capacity is 5,140 gallons. Starting with the tank two-thirds full of water under a pressure of 70 pounds, 4,000 gallons of water are available before the pressure falls below 25 pounds. As 25 pounds pressure is equivalent to a height of 57.72 feet, it will readily be seen that in addition to a plentiful supply of water for ordinary purposes an installation of this kind gives excellent fire protection.

The motor driven pump, which is used under all ordinary conditions is the larger of the two, and has a capacity of 20.7 gallons of water per minute. The pump is equipped with a differential cylinder and furnishes air with the water to the pneumatic tank, so that no auxiliary air compressor is necessary. It is operated by a four horsepower motor and will work against a maximum pressure of 100 pounds per square inch. As the tank is tested under a pressure of 125 pounds per square inch this gives a system from which exceptionally high pressure may be secured if necessary.

The pump is automatically controlled, so that it needs no attention other than an occasional oiling or cleaning. For an installation of this kind an automatic regulation of 25 pounds variation is sufficiently close. That is: when the pressure in the tank reaches a pre-determined point, say 40 pounds, the automatic device stops the motor. When sufficient water has been used from the tank to lower the pressure 20 pounds (in this case to 20 pounds per square inch), the automatic device throws in and the pump is started running until the higher pressure is again reached.

With a pump of this capacity and a tank of this size, starting with an initial pressure of 70 pounds and the tank two-thirds full of water, there is instantly available 4,000 gallons of water and this is augmented by the pump capacity so that there may be used during the first hour 5,246 gallons of water at a maximum pressure of 70 pounds, and a minimum pressure of 25 pounds. The auxiliary engine-driven pump could also be started, increasing the capacity by 770 gallons.

This capacity is sufficient to keep approximately two five-eighths inch fire nozzles working simultaneously for one hour. Starting at seventy pounds pressure these nozzles would throw a stream nearly

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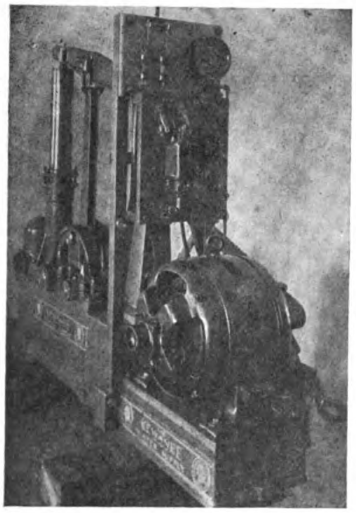


Motor-driven pumping unit

one hundred and ten feet high and even at the minimum pressure of twenty-five pounds, the height of the steam would be forty feet. As this water is instantly available it gives a fire protection at least equal to that to be obtained in most cities, and this is taken into consideration by the fire underwriters in determining the insurance rates.

The auxiliary pump consists of a combined gasoline engine and deep well pump, directly connected by gears. Both this pump and the larger one are mounted directly over the well and are connected to the same discharge pipe. Gate valves are placed in this discharge line so that either pump may be cut off from the system. Under ordinary conditions the gate valve between the motor driven pump and the tank is left open so that the automatic device may control the operation of the pump, depending upon the tank pressure. In the event of an accident to the electric current or a breakdown of the larger pump it is only a matter of closing this valve and opening the one on the auxiliary pump discharge line, before the other pump is in commission and working without causing inconvenience.

The engine driven pump is also equipped with an automatic stopping device, so that it may be started and then left without attention. When the pressure in the tank reaches the pre-determined working pressure, the engine and pump will be automatically stopped. While both pumps are equipped with automatic devices, the best practice is to install a relief valve in the discharge line, between the pumps and the tank for added safety.

With such a relief valve, installed, the machinery is protected against any undue strain which might be caused by failure of the automatic devices to work, causing excessive pressure in the tank. Such pressure might also easily cause a break in the plumbing and considerable damage to furniture and decorations before it became known. The relief valve is therefore installed and set at a pressure usually 5 pounds over the maximum working pressure. Should the automatic devices fail, this valve opens as soon as the pressure increases 5 pounds over the maximum and, in this case, discharges the water from the discharge pipe back into the well. While this does not stop the pump it effectively protects the machinery and plumbing from excessive pressure, which is sufficient.

The following specifications are suitable for an installation of this kind and may be used for similar work, with minor changes to meet local conditions:

SPECIFICATIONS.

Furnish and install complete, where shown on plans and in accordance with these specifications and following the details and instructions furnished by the manufacturer, one complete water system consisting of the following:

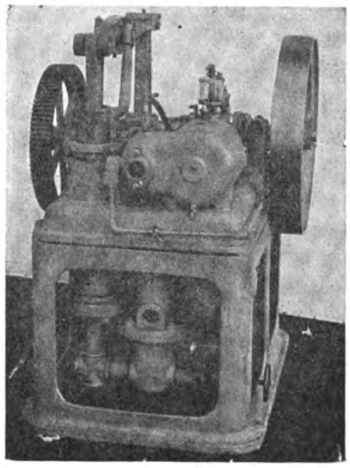
EQUIPMENT.

One 6 foot by 36 foot plain pneumatic tank, having a total capacity of 7,610 gallons and a working capacity of 5,140 gallons. Tank to have manhole in head and to be tested under a pressure of 125 pounds per square inch and guaranteed by the manufacturer for a working pressure of 75 pounds per square inch. Tank to have longitudinal seams double riveted lap joint. Shell to be of 5/16 inch steel and heads of ½-inch steel.

One stringer containing two water gauges and one pressure gauge.

One deep well pumping unit, consisting of long stroke working-head fitted with differential plunger and having a capacity of 20.7 gallons per minute from a depth of 200 feet against a maximum pressure of 100 pounds per square inch, belt-driven by a 4-horsepower, 110-220-volt, 60-cycle, single-phase alternating current motor, mounted on cast iron subbase.

One automatic starting and stopping device for electric motor with not to exceed 20 pounds variation between maximum and minimum pressures.



Auxiliary engine-driven pumping unit

One deep well pumping unit, consisting of deep well pump, fitted with differential plunger and having a capacity of 12.8 gallons per minute direct connected by means of gears to a 2-horsepower

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gasoline engine, mounted on the same cast iron sub-base.

One automatic stopping device for gasoline engine.

Forty feet of 3½-inch galvanized drop-pipe.

Forty feet of 2¼-inch wood rod.

One 3¼-inch by 16-inch all brass artesian well cylinder.

Connections for 3-inch service pipe.

Connections for 3-inch discharge pipe.

One 1½-inch all brass water relief valve.

One 2¾-inch by 10-inch all brass artesian well cylinder.

Forty feet of 3-inch drop pipe.

Forty feet of 1⅝-inch wood rod.

Connections for 1¼-inch discharge pipe.

Both pumps to be equipped with devices for furnishing air and water at the same time, so that no auxiliary air compressor will be necessary. Pumps to have combined air chambers and check valves. Valves to be hard rubber disc on bronze seat. All bearings in pumps and engine to be fitted with removable bronze bushings. All pins, shafts and plungers to be ground to perfect circle and mirror finish. Both units to be furnished complete with sight feed oilers, hard oil cups and necessary tools for repair or adjustment, if special tools are required.

SETTINGS.

Pressure Tank.—Tank to be buried under ground, at sufficient depth so that water will be below frost level when tank is full, with head extending three feet inside basement wall. Tank to be carefully set in place on wood bases or sand cushion, which shall be free from stone or other hard substances, and not to be allowed to be dropped or to fall. After tank has been set and all connections made, the outside surfaces shall be cleaned free of all dirt and rust spots, using a steel brush. The surface shall then be given two coats of asphaltum varnish, allowing the first coat to dry before the second coat is applied.

Motor-Driven Pumping Unit.—The motor-driven pumping unit shall be installed directly over the well, as shown and fastened in place by anchor bolts set in concrete floor. Sheet lead cushions shall be used in making the pumping unit set perfectly level; these lead cushions to be placed at corners of pump and motor frame, with anchor bolts extending up through the cushions.

Engine-Driven Pumping Unit.—The engine-driven pumping unit shall be installed directly over the well, as shown, and fastened in place by anchor bolts set in concrete floor. Sheet lead cushions shall be used in making the pumping unit set perfectly level; these lead cushions shall be placed at the four corners of frame, with anchor bolts extending up through the cushions.

CONNECTIONS.

Install the 3¼-inch by 16-inch cylinder in the well for the motor-driven pumping unit, using 40 feet of 3½-inch pipe and 2¼-inch wood rod. The drop pipe and rod to be cut to proper length, in accordance with instructions furnished by the manufacturers of the pumping unit.

Install the 2¾ by 10-inch cylinder in the well for the engine-driven pumping unit, using 40 feet of 3-inch drop pipe and 1⅝-inch wood rod. The drop pipe and rod to be cut to proper length, in accordance with instructions furnished by the manufacturers of the pumping unit.

Well casings to be cut off above the pump room floor and threaded by this contractor, who is to furnish and install stuffing boxes, packing nuts and reducers to make water-tight joints between the drop pipes and well casings.

Install a 3-inch discharge pipe from the motor-driven pump to the tank. On this pipe install one 3-inch gate valve near the pump, as shown on drawing and a 2-inch water relief valve on this pipe between the pump and gate valve and run waste pipe from relief valve to discharge into well.

Install a 1¼-inch discharge pipe from the engine-driven pump to the 3-inch discharge pipe, making the connection between the gate valve and water relief valve. On this pipe install a 1¼-inch gate valve and a 1-inch water relief valve between the pump and gate valve and run waste pipe from the relief valve to discharge into well.

Install and connect automatic starting and stopping device for electric motor in accordance with details furnished by manufacturers. Install and connect automatic stopping device for engine in accordance with details furnished by manufacturers.

Install a 3-inch service pipe from the pressure tank. On this service pipe install one 3-inch all brass angle valve.

WORKMANSHIP.

All work in connection with the installation of the water supply system to be done in a neat and careful manner by competent mechanics. All pipe and fittings to be of merchant stock and of full internal diameter through entire length. All pipe ends to be reamed after cutting.

Test—A test of 75 pounds per square inch shall be applied to the discharge and service pipes and the service tank. The pressure tank shall be filled two-thirds full of water and the service and discharge pipes shall be filled full of cold water. This test to be applied for a period of three hours in the pres-

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ence of the architect or his representative, without loss of pressure. Should any leaks appear in the discharge or service pipes, these leaks shall be made perfectly tight in the usual manner. Any leaks appearing in the pressure tank shall be made perfectly tight in accordance with instructions furnished by the tank manufacturers. Such installations should give entire satisfaction.



Bungalow at Los Angeles, Cal., designed and built by The Briggs Company

Development of the Bungalow

THE bungalow had its origin in India. It came about through the need created by European invasions of India to resort to certain definitely located stations where the traveler might find a place for rest and shelter from the torrential rains and the directly beating heat rays of the sun in a climate whose rigors try even the natives.

The bungalow in its original and proper type is strictly a one-story building, generally with a more than usually high ceiling elevated on an unusually high foundation and surrounded by wide porches with equally wide overhangs. The windows in almost every case partake of the nature of doors and are of the so-called French type coming down to the floor so that every room in the bungalow will have direct access to the porch.

The picturesque development of this type of building and its further development as to plan for the necessities of housekeeping at once suggested its availability with certain modifications that would adapt it to a less rigorous tropical climate. In the United States the bungalow has probably reached its most perfect development on the Pacific Coast. Owing to the fact that it is so readily adapted to that climate the bungalow especially in the neighborhood of Southern California and more particularly in the city of Pasadena has become a very general type of dwelling place.

While it may be insisted that no building of more than one story can properly be called a bungalow, such insistence will be of little avail, as any building that is practically limited to a one-floor plan with perhaps one or two additional rooms in a low setting story has become by general acceptance a bungalow.

The bungalow in its plan of a one-story domestic arrangement and the ease with which the housekeeper might with a minimum of labor conduct the routine of the house undoubtedly suggested the early development of the modern apartment dwelling which is really a series of bungalows grouped under one roof, and one might by a little stretch of imagination include in this similarity the duplex apartment which carries on a second floor such additional bedcham-

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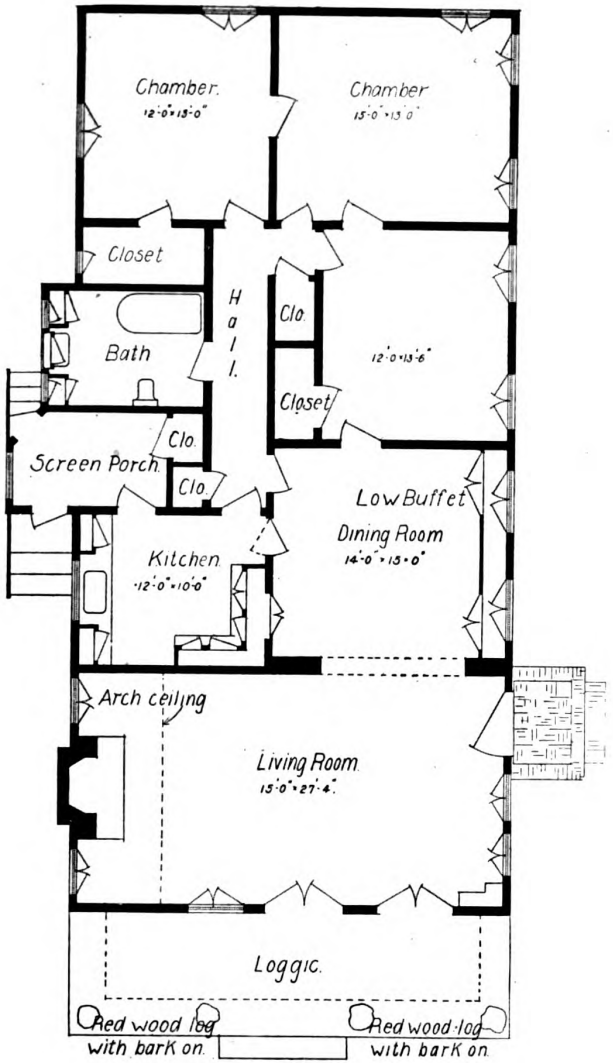
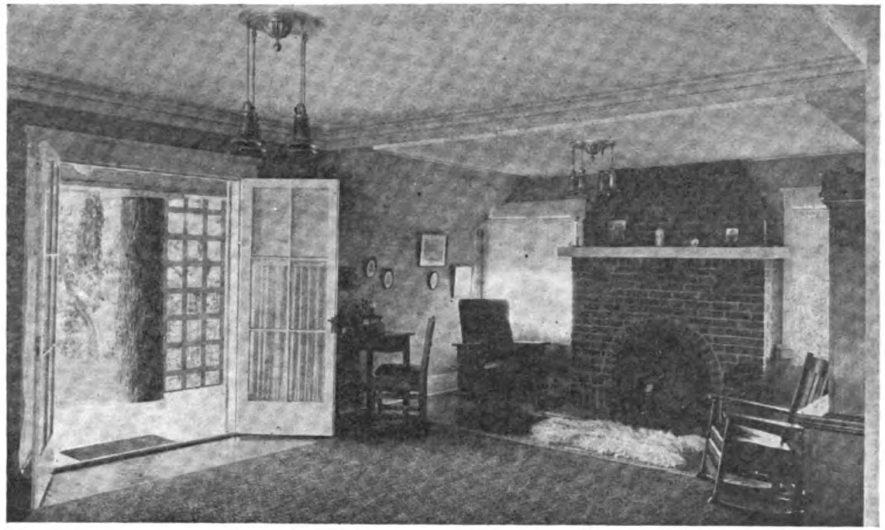
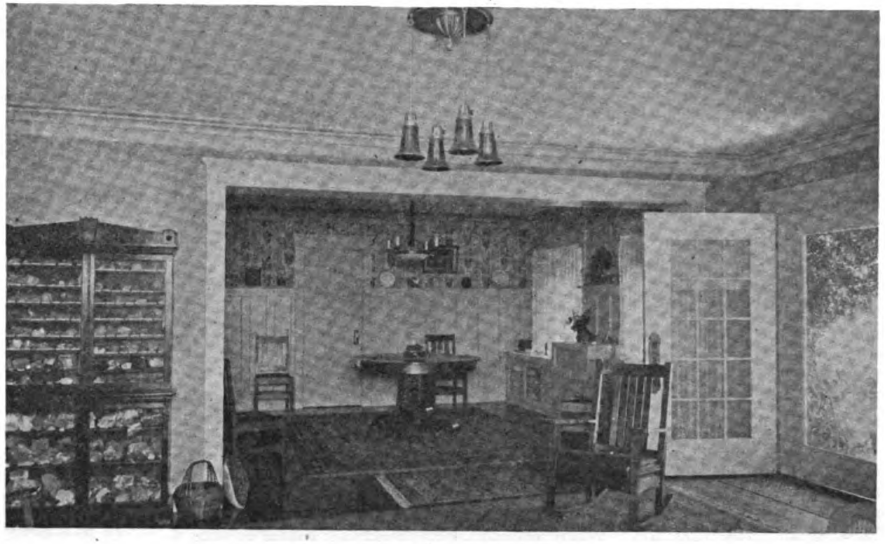


Floor Plan



Living Room



View of the Dining Room from Living Room

BUNGALOW AT LOS ANGELES, CALIFORNIA
Designed and built by The Briggs Company

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HOUSE IN LOS ANGELES, CAL.
Designed by the Davidson Construction Co.

This house was awarded Honorable Mention, as a notable example of small house architecture, by a recent jury of The Southern California Chapter of The American Institute of Architects.

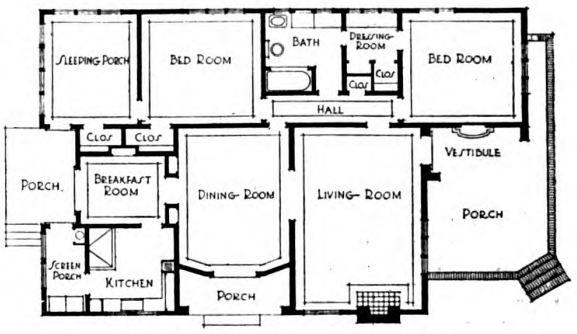
bers as may be necessary to supplement those on the lower floor.

One has but to carefully study the series of plans that are presented in this issue to understand the great amount of thoughtful care and hard study that have been given to the evolvement of the plan of the bungalow. The formal drawing room or reception room find no place here, but the whole symmetry of plan and the location of rooms is regulated by one large living room from which by easy access the kitchen, bedrooms and any other rooms are to be reached. The modern bungalow as now developed except in the more expensive types, is as a rule confined to a maximum of seven rooms. These are the living room, dining room, breakfast alcove and kitchen, two bedrooms and perhaps a maid's room. Such space as may be found on an upper story where rooms are not planned is as a rule used for storage and approached by a ladder or stairway generally concealed from view in some closet or screened corner in the plan.

Many timid persons are averse to living in bungalows on account of the low window level and the possibility of intrusion either of the predatory burglar or prowling animals. This is overcome in a great many plans by the high placing of windows, insuring the necessary amount of ventilation but depriving the occupants of the cheerful aspect of out of doors.

There are innumerable ways of introducing attractive features that make a homelike interior. Nooks and corners may easily be prearranged to provide an aspect of sociability and coziness, especially about the fireplace and windows where people naturally group themselves.

Built-in furniture is a very necessary feature where economy of space is desired and where there must be found storage facilities for the great amount of impedimenta that accompanies even the smallest families. This built-in furniture may take any of the forms that have been from time to time so fully discussed in BUILDING AGE. In no part of the house will there be greater necessity for such economy than in the kitchen because of the comparatively limited space available there, owing to the inclination to make the living room as large as possible. In most plans the kitchen has been reduced to its smallest



Plan of a house in Los Angeles, Cal.

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possible dimensions. Built-in furniture, therefore, and especially the modern kitchen cabinet, becomes an important consideration. The kitchen should be arranged as far as possible in accord with the suggestions made in May and June issues of this magazine, as only by such thoughtful planning can time, money and patience be conserved. Built-in furniture is also useful in library book-cases, bedroom closets, window seats, ingle-nooks as already mentioned, dining-room china closets, and many other places that have been previously discussed and which will be readily recalled. Outlets for electricity where current is available should also receive ample consideration. Rules for lighting the bungalow differ in no way from those which govern the lighting of any low cost house.



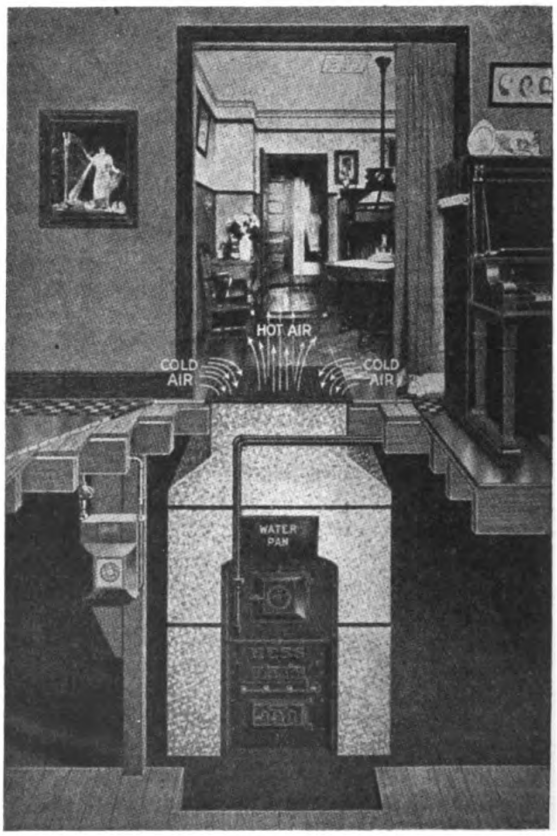
A bungalow at Bradley Beach, N. J.

The bungalow as an all the year round house should be easy to heat in winter and easy to keep cool in summer. The window openings should be generous in size and in the living room should perhaps be of the French type, so that the porch may be easily reached and become in a sense an auxiliary room in summer where the family may congregate. The ideal bungalow would be one that was absolutely fireproof. The floors might very well be of square dull red tile. The trim and window casings of metal, and the elimination of every inflammable material should be made. This is of course an expensive type and these features are rarely to be found in the low cost bungalow.

Awnings while generally a necessary feature in summer are always more or less disfiguring from an artistic point of view, even when harmoniously designed and colored. The California types of bungalows have large overhangs which act in a sense as permanent awnings and have been found to very well answer the purpose desired.

The site chosen for the bungalow is important. Good pure water should be available. The proper facilities for disposal of household waste should be provided. Bungalows when well designed have a very attractive and homelike appearance. Whenever it is possible, they should be set on a low terrace or base slightly above the sidewalk level, as to better insure privacy, especially if the bungalow is placed close to the sidewalk level. The planting should be as well considered as even the more expensive houses and should be set out with a view to its all year round appearance. The color of the bungalow will largely depend on the nature of the material used. If it is of cement or stucco there are a great variety of finishes in color that may properly be used, but care should always be exercised in following the individual taste of the owner. He should not create an effect that will fail to blend harmoniously with the houses of his neighbors.

The matter of properly heating the bungalow is of course of importance. There is the warm-air furnace method, which is suitable in houses of more than one-story and the pipeless heating method, which is successfully used in the compact one-story struc-



Sectional view showing installation of a pipeless furnace

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ture. Illustrations are given herewith. Both methods are commendable. As they have been covered in the heating articles in BUILDING AGE, they will not be again described herein.

The log-cabins described in our April issue are typical and very fine bungalows, and this article might advantageously be consulted now. The principles of decorating and furnishing the low cost house as fully set forth in the recent series by that name are absolutely applicable to the bungalow and should be carefully considered in every instance where building is undertaken.

For additional illustrations see pages 44 and 45.

A New System of Hollow Concrete Wall Construction

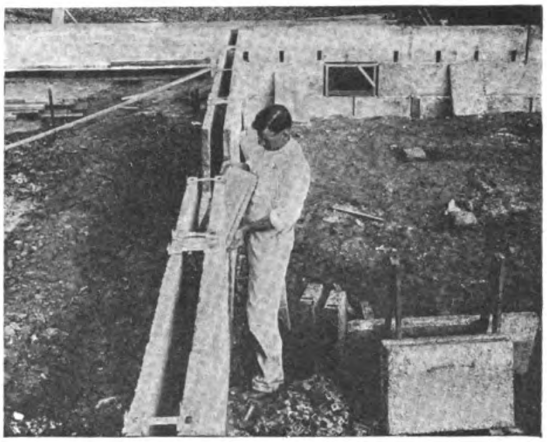
By Charles Alma Byers

THE general desirability of a hollow concrete wall over the one of solid concrete construction in home building and for other comparatively low structures is commonly recognized and well understood. The hollow wall, for instance, because of its air space, naturally assures an interior both freer of dampness or moisture condensation and of more equalized temperature. Also, due to this air space, it requires less material to build, and therefore may mean a saving in cost.

In the accompanying reproduced photographs is illustrated a new system of hollow concrete wall construction, designed and basically patented by Charles B. Harp, a construction engineer and concrete contractor of Los Angeles, California. This system, as will be observed from at least one of the pictures, consists of the erection of walls with pre-cast concrete slabs, which are set edgewise in two tiers to form a continuous air space, and are securely bonded together in this wise to furnish the required stiffness and rigidity. The slabs are cast in various sizes convenient for handling, and the walls are therefore easily and quickly laid.

The casting of the slabs is naturally an extremely simple operation. The form consists of but a rough board floor with an arrangement of edgewise-set strips to separate the poured concrete into units of the desired sizes. The upward extending strips are ordinarily intended to correspond in height with the thickness desired for the slabs, and hence the concrete mixture is brought smooth or level with the top edges. By properly arranging these strips the slabs may be so molded as to fit around windows and other openings, as well as otherwise shaped to suit the work under construction. The units are individually reinforced, with either rods or wire mesh, during the casting, and the centering of this reinforcing is thus made easy.

In the erection of a wall of this kind, the slabs, set edgewise, are naturally laid to break joints. Rust-proof steel ties are used to hold the units in the desired position, and these, together with a system of concrete studs, give the erected wall the necessary rigidity and stability. These ties, however, while never removed, are principally intended to hold the units in position only until the studs may take over the strain. Two kinds of ties are used—one kind to span the air space and grip the edges



Constructing a double wall with concrete blocks. In this case the air space is continuous and furring the interior is unnecessary

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of two upper and two lower slabs, and the other kind to fasten the slabs to the upright studs. Continuous concrete plates to engage the two tiers of slabs



The double walled concrete block bungalow ready for stucco finish

may also be used to increase the stability of the wall when unusual strength is necessary.

The wall erected in this way is, of course, plastered, and the naturally rough surface of the slabs insures an excellent bond. These outer and inner coats of plaster cover all mortar joints and the exposed portions of the metal ties.

The slabs may be of any thickness desired, but for the walls of the house here shown in various stages of construction, they are only 2 inches, while the air space is 4 inches wide. This, exclusive of the plaster coats, therefore gives an 8-inch wall. The air space also may be increased or decreased in width. In the construction of this house 21 cubic yards of concrete material were used. The reinforcing consists of 15/64 inch round rods. Less than 150 feet of lumber, board measure, were used for the casting forms. The house is not only of very stable construction but attractive in appearance.



The completed bungalow

The Use of Lumber in America

More lumber is use din the United States for general building and construction than for any other purpose, says the U. S. Forest Service latest report. In normal years probably 28 billion board feet is used in this way out of an average annual cut of forty billion feet.

For the five years before the war, 1910-14, the average annual building bill of the country shown by building permits was approximately $670,000,000. After dropping to $445,549,903 in 1918, it rose in 1919 to $1,326,736,702; but with building costs increased 100 per cent. or more, actual construction did not much, if any, exceed the pre-war average.

The building permits issued in twenty-one cities of various sizes widely distributed over the country show that, in values, housing construction formed 36 per cent. of all building in 1913; 21 per cent. in 1918, and 27 per cent. in 1919. The amount of housing construction in 1913 was exceeded in 1918 in only two of the twenty-one cities, and in 1919 in only six, in spite of the "build-a-home" campaign. The falling off in house construction, continues the Forest Service report, generally appears to have been particularly marked since the latter part of 1919, when the greatest upward movement of prices began.

The United States Housing Corporation states that normally 30 per cent. of the number of buildings constructed are dwellings; that in 1919 dwellings were only 15 per cent; that 1,000,000 families in the United States desired homes even before the war; that the shortage has since increased very rapidly; that there were but 70,000 houses built in 1919, when to have met the requirements there should have been 500,000, and that in 1890 an acerage of 110½ families occupied 100 homes, but to-day 121 families occupy 100 homes.

Wants Postal Savings Funds to Aid Home Builders

Postal savings deposits totaling $175,000,000 would be turned into a vasting building loan fund to relieve the nation-wide housing shortage under a bill to be introduced at the next session of Congress by Representative M. Clyde Kelly, of Pennsylvania.

Kelly would have the money, and loans to be made wit hit, administered under the direction of a group of depositors in each community.

Kelly is one of a group of Representatives and Senators now planning to introduce bills dealing with the housing shortage at the next session of Congress.

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Lighting the Home

By M. Luckiesh

III. The Dining Room

THE lighting of the dining-room is based upon conditions differing very much from those of the living-room. In the latter, the arrangement of furnishings is not thoroughly fixed. There is a mobility in this respect which is quite absent in the dining-room. Furthermore, a variety of occasions are met in the living-room. In the dining-room the furniture is located very definitely and the occasions are all similar as far as lighting is concerned. At least the dining-table may be permanently located, usually in the center of the room. No room in the home offers the interesting opportunities of utilizing the potentiality of light as the dining-room and no room in the average home at present is lighted with less understanding.

Underlying Principles.—Matters of taste are not subject to unbending rules but there are general laws of esthetics to which individual taste must bow. Intermingled with the various artistic aspects of lighting are certain psychological effects of light, shade, and color which must be recognized if the potentiality of lighting is to be drawn upon intelligently. In the dining-room the table is the area of dominant interest and the lighting should be such as to operate in harmony with this fundamental precept. Brightness attracts and holds the attention. The table should be the brightest area in the room and the surrounding walls and ceiling should be relatively much less bright. The brightly illuminated table holds the attention of the diners and the semi-darkness of the surroundings hems them in. The psychological basis of this argument is readily established by demonstration and it is interesting to attempt to find the origin of this psychological effect of light and shadow. Without entering upon details it may be mentioned that thoughts pertaining to this aspect readily gravitate down the centuries to the primitive campfire. Regardless of the source, persons will very generally agree that the dining-table should be the dominant brightness in the dining-room when they have had an opportunity to witness demonstrations of the various lighting effects in the same room. Then why are so many dining-rooms lighted otherwise? The answer is the same as in many other cases of interior lighting, namely, the householder is unacquainted with the possibilities and effectiveness of lighting methods and is, therefore, indifferent and unobservant. Modern lighting with its extensive possibilities is relatively new.

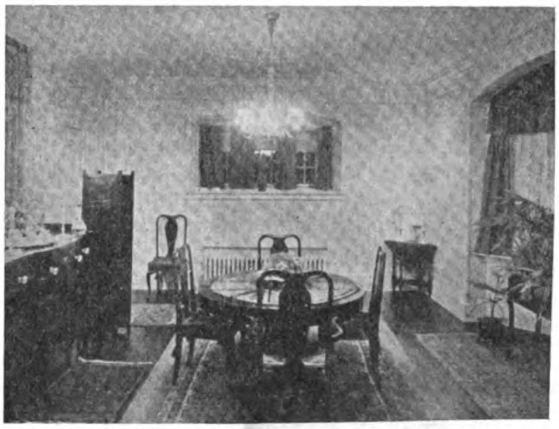

Fig. 2. The candelabra when equipped with dense shades with white linings produces a fairly satisfactory effect, but usually there is too much light on the ceiling



Fig. 1. The semi-indirect unit illuminates the dining room too uniformly and the ceiling is too bright compared with the table

The various points pertaining to dining-room lighting may be brought out by critical analyses of common methods of lighting.

Wall-brackets.—The statements pertaining to wall-brackets found in the second instalment of this series apply equally well to the dining-room. Such fixtures ar[illegible]ring because they are directly

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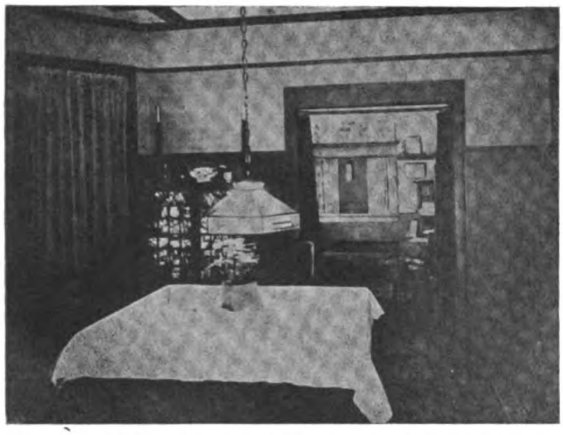

Fig. 3. The "old-fashioned" dome when properly designed and hung produced an ideal lighting effect. Its chief disadvantage is its obtrusiveness

in the field of vision. Their locations on the walls make it impossible for them to light the table predominantly. In fact, they tend to produce an effect quite opposed to that which is most desired from the psychological point of view. They make excellent ornaments if the lamps are densely shaded but there appears to be little in their favor as lighting-fixtures for the dining-room. Notwithstanding the fact that their use is opposed by various considerations such as utility, psychological effect, and visual comfort, they are often employed by architects and decorators in the more pretentious dining-rooms. When placed against dark panelling or other dark wall-covering they are usually glaring despite the density of the shades. When supplemented by a central fixture their undesirable features largely disappear and they

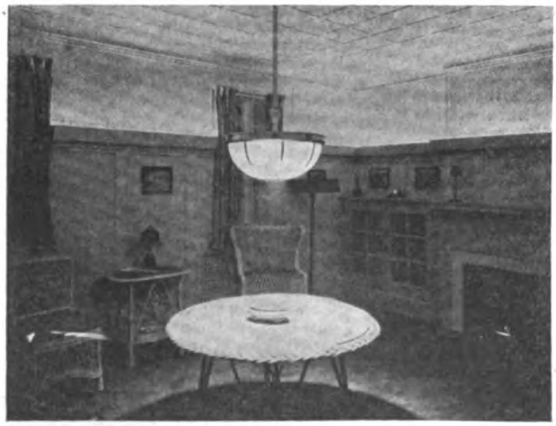

Fig. 5. A new type of dining room fixture which produces a combined effect of a sem-indirect unit and a powerful downward cone of light. This is an illustration of a demonstration room. The cove is emiting a low intensity of tinted light

usually may exist without criticism as ornaments.

Candle-sticks.—Well shaded candle-sticks containing small lamps may be very attractive on the dining-table. They must be low in order not to obstruct the view across the table but rarely are such fixtures sufficiently well shaded to prevent glare. They usually supplement other fixtures such as brackets, semi-indirect and indirect fixtures which do not direct the light dominantly upon the table. Candle-sticks may add a charm to the dining-table but they have some disadvantages. They are usually glaring

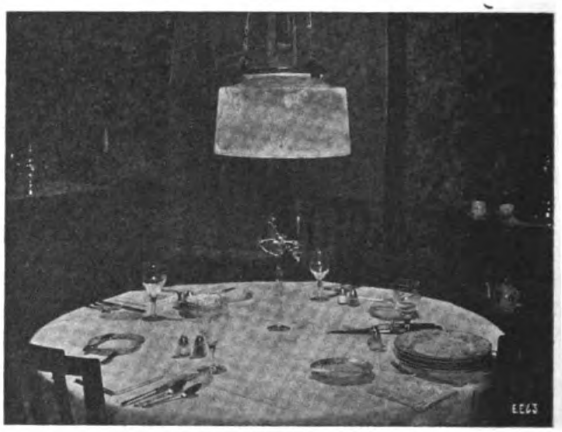

Fig. 4. A type of modern dome which is not too large and which may be hung sufficiently high

and they interrupt vision. Furthermore, an unsightly connecting wire often dangles from the overhead fixture or rises from beneath the table to cause more or less annoyance.

Candle-sticks on the buffet provide a charming touch to the dining-room if they contain small lamps and are well shaded. Miniature lamps of low voltage obtained from a small transformer provide the dimness of light so appropriate to such fixtures. If two candle-sticks adorn the buffet their lamps of normal voltage may be connected in series, thus reducing their brightness. A series-parallel switch is convenient in such cases.

Indirect Lighting.—The lighting fixture, which directs the light upward to the ceiling whence it is diffusely reflected about the room, has many applications in various fields of lighting, but it does not alone supply the best effect in a dining-room. If supplemented by candle-sticks on the table it may be considered as a desired secondary source of light. However, if a fixture must hang over the dining-table it may just as well supply the lighting effect desired without requiring any help.

Indirect and semi-indirect lighting fixtures may vary from opaque to translucent bowls, from inverted opaque shades to translucent ones, and through

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a vast variety of forms. But if most of the light is directed first to the ceiling whence it scatters more or less uniformly over the entire room, the best lighting effect in the dining-room is not obtained. The bright ceiling and the uniformly illuminated surroundings as illustrated in Fig. 1 are distracting and the coziness of a dominantly bright table is lacking. There are many dining-rooms lighted in such a manner because fixture-dealers sell fixtures and householders buy fixtures. If *lighting effects* were the commodity such errors would soon be eliminated.

The Candelabra.—During recent years a popular style of fixture for the average dining-room has been the candelabra. It consists of a group of imitation upright candles, each surmounted by a round-bulb frosted lamp. Usually the lamps are unshaded and the light escapes in every direction. The ceiling is

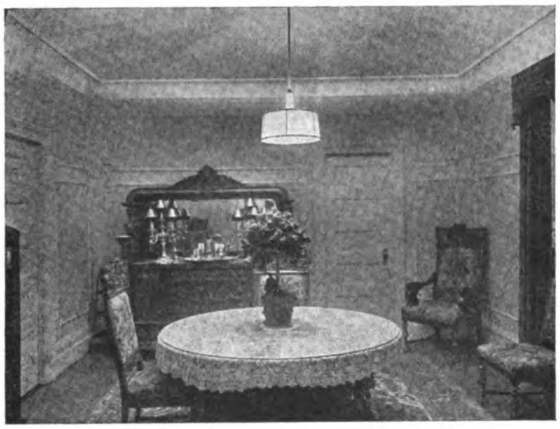

Fig. 6. A modern fixture concealed by a silk shade. Most of the light is directed upward, but a fairly strong component is emitted downward. The silk shade should be deeper and the fixture should be hung a foot or two lower

quite bright and the general effect does not differ much from that obtained from a so-called semi-indirect unit. There is little to recommend this type of unit for lighting the dining-room. However, if dense shades with white linings be placed over the lamps more light is directed downward toward the table and the brightness of the ceiling is very much subdued. The effect is very much more desirable than that from the bare lamps. In fact, it is a long step toward the ideal lighting of the dining-room. This is illustrated in Fig. 2.

The Shower.—A group of small pendant shades supported at the ends of chains or rods or grouped on a decorative element has been used considerably as a central fixture in the dining-room. Such a fixture possesses the desirable feature of directing the light predominantly downward upon the table. The shades should be of dense opal glass or fabric and should be deep enough to conceal the lamps from the eyes of the diners. The shades should not be too high above the table, three feet being sufficient. The height, however, is governed by the depth and size of the opening of the shades. Sometimes shades which are shallow and flare too much at their openings provide a very unsatisfactory effect because the lamps within them are not concealed from the eyes. A simple remedy is to replace them by shades of smaller aperture, or of greater depth. Bowl-frosted lamps are often desirable in such fixtures.

Perhaps the commonest dissatisfaction with such fixtures is due to their being hung too high. It should be obvious that if the shades are low the table may be illuminated satisfactorily while the eyes of the diners—fifteen inches above the top of the table—may be in the softer illumination of partial shadow. Shades of warm tints diffuse a charming warm glow about the room while the untinted light escaping from the apertures of the shades illuminates the table brilliantly. So-called "daylight" lamps will be found to produce a delightful effect upon the table but the shades must possess a deep warm color in order that the room as a whole does not appear too cold.

The Dome.—The old-fashioned dome when properly designed and hung, lighted the dining-room in an ideal manner. The only objection which can be offered under these circumstances is that it is a rather large object which when hung low is more or less obstrusive as seen in Fig. 3. However, the dome must not be hung high because the eyes will not be shielded from the light-sources within. There are some modern domes now reaching the market which may be hung somewhat higher (see Fig. 4), if a single lamp is mounted high up in the center of these units. There are still further possibilities along this line; that is, the lighting principle of the dome may be incorporated in the more modern and decorative types of fixtures. Several of these are now in use but inasmuch as they have not reached the market they will not be discussed in detail. One of these[1] is illustrated in Fig. 5 as it hangs above a table in a demonstration room employed by the writer. The aim was to make it appear like a simple bowl; however, within this bowl and directly over a hole in the bottom is an opal glass shade. The hole and the shade are each about three inches in diameter. This small shade contains a lamp and a cone of light escapes from the aperture to the table. Dimensions and height are such that the cone of light is barely greater in area than the table at that plane. The faces of the diners are in the subdued warm light emanating from the bowl after passing through the inner shade of a warm tint. Another circuit controls small lamps in the bowl giving an effect similar to that of the regular semi-indirect unit. This is described in detail in the reference given, but has been mentioned here to illustrate the possibilities in fixture design.

A fixture is illustrated in Fig. 6 which appears like

[1] "The Lighting Art," by M. Luckiesh, p. 141; McGraw-Hill, N. Y.

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a dome but the lighting effect is different. A greater component of light is directed upward against the ceiling than in the case of the dome. The effect is that the table is not as bright as the ceiling. However, the unit is fairly satisfactory for dining rooms. It should be hung a foot or two lower than in the illustration for the best effect and the textile shade should be deeper.

Secondary Sources of Tinted Light.—If the table is dominantly lighted by means of a central fixture some very charming effects of tinted light may be obtained from secondary sources. A cove may be built around the room as shown in Fig. 5. Two circuits of lamps of low wattage alternating blue and warm yellow may be installed. The secondary effects of blue, yellow, and rose (a combination of the blue and yellow) are charming and not at all spectacular. Similar effects may be obtained from lamps in imitation of flower-boxes supported on the walls or in large receptacles such as baskets or vases supported conveniently. In Fig. 5 is illustrated (without the color effects) the results of the subdued cove-lighting and the directed light from the special fixture designed by the writer to embody the lighting effect of the dome in a modern unit which could be hung high. The dark shadow under the table testifies to the directness of the downward cone of light.

Outlets.—An outlet of two circuits should be provided in the ceiling above the center of the dining-table. The latter may not always be in the center of the room owing to a window-seat, to built-in china cabinets, or to the disposition of the buffet and other furniture. The exact position of the table should be determined before the wiring is done for it is far better to have the ceiling fixture hanging directly over the table than to have it suspended from the center of the ceiling regardless of the position of the table. This mistake is often made. Two switches for these circuits should be provided at a convenient point such as near the kitchen or pantry door.

A baseboard outlet should be provided for the candle-sticks on the buffet and one or two other baseboard or wall-receptacles should be available for other purposes such as for connecting the electric toaster or percolator.

If brackets or other wall units are desired, the outlets may be easily provided.

Automatic Fire Escape Approved

An automatic fire escape was recently demonstrated at New York fire headquarters, when two men lowered themselves from an eight-story window on it. The escape is a rope with a wire running through it and running through an automatic pulley. The rope travels through the pulley at the rate of about four yards a second. It has been tested to bear 1,100 popnds.

No Use for Door Keys in Russia

Door keys are considered unnecessary in the Bolshevik scheme of life in Russia. Only privileged persons are supposed to possess them.

When the Associated Press correspondent, who recently crossed Russia, asked for a door key in one of the nationalized hotels at Omsk he was informed by the hotel "commissar," formerly the owner, that under the Red regime doors are not supposed to be bolted.

An appeal to the Omsk Bolshevik commandant resulted in the American correspondent obtaining an official document granting him a key and the privilege of locking the door of his room.

Concrete Window Weights Replace Cast Iron

With the increase in cost of iron, and the delay in obtaining it, substitutes are being adopted in many odd places. A California concern, for instance, is making and installing window-sash weights of concrete, reinforced with a wire loop. They are made large enough to occupy the whole weight run, one weight being made to serve both the upper and the lower sash by setting a pulley in the top and running the cord in a loop around it. This saves cord and labor as well as iron.

Eight Desks Combined in One by College Professor

Needing several desks to carry on his diversified work, but finding his office too small to accommodate them, a college professor in charge of an astronomical observatory on a West Indian Island, devised a space-saving piece of furniture that permits him to labor at eight different desks without leaving his chair. The desks are supported by a ball-bearing pedestal, around which they revolve, and can be drawn into position with slight effort. In the center are shelves for books and supplies.

Timber from Dead Trees

The prejudice held by certain builders against the use of lumber from fire or insect-killed trees has been proved groundless by recent experiments of the forest products laboratory. Here it has been found that lumber cut from sound dead trees is in no way distinguishable from any other, except that it may be partly seasoned. If the wood has not been injured subsequently by decay or further insect attack, this "dead" lumber is the equal of "live" of the same grade for all structural purposes.

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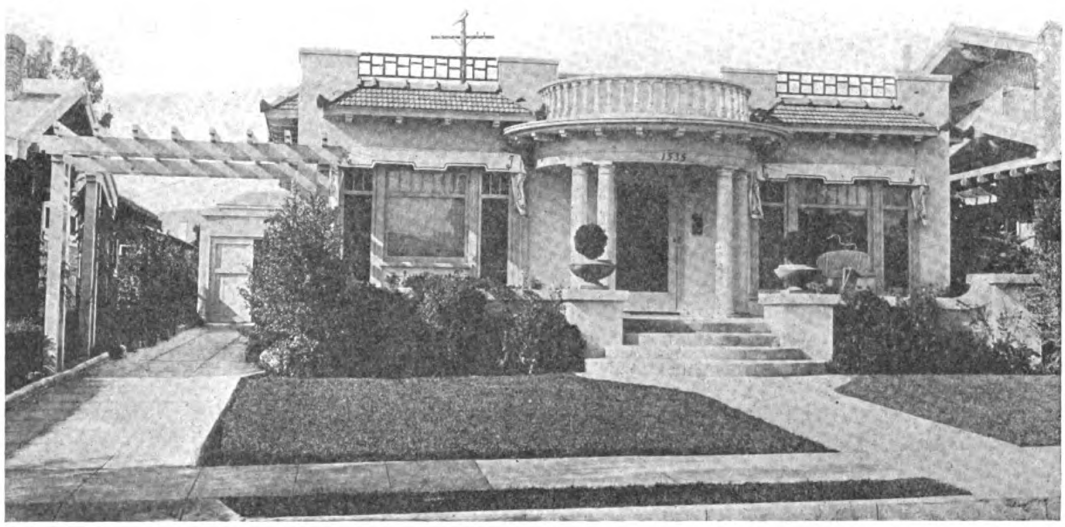

A PATIO DWELLING AT LOS ANGELES, CAL.
L. B. Volk, Architect

A Type of Patio Dwelling Possessing Many Desirable Features

SINCE the United States embraces such an extensive area, and one possessing so wide a range of climatic conditions from that of perpetual summer in Palm Beach and lower California to the "July, August and winter" climate common to the Northern states, it is but natural that types of dwellings developed to furnish a maximum of comfort should differ widely throughout the country.

In those regions where the climate permits of an all the year round outdoor life, it would seem undesirable to duplicate the conditions of design which prevail in sections in which artificial heat must be resorted to during a large part of the year. Yet, while in such localities as lower California nature has made it possible for one to sit out of doors the year round without fear of chill winds, neither the ordinary porch nor the rear garden furnishes that degee of privacy which may be enjoyed within the confines of the dwelling. To combine the privacy of the home with the atmosphere and comforts of outdoors is indeed a desirable feature for homes located in such favored regions.

This has been accomplished by combining with the dwelling proper a patio, or enclosed open space which is secluded from outside observation, yet permits a feeling of relief from the stuffiness of the house. It is not always customary so to construct this enclosure as to be rain proof. Often a high garden wall, separating a yard or court space open to the sky, is developed as a garden, with pool, attractive planting and easy chairs. Such a patio was incorporated in the unique house designed by Mr. Davis, and illustrated on page 50 of our October issue. The entrance garden and rear court of the house designed for Mr. E. Roscoe Schrader, by Mead & Requa, architects, illustrated on page 46 of this issue, serve a similar purpose.

Accompanying this article are illustrations of two patio dwellings of a type designed by Mr. L. B. Valk, a Los Angeles architect.

The first of these is Mr. Valk's own residence, which is located in Alhambra, Cal. The essential features of both these buildings, as well as others designed by the same architect and of similar type, are described below.

Such a building, in common with the bungalows, has the advantage of having all rooms located on one level, i. e., the ground floor. This eliminates many steps and thus reduces the labor on the part

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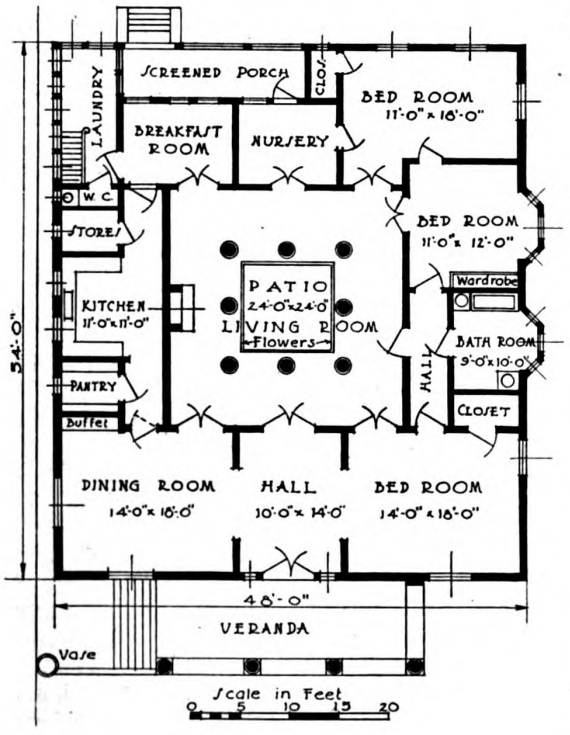
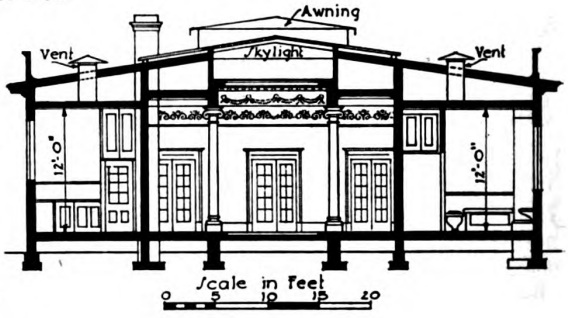
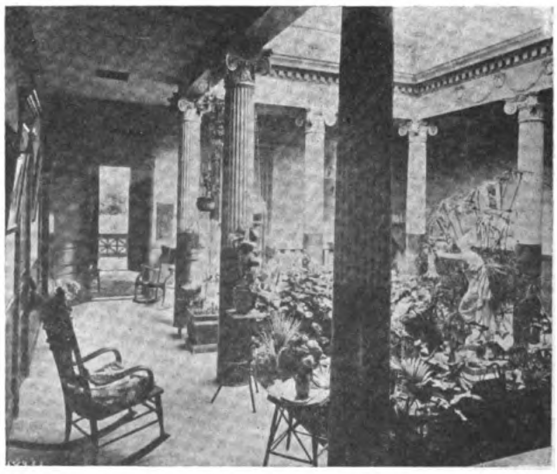
Exterior view



Floor plan





Interior view showing "Patio"

OWN HOUSE OF L. B. VALK, ARCHITECT, LOS ANGELES, CAL.

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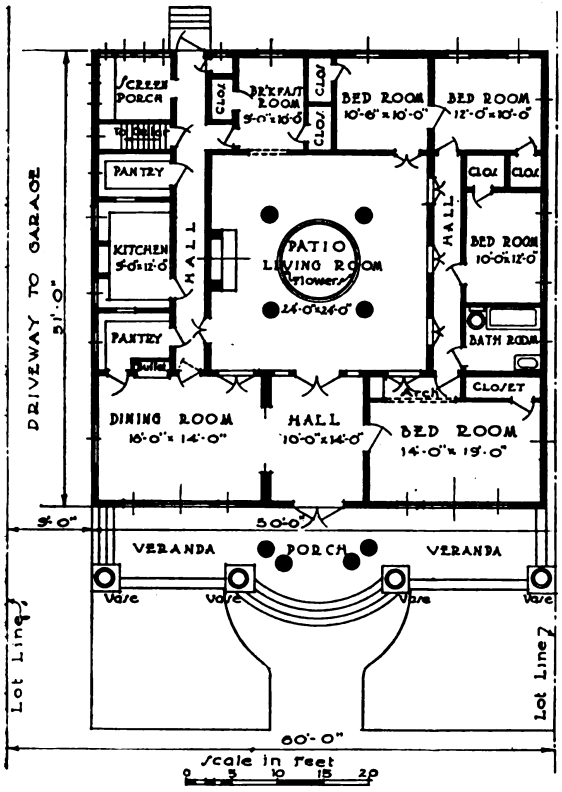
of the housewife. Although containing but seven or eight rooms, including the patio, the building presents an exterior appearance of spaciousness. The interior is entirely lacking in that cramped look frequently found in the bungalow and small cottage. The central room, termed the "patio," is approximately 24 feet square, and, as shown in the cross section, has the central portion covered by a skylight, constructed so as to readily slide off or on by an operating device controlled at the floor below. The skylight is about 12 feet square. When the skylight is slid to one side this leaves the room be-



Plan—Patio dwelling at Los Angeles, Cal.
See illustration on page 37

low, which in reality is the living room of the house, open to the sky, thus providing excellent light and ventilation. Since there are periods during the day when the heat from the direct rays of the sun would render the patio uncomfortably warm, a water proofed awning is placed some distance above the skylight. In the dwellings of this type erected in lower California, it has been found advisable to keep this awning in place for approximately nine months of the year, and during the major portion of this period the skylight is maintained open. The placing of the awning as shown tends to accelerate the air circulation, and thus induces a more comfortable temperature in the dwelling during the hot weather. In the event of a severe storm arising quickly, the presence of the awning prevents any serious water damage to the interior prior to the closing of the skylight. The decoration of the central room should be in keeping with the architectural style of treatment of the exterior. It may be made elaborate or kept quite simple. The use of flowers adds to the out of door feeling as well as to the charm and attractiveness of the room. The use of palms in localities not visited by frost is also appropriate. With the exception of the kitchen, pantry and laundry, all rooms open on the patio where French glass doors are used to good effect.

The rooms can be particularly well ventilated, since in addition to opening on the central patio, they have windows in the exterior walls.

The houses shown have been constructed with a comparatively flat roof, the exterior walls being carried up several feet above the cornice line. With the exception of the patio, the rooms have a clear height from floor to ceiling of 12 feet and an air space 3 feet high is provided between the roof and ceiling by using a hung ceiling. This space is well ventilated. The roof over the central room is supported by four columns in the case of the Los Angeles dwelling and by eight columns in the case of Mr. Valk's residence. These columns form a part of the decorative treatment of the interior. In each of the two houses illustrated, a parterre of flowers has been located directly under the skylight. This has been constructed of concrete, and depressed, forming a shallow basin. Roses, larkspur, verbena, daisies, and other flowering plants, as well as ferns and palms can be planted to advantage. Since artificial heating is seldom used, it is not necessary to provide any extensive heating plant. By using gas fired radiators, no central boiler is required. In sections where hydro-electric power is available, thus allowing low rates, electric heating can be resorted to. Of course, if desired, a cellar can be excavated, and one of the more common types of heating systems installed, but where economy is essential, the cellar can be eliminated or placed under only a portion of the building. In any event, the floor is kept several feet above the ground level.

The house of Mr. Valk is constructed with concrete foundation walls, and frame walls above sheathed with stucco boards, and having a stucco finish. Any other type of wall construction, such as brick, hollow tile, etc., can be used. Both of the houses are built on lots 60 feet wide.

By incorporating certain modifications of design, this type of dwelling could be made adaptable to colder climates. In such a case, however, an efficient heating system would have to be installed.

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Constructing a Winding Stairway

VII—Assembling the Stairs

By Richard M. Van Gaasbeek

School of Science and Technology, Pratt Institute, Brooklyn, N. Y.

HAVING completed the different parts of stair they can now be assembled. Lay string A down flat, insert treads 2 and 3 and put string D in place glueing and wedging fast. Raise string B in position and insert the tongue of string A and fasten. Likewise raise string C in position and fasten, being careful to have the treads level and risers plumb. Angle post No. 2 can then be put in place, plumbed and fastened. Raise string F, bracing it in position until tread No. 11 is fitted. Raise angle post No. 3 and fasten tread No. 11 at the same time, as it will be difficult to get it in later. Then angle post No. 4 and string E can be raised and braced in position. The wall strings should be fastened securely to the wall and the outside strings be parallel to them

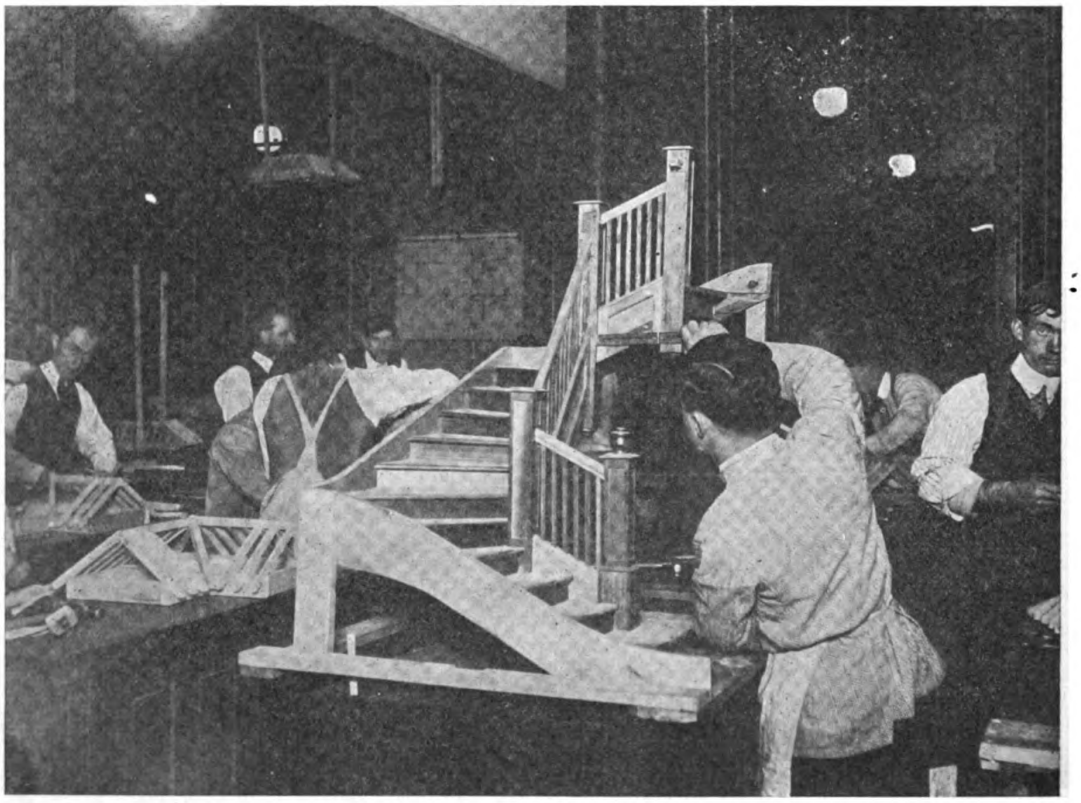

Fig. 31. The completed stair, one-third full size. A practical problem exemplifying many of the fundamental principles involved in the art of stair building

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throughout the distance of the required width of the stair. With the skeleton work in the place the remaining treads and risers can be fitted and inserted from the back, glued and wedged in position. The bull nose step is inserted last.

building up a paneled effect, stiles should be placed against the posts and the rails cut in between the stiles, the stiles and top rail being the some width, and the bottom rail an inch or more wider. The muntens can be narrower than the stiles and if

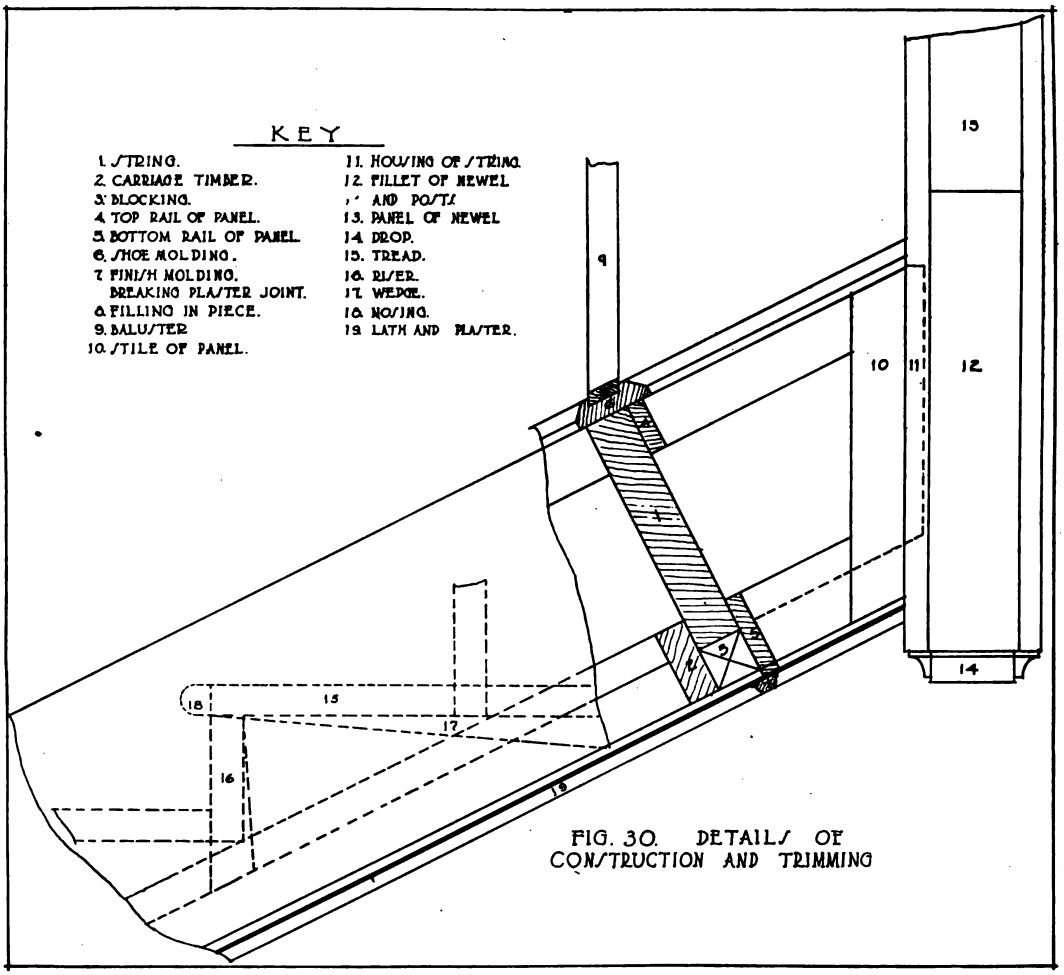

FIG. 30. DETAILS OF CONSTRUCTION AND TRIMMING

With the body of the stair in place, the average mechanic should be able to trim it without serious difficulty. This article is intended to deal with the stairway so that no special references will be made fundamental principles involved in laying out a as to the details or trimming. In many cases the stock to form the panels planted on the face of the strings, the top and bottom rails are very ofen butted against the posts. This is poor construction and should attract the eye of any mechanic. In

laid off into smaller panels the muntens should be cut between the rails as shown at 10 in Fig. 30.

After the panels are built up the shoe molding can be placed on top covering the joint between the string and panel. The length and bevel for the balusters can be taken from the lay-out of the newel and posts and when the handrail is in position it should rest against the fillets as shown on the various lay-outs.

(The End)

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Editorial

Getting Back to a Firm Foundation

AT a recent hearing before the Committee on Housing of the New York State Legislature, Frank Mann, Tenement House Commissioner, stated that houses were not being built because under present conditions it was not "good business to build them." Subsequently a builder, then engaged in erecting large numbers of one and two family houses in a suburban section, urged the necessity for the passage of legislation enabling the credit of the State to be placed at the disposal of builders of low-cost houses, and that further provision be made that the money therefore might be secured at reasonable rates. In reply to an inquiry made by a member of this Committee as to whether the houses in question could be disposed of after completion, this builder answered in the affirmative and stated that, in his judgment, lack of easily obtainable money was the chief reason for the curtailment of the activities in building operations of the firm he represented.

Many analyses as to the root of the trouble in the building trades today would seem to indicate that the basic or real cause of the present conditions lies in the inability to secure mortgage money at reasonable rates. In this connection, it is pertinent to refer to a statement recently given out to the daily press by John Skelton Williams, Comptroller of the Currency, in which he set forth that New York banks were receiving from 15 to 30 per cent. on call money, while at the same time they were themselves borrowing from the Federal Reserve Bank at less than 6 per cent.

With such conditions as these, the truth of which cannot be questioned, is it not pertinent to inquire what chance will a man have who wants to build himself a house and expects to get the money at a legal 6 per cent. rate. Have the banks, the insurance companies and other loaning institutions got us all by the throat, or have the material men, by maintaining high prices, and labor by its autocratic attitude, made building such a venturesome thing that the banker hesitates to place the money entrusted to his care, on so risky a proposition? With money selling, as Mr. Williams shows, from 15 to 30 per cent., the contention that has been made in these columns and on the part of others quoted therein, that the greatest retardance to housing was due more to capital than to any other factor, would seem to be justified.

An investigation now being conducted by the New York Legislative Committee with the aid of Samuel Untermyer, is endeavoring to get at the bottom of the facts as relating to alleged profiteering among the building material group. Sufficient progress in this investigation has not been made to establish any facts, but the inference is quite natural that such an investigation would not be undertaken unless it was believed there were well grounded suspicions of a tendency on the part of material dealers to unjustly boost prices and control the output of material manufacturers.

We are today so close to these unusual conditions that we are perhaps apt to magnify their importance as to their influence on the future. The inconvenience that has arisen from the lack of housing naturally is an irritating influence on the public mind, and the unfortunate element is that a great many theoreticians rush blindly into print with all sorts of impossible ideas and no well developed methods of solution.

That we shall get our feet on solid ground, and before long, need not be doubted. The New York Evening Mail has tersely but very aptly set forth some of the reasons for the depression in housing, and under the heading "What's the Matter with America?" it states as follows:

Too many diamonds, not enough alarm clocks.
Too many silk shirts, not enough blue flannel ones.
Too many pointed-toed shoes and not enough square-toed ones.
Too many serge suits and not enough overalls.
Too much décolleté and not enough aprons.
Too many consumers and not enough producers.
Too much envy of the results of hard work and too little desire to emulate it.
Too many desiring short cuts to wealth and too few willing to pay the price.

What we shall need now, in fact, what we always need, is a sober, sane conduct on the part of everyone interested in building. We are optimistic that these conditions will before long become very much better and, in fact, we believe that a more satisfactory era has already begun.

It is, therefore, no time for impatience, but it is time to clean house—to curtail needless expense, to reduce all wasteful overhead, to eliminate every unnecessary expenditure, and when we have sufficiently followed these sane guides, we shall put business where it was before the war, on a bed-rock of common sense methods.

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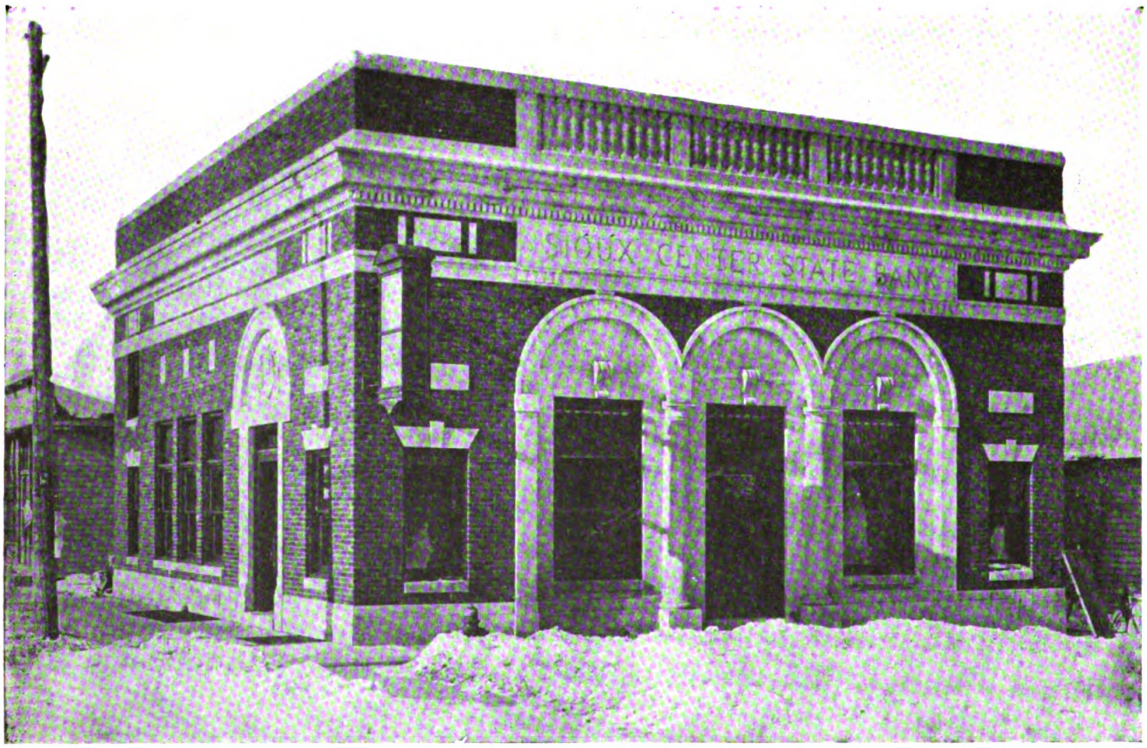

SIOUX CENTER STATE BANK, SIOUX CENTER, IOWA

A. Moorman & Co., Architects and Builders

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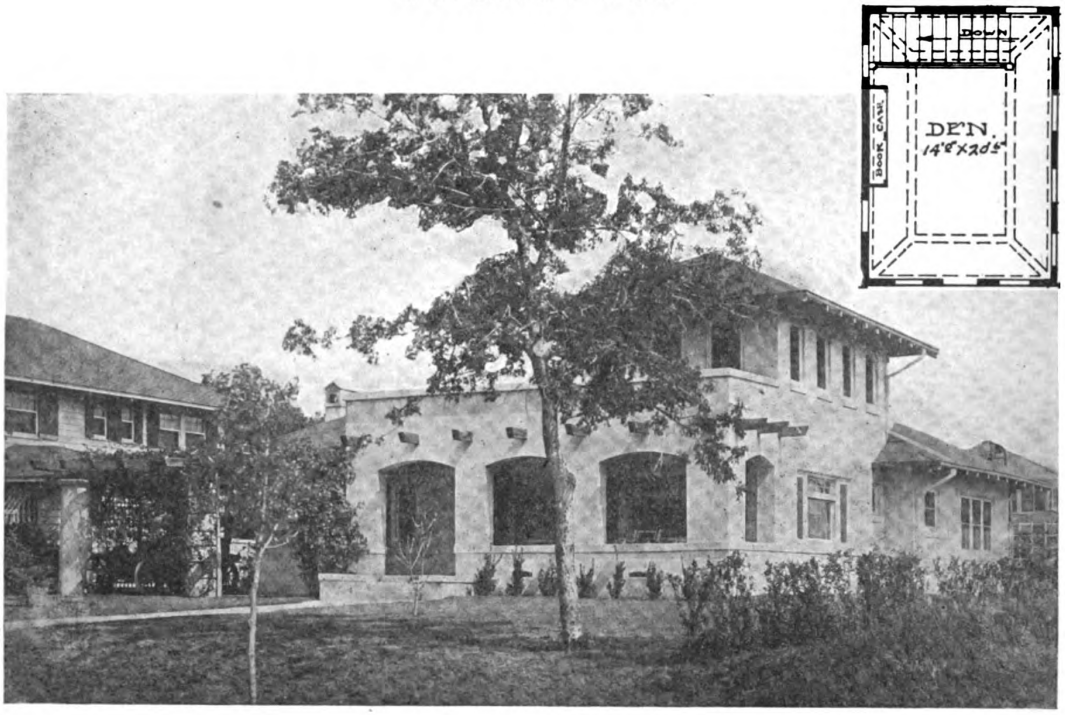

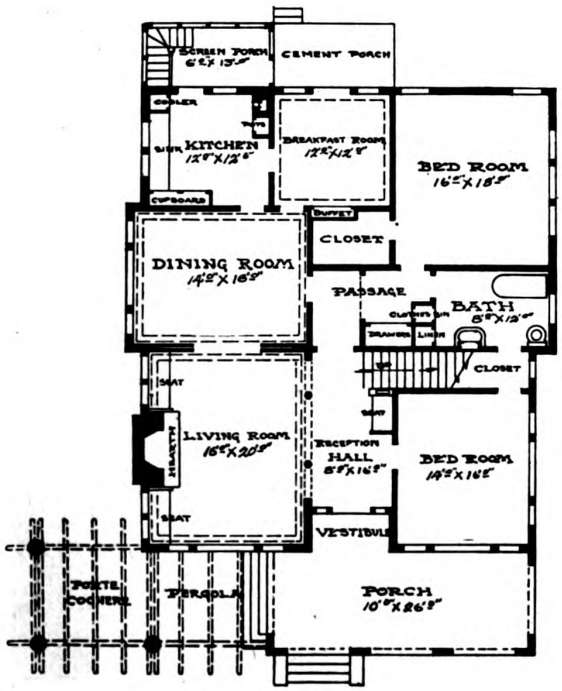

A STUCCO BUNGALOW IN TEXAS

This attractively designed bungalow is particularly adapted to the hot, sunny climate where it is located. The wide, covered porch with its large openings in the front and sides makes every breeze available and yet affords the necessary shade. The building is unusually roomy and comfort-giving.

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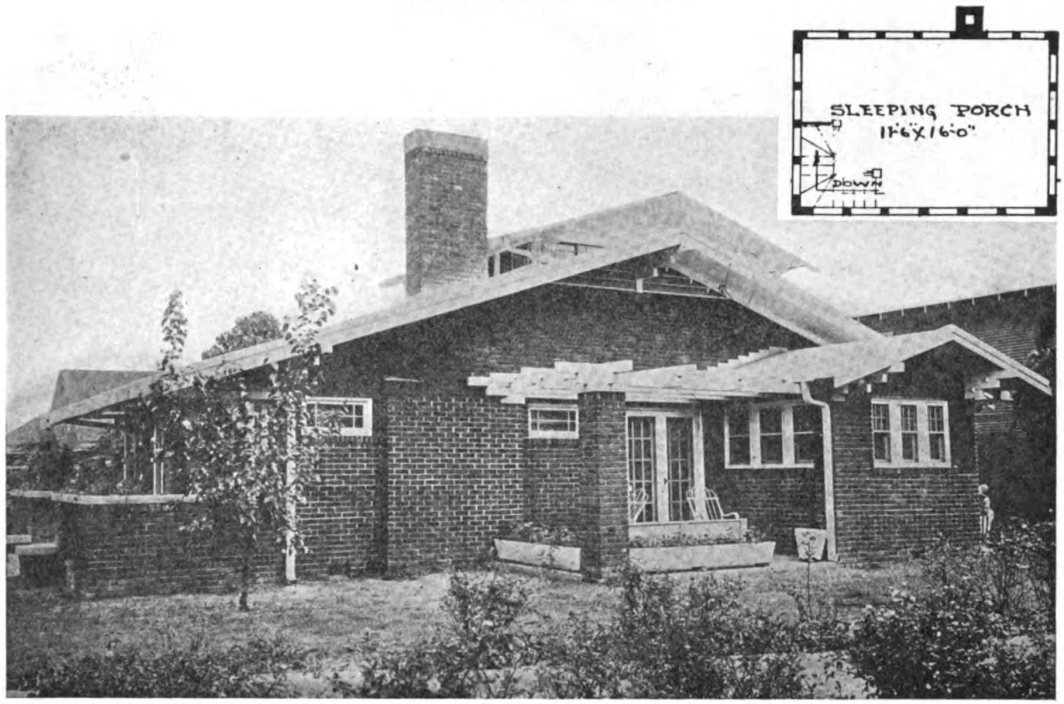

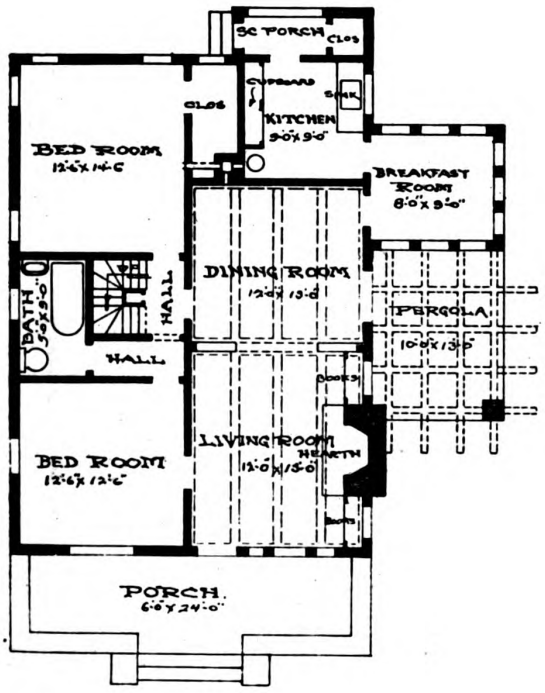

A HOMELIKE BRICK BUNGALOW

A southern dwelling, amply provided with front porch, back porch, pergola and access to the air. The large sleeping porch in the roof is a desirable room during the warm southern summers. The breakfast porch is an attractive feature, now widely in use in the modern bungalow.

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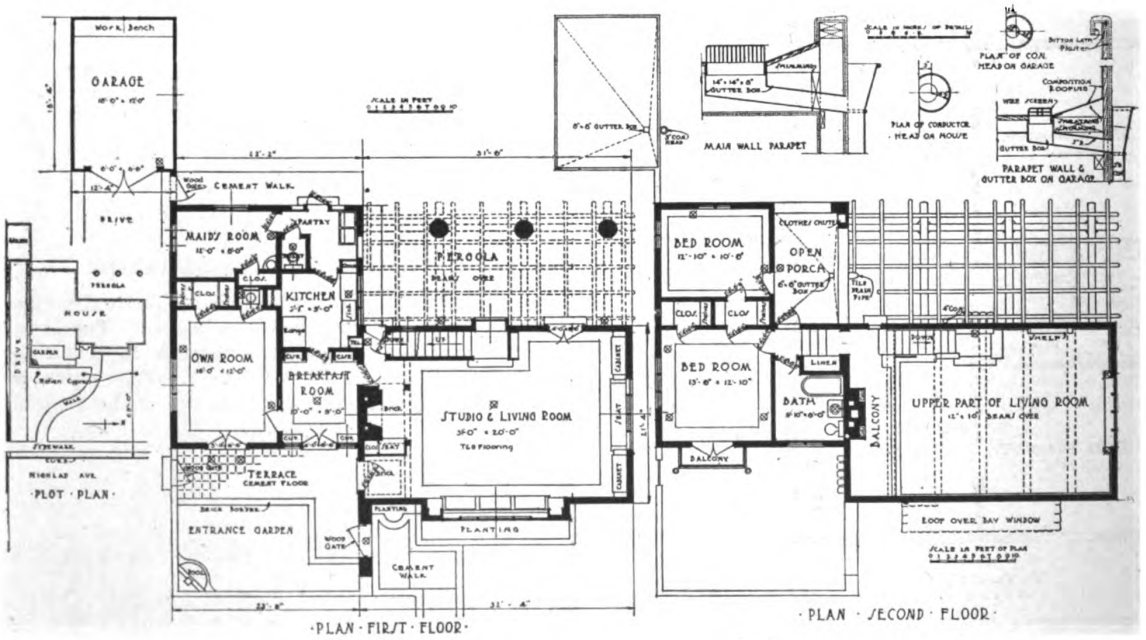

HOUSE OF E. ROSCOE SHRADER, HOLLYWOOD, CAL.
Mead & Requa, Architects

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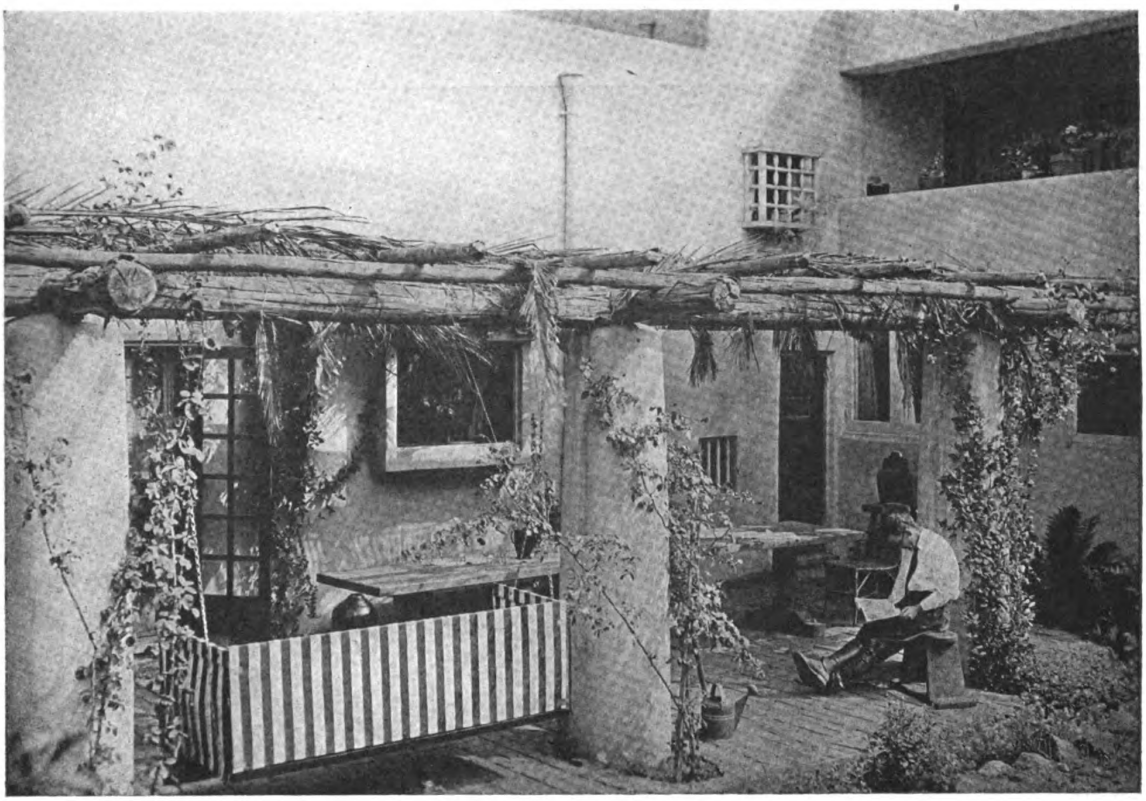

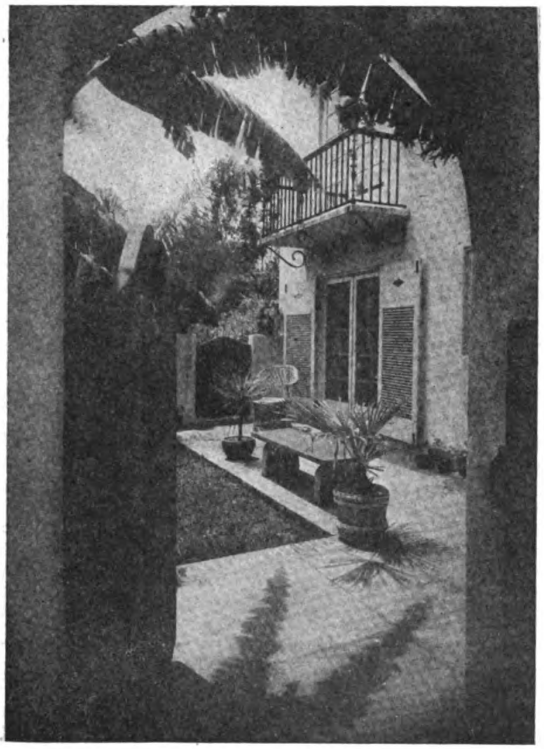

REGIONAL ARCHITECTURE, by which is meant a style of design and building that is purely local in character, is always interesting, especially so when it suggests not only the materials that are readily obtainable in the near locality, but also when it brings to mind the early history and traditions of that locality. This house is of undoubted attractiveness, and fulfills every good suggestion of regional characteristics.

It is along the lines of the type that the early Spanish settlers of California first implanted on the Pacific Coast. These devout and austere people, led by their priests, built houses almost similar in design. They knew how to build for the climate and how to design for it. No floridness or over decoration forms a part of it. Note the straight lines of this house and how well it accents the decorative aspect of the semi-tropical foliage and the dune-like aspect of the hill which forms a background. The setting is particularly good.

The plan is also well designed to fit the climatic conditions and provides the best elements of comfort and convenience. The large living room, extending through two stories, with its easily accessible pergola, gives an opportunity for domestic assemblage that is very good. There is a well placed fireplace, where a cheery wood fire may enliven dark or rainy days. The second floor has two bed rooms of good size and an attractive porch, which can be easily converted into an out-of-door sleeping room. The balcony on the second floor overlooking the living room is a very good feature of the plan, and lends a most attractive aspect to the interior. There is also provision for a second fire-place on this balcony, a most excellent feature.

HOUSE OF E. ROSCOE SHRADER, HOLLYWOOD, CAL.

Mead & Requa, Architects

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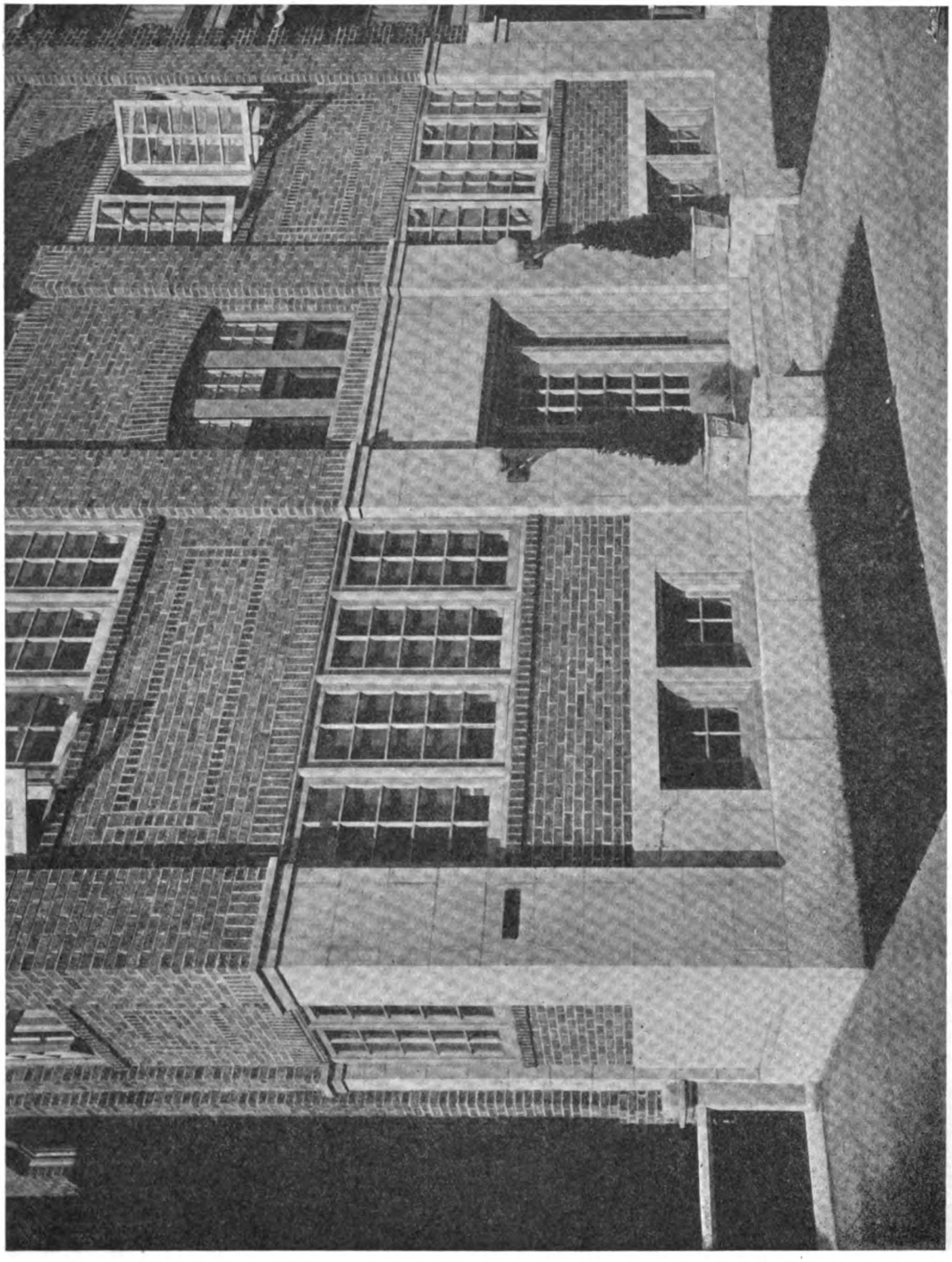

DETAILS OF LOWER STORIES OF A PHILADELPHIA APARTMENT HOUSE
Designed by D. Knicberbacker Boyd and Victor D. Abel, Architects

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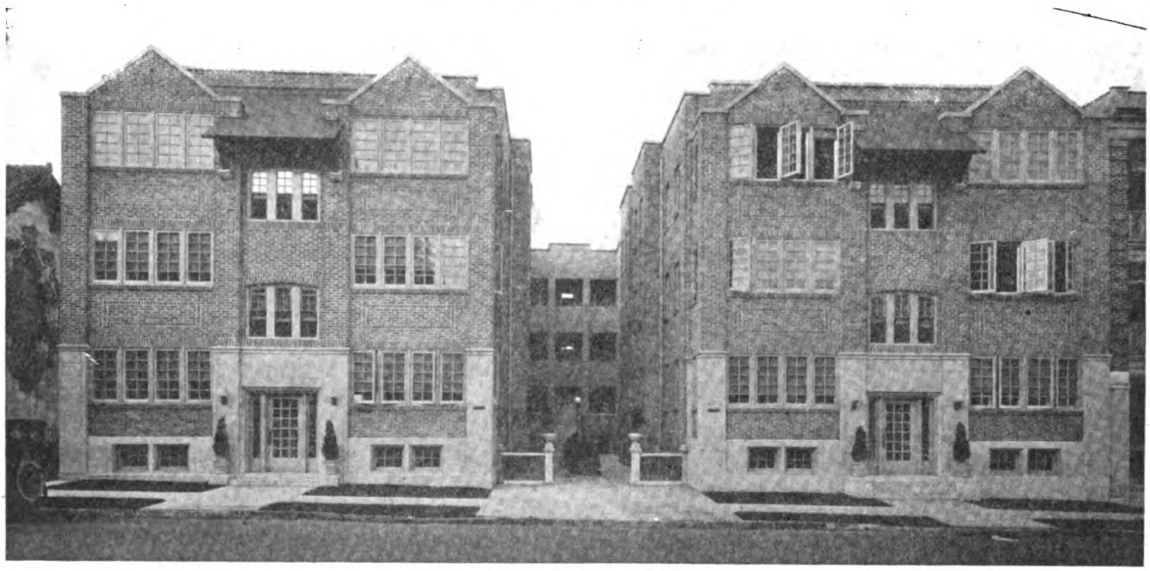

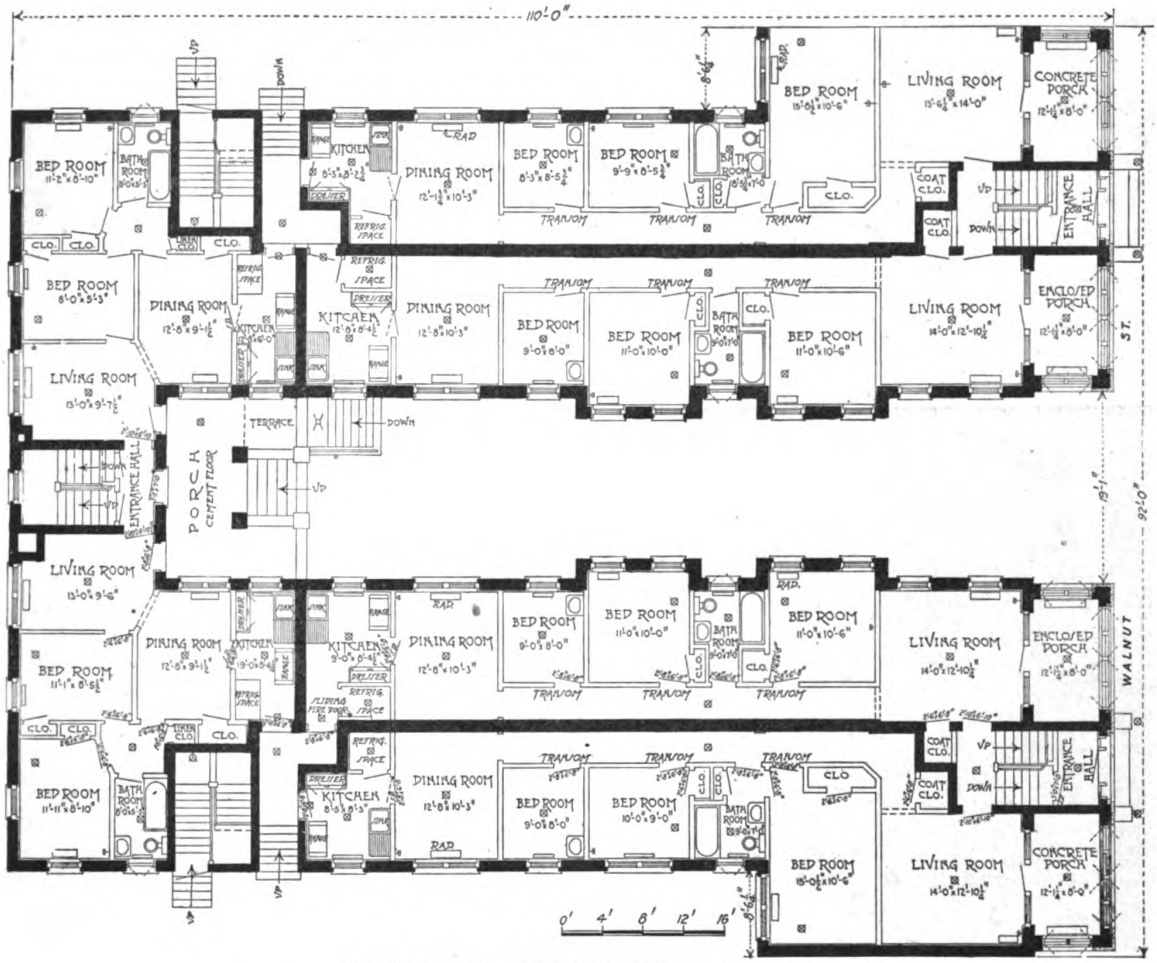

A PHILADELPHIA APARTMENT HOUSE
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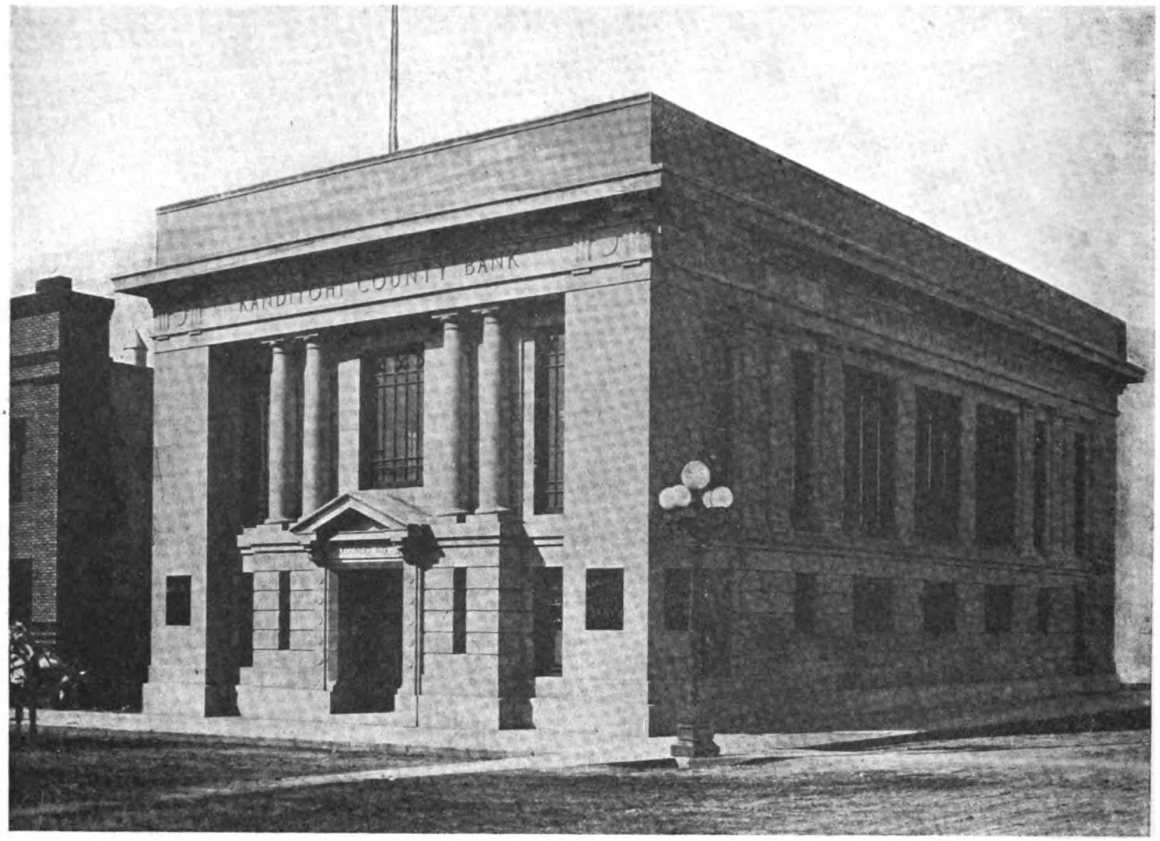

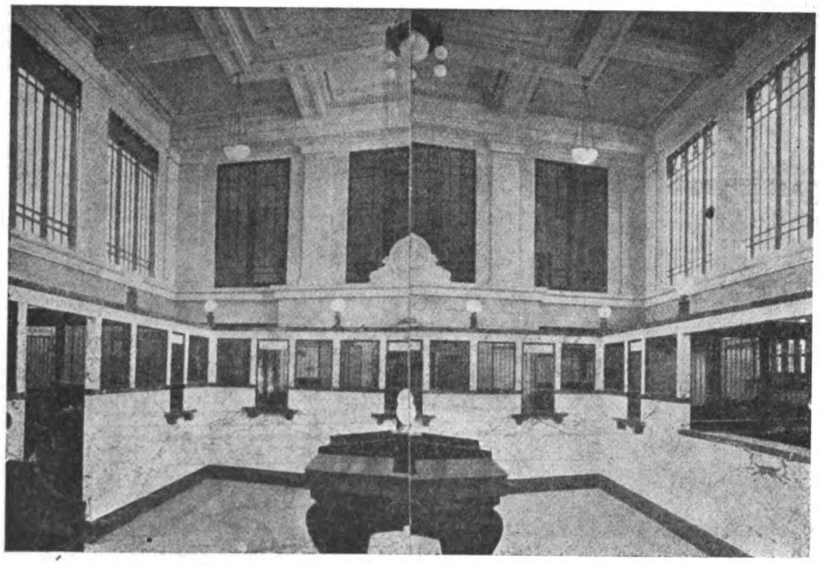

KANDIYOHI COUNTY BANK,
WILMER, MINN.

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The Need for Apartments in Warsaw

NEW YORK and Chicago are not the only cities suffering from the housing shortage. Before the military activities of the late summer, Warsaw, the capital of Poland, was facing such severe conditions that its people were offering $100 rewards for the finding of a four-room apartment. Only the aristocracy or the very rich



Poland is the home of wicker work, but though even wicker beds are sold cheaply on the public corner, what's the use of furniture without a home to furnish

occupy whole houses and these instances are so rare that such houses, once considered mere dwelling places, now are called "palaces." Rooms are at a premium, flats and apartments are practically impossible to find, and hotels are packed to the limit, with long waiting lists of applicants who can not be accommodated.

Such crowded conditions, naturally, have turned Warsaw into a gold mine for the builder. Fortunes await only the transportation of building materials or the securing of capital, and loans have been so arranged that it is possible to borrow money without financial backing and still realize a profit of 2 per cent. Skilled labor is plentiful and is lying dormant, awaiting only a resumption of building activities.

Poland's housing problem resulted from the war. Formerly Warsaw numbered between 800,000 and 900,000 inhabitants. With the constant arrival of refugees, the city's population has jumped to 1,125,000.

This influx of newcomers, appearing at a time when building operations were at a standstill, resulted in the serious housing situation which Poland is facing today.

The provision of homes for the homeless is one of the greatest tasks confronting the new Polish Republic as it contemplates its reconstruction program. In the solving of this problem Poland has turned to America for aid and America, through the mediumship of the American Red Cross, has assisted thousands of refugees either to return to their former places of abode or has housed them temporarily in camps. The American Red Cross has not only helped to house war-striken Poland, but has helped feed and clothe her as well.

Warsaw is a city of flats and apartments, built for the most part of brick with stucco trimming. It has been a lucrative field for the builder during the past, and large fortunes have been amassed through real estate investments. Predictions have been made that the future offers still greater promise to the investor if only building materials can be transported and capital can be obtained.

Remember the Fourth Roll Call of the American Red Cross. It is a good plan to join on Armistice Day, November 11, but if you forget it then, do it before Thanksgiving Day, November 25.



Courtyard of a crowded Warsaw tenement, showing a disinfecting plant in operation

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Heating Equipment for the Low-cost House

Modified Systems of Steam Heating

By Charles L. Hubbard, Heating Engineer

OWING to the difficulty of regulating the temperature with the ordinary low-pressure system of steam heating, and the length of time required to remove the air and establish a good circulation through all parts in the large plant, this method of heating is being largely superseded by what are known as "modified" systems, which include the "vapor," "vacuum," "vacuo-vapor" and similar arrangements under different names.

Vacuum systems, as previously stated, are operated at various pressures below the atmosphere. Temperature regulation is secured by varying the steam pressure, and is therefore limited. The simplest form of vacuum system may be made from an ordinary low-pressure gravity return system by simply replacing the automatic air valves on the radiators by vacuum valves. These are similar to the usual automatic valves except they are constructed on the principle of a check valve, so that after the air is once forced out of the piping and radiators, by raising the stream pressure slightly above that of the atmosphere, it cannot return through the valve when the steam goes down, and so long as this condition holds pressures considerably below atmosphere may be carried on the boiler, thus lowering the temperature of the radiators, and therefore their heating capacity.* Although limited in range, a system of this kind would be an improvement on the ordinary low-pressure system, if the inleakage of air could be prevented after the boiler pressure falls below that of the atmosphere. As a matter of fact, it is impossible to make a system of piping tight enough to prevent this, and the boiler pressure has to be raised at more or less frequent intervals to clear the system of of air. To make a system practical, it is necessary to provide some sort of pump or exhaust to remove the air as fast as it leaks in. While a vacuum system equipped in this manner is admirable for large plants, and especially those employing exhaust steam, it is not so well adapted to dwelling houses for two reasons. First, a system for this class of work should be extremely simple, and so far as possible, without mechanical appliances of any kind to get out of order or need adjustment. Second, a vacuum producing any considerable degree of suction tends to pull wet steam out of a cast-iron house-

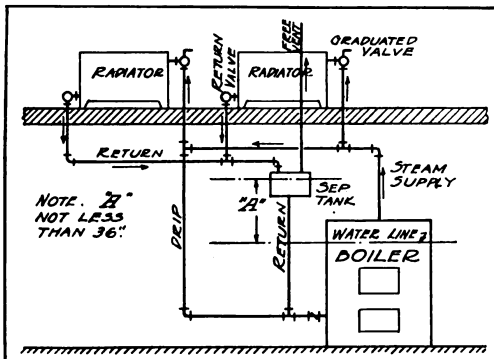

FIG. 7. DIAGRAM OF OPEN VAPOR SYSTEM.

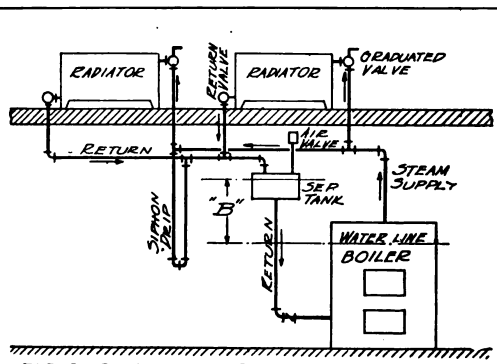

FIG. 8. DIAGRAM OF CLOSED VAPOR SYSTEM.

*Note: This was done on my own house last winter, and proved quite successful. Five inches of vacuum were maintained, and the compound gage still shows 2 inches of vacuum after over 5 months' disuse. All radiator supply valves were packed and the system made tight under 15 lbs. pressure before the vacuum air valves were substituted for the ordinary kind.—Editor.

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heating boiler, thus lowering the water line and exposing the interior surface to danger of over heating and cracking. The more recent tendency is toward the vapor system for dwelling house work, which in connection with the graduated valve, gives a wide range of temperature regulation to the individual radiators, does not suck water from the boiler and is very nearly as simple as the ordinary low-pressure system. In this case a constant boiler pressure, ranging from 1 to 5 ounces in different cases, is carried on the system by means of an automatic regulator. The heating capacity of the radiator is varied by the amount of steam admitted. Hot-water radiators are used, steam being admitted at the top and the condensation drawn off at the bottom. As steam and air will not mix, admitting less steam than the capacity of the radiator will simply force out a portion of the air, leaving the bottom filled with air and reducing the effective or heating surface of the radiator that much. For example, if the graduated valve is opened just enough to admit a quantity of steam which will be continuously condensed by one-half the surface of the radiator, then the latter will stand half full of steam and half full of air, and its heating capacity will be reduced one-half and so on for any other proportion between wide open and proportion between wide open and closed positions of the valve.

The return end of the radiator is provided with an automatic valve which allows the condensation to pass out, and also such an amount of air as it is necessary to displace for the entrance of the desired quantity of steam. After leaving the radiators the water of condensation is returned to the boiler by gravity and the air discharged to atmosphere. Regulators for maintaining a constant low pressure on the boiler, graduated supply and automatic return valves on the radiators, special receivers and air vents for handling the condensation and air after they leave the radiators, are patented devices whcih vary in general design and construction with different manufacturers.

The diagrams shown in Figs. 7 and 8 will serve to illustrate the principles involved in the two more common arrangements. In the first, known as the open system, the air and water pass into a separating tank, from which the former passes directly to the atmosphere through an open vent and the latter flows back to the boiler by gravity, the height of the column "A" being sufficient to overbalance the low steam pressure carried. Thermostatic return valves which prevent any possible passage of steam are commonly used on the radiators with this system.

In the closed system a special form of automatic air valve is placed on the separating tank, which prevents the passage of any steam which may have passed from the radiators with the air and water. The various devices employed in connection with systems of this kind are best studied from the manufacturers' catalogues.

Comparison of Costs.—The cost of a low-pressure system, such as that illustrated in Figs. 4, 5 and 6 is somewhat higher than the furnace system shown in the previous article.

Vapor systems will vary in cost according to the particular system used.

In general, an average layout of this kind will cost approximately 25 per cent. more than a low-pressure plant. When using a patented system it is best to have all computations as to size of boiler, radiators, piping, etc., made by the makers of the system, or if computed by the architect or builder, they should be checked up by the engineers of the manufacturers.

Does Advertising Pay? This Lumber Dealer Says "Yes"

A Bloomington, Illinois, lumber dealer surprised the townsfolk, after completing a huge warehouse for storing lumber and building materials, by covering the entire front with a monster sign. In the center of this sign is shown an attractive dwelling.



Does advertising pay?

The two warehouse entrances have sliding doors. When both are closed, one shows the reproduction of a garden fountain, while the other carries an arbor. The sign is believed to be one of the most unusual ever designed in that section of the state and has been attracting much attention.

—E. E. Pierson, Bloomington, Ill.

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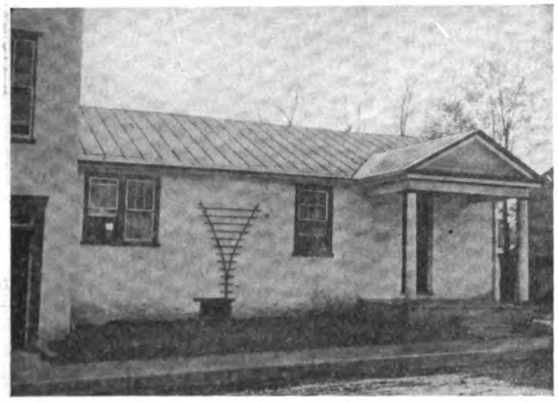
Putting an Old Building on a New Footing

OLD buildings are not necessarily a discredit to a community. In fact, the chief boast of some towns is their old buildings, historical, dignified and architecturally correct. But there are old buildings and *old buildings,* those



The old store and "flat" building before alteration

which have no claim to peculiar associations and are not old enough to possess any historic merit. These often become run down, cease to be profitable to the owners and go from bad to worse. Every town has such buildings, and they are no credit to it. Kenneth Square, Pa., is no exception to the rule. Located in a good residential community, at the corner of Broad and Cypress streets, some one,



Old school house converted into a bungalow. The original building had walls of whitewashed stone. Opening to the left was originally a single window, which has been enlarged. The porch is new. Roof is of tin laid with standing seam

years ago, had erected a three story red brick building with "flats" in the two upper stories and a store in the first story. This building had a far from cheerful look, and gradually took on a dingy appearance. The little one-story school house, which had outlived its usefulness, adjoined this building to the rear. As time went on, it became less desirable for residential purposes until the income from both old building and school house was but twenty-



The remodeled building as it now appears, an up-to-date apartment house. The frame side extension, providing a sun-parlor in each story, is new. The old school house, as remodeled, can be seen to the extreme right

five dollars per month. The property was valued at but $6,000.

Then a more progressive owner purchased the property, and retained an architect to reconstruct the old building. The illustrations tell the story.

On the front the brick work was painted a light, cheerful color and the brick wall fronting on the side street, as well as the front of the old school house, given a stucco coating. A large bay window extension of frame construction was added, as shown in the photo and plan, and the interior re-

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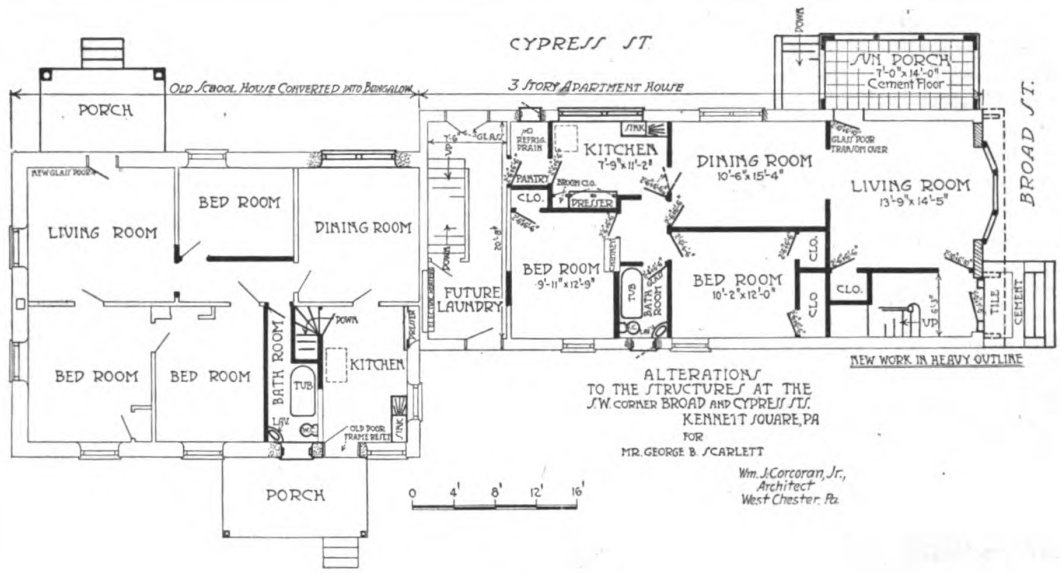
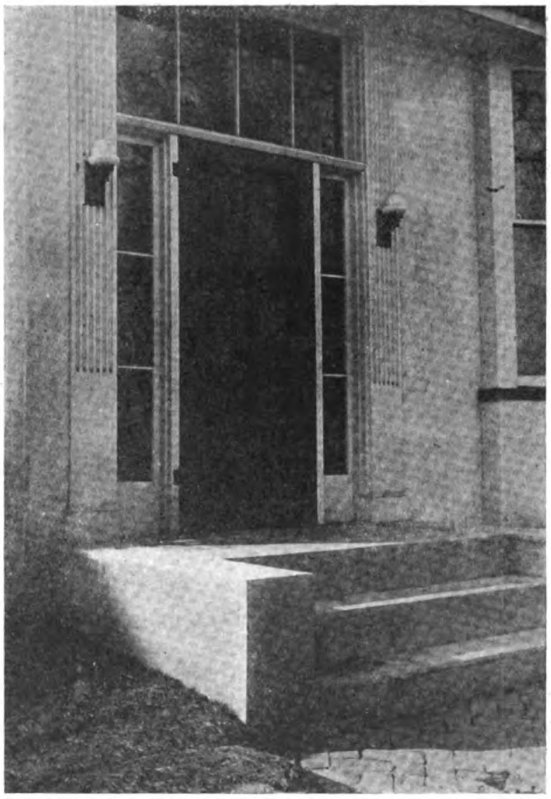


First floor plan



Cypress street elevation



The old store front was removed and the front as remodeled includes an attractive entrance



A corner of the sun-parlor—a valuable addition

PUTTING AN OLD BUILDING ON A NEW FOOTING

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arranged so as to provide an up-to-date apartment on each floor. Steam heat, electric light, new plumbing fixtures providing a modern kitchen and bathroom, as well as interior decoration so changed the interior aspect that one could no longer recognize this as the previous building. The show window in the first floor was removed, a new front and attractive entrance added, and the entire first floor remodeled. The school house was converted into a model bungalow. The cost of the alterations was approximately $7,000. At the present time, the property is valued at $20,000. The three apartments each bring in $45 per month and the bungalow also rents at $45 per month; thus the annual income is now $2,160. Due to the high rents prevailing, it is quite possible that this income could be considerably increased. The carrying charges, however, are not particularly high.

Thus from a financial standpoint, the improvement has been quite successful, and a study of the photographs will show that the appearance of the building has also been much improved, which has a beneficial effect on the entire neighborhod.



Interior view looking from the dining room towards bed room and kitchen. All rooms enjoy excellent natural light

Book Notes

EARTHWORK AND ITS COST BY HALBERT P. GILLETTE. IMITATION LEATHER—4½x7—1,327 PP. McGRAW-HILL BOOK CO., INC., NEW YORK CITY.

While this is the third edition, it has been so enlarged and revised as to be in reality a new book. Since scarcely a building operation of any nature does not involve earthwork of some kind, a handbook such as this should contain practcal data for the constructor. In this work a compilation of a mass of practical data on earthwork has been made, and the cost analysis so arranged as to be useful even though labor scales vary, since by substituting new rates, changed conditions can be met. Data on excavation under widely varying conditions, and with equipment ranging from the simplest to the most elaborate, is given. There are few who have to do with construction work who will not find something of interest in this book.

MODERN BRICKMAKING. BY ALFRED B. SEARLE. 6x9½—482 PP. STIFF COVER. SCOTT, GREENWOOD & SON, LONDON, PUBLISHERS. D. VAN NOSTRAND CO., NEW YORK CITY, AMERICAN DISTRIBUTORS.

When one considers that some of the earliest of our "Colonial" buildings, still in excellent condition, had walls constructed of brick brought from England, a book on the subject of brickmaking by one as familiar with the subject as Mr. Searle, a British expert on clays and clay products, and lecturer on brickmaking, merits careful consideration. This is the second edition of this book, revised and enlarged. Although the making of bricks is as old as civilization itself, yet methods of manufacture have progressed with such rapidity during recent years, that the first edition was becoming out of date. The opening chapters deal with the nature and selection of clays, choice of process and plant. These are followed by descriptions of various processes of manufacture, types of kilns, methods of burning, machinery, etc. The book is well illustrated. Altogether this is an excellent work on the subject. At a time when the price of brick is mounting higher and higher, every manufacturer should study all methods making for efficiency with a view to modernizing his plant, otherwise it will soon become an obsolete type.

A MANUAL OF FACE BRICK CONSTRUCTION. CARDBOARD COVER—8½x11—111 PP., ILLUSTRATED. AMERICAN FACE BRICK ASSOCIATION, CHICAGO, ILL.

This book, describing and illustrating the use of face brick in small house construction, is divided into two sections. The first, consisting of 38 pages is devoted to a brief historical sketch of the story of brick, followed by illustrations of modern examples and details of construction. The second section is composed of a collection of small brick house designs. The elevations are all perspective drawings reproduced in color. Floor plans accompany each design. While for the most part, the floor plans show a compact, well worked out arangement of rooms, the selection of the exteriors seems unfortunate in the majority of designs, and not up to the present standard. Even considered as workingmen's homes, the illustrations do not compare favorably with the designs produced by the Government's war housing developments. It is to be hoped that a future edition of this book, which contains much valuable data, will contain a more excellent set of examples of small house designs.

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Opportunities for Progressive Builders

By Robert F. Salade

AN event which is of interest and importance to the entire building industry of the United States was the recent appropriation of $5,000,000 by the city of Chicago for the purpose of building new homes for the people of that district. This movement, which is several years late, is perhaps the beginning of a general movement in all parts of the country for the erection of many thousands of additional homes. This is the only practical way for the governors of the larger cities to solve the housing problem, and it is a plan which deserves the financial support of public-spirited capitalists.

Would that a Rockefeller, a Carnegie, or some other great philanthropist might start a mammoth home-building fund with several million dollars! Such a foundation would be of the utmost economical value to the American people. It would help in making better and more useful citizens. It would help in eliminating poverty and disease. It would help in saving human lives!

This plan of home-building could be carried out in a very simple manner—responsible heads of families to buy the new homes on the installment system, eventually paying the cost price of a home, plus about 6 per cent. interest per annum. The plan is so simple that it seems strange that big municipalities like New York City, Chicago and Philadelphia, have not tried it long before this late day.

Here is a wonderful opportunity for builders and contractors to do the most important work in their history—that of erecting a sufficient number of new homes to completely solve the housing problem. Let the progressive builders of every city get together on this proposition. Ascertain exactly how many additional houses are needed in your community; draw plans for inexpensive but beautiful homes of the required number; find out the amount of capital that would be essential for doing the job. Then, armed with all this information, go before your "city fathers" and ask them to raise the necessary money. It would be merely a case of the city *loaning* the money for this splendid cause.

Leaving this important suggestion in the mind of the reader for serious consideration, we shall now turn to the subject of remodeling old homes, describing some of the things in this field which have been done during the last few months:

On the corner of two streets in Philadelphia stood an old two-story brick home much in need of repairs. In front of this house was a small garden, about 18 x 18 feet square. The house contained a parlor, dining room, kitchen and summer kitchen on the first floor, and on the second floor were three bedrooms and a bath. One morning during the last winter, a builder of the neighborhood called upon the owner of this house and suggested an idea which the owner had never thought of. After an hour's talk the builder left with an order for making a three-story apartment house out of the old building referred to.

Today this three-story apartment house is one of the most attractive and useful buildings in the city, and is paying the owner about $200 monthly, where before the owner had received only $40 per month. The "re-vamping" of the old house was a comparatively simple matter: Where the little garden had formerly stood now stands a handsome, three-story, red brick structure, and a section of the new brickwork extends over the former roof of the old house. In front of the entrance which leads to the three different flats are steps and pillars, made of concrete. The pillars are of artistic design. Each one of the three flats now contains a parlor, two bed-rooms, bath, dining-room and kitchen. The heating is done by a hot water system, with the furnace located in the basement.

In another section of Philadelphia is a large-size, stone, corner-house of modern design, and this building was recently remodeled in a unique way. It is a three-story home with a spacious basement and a terrace front, so constructed that the basement windows, on the side of the house, are higher in elevation than the sidewalk. In other words, these windows overlook the sidewalk on this side of the house. At the back of the house was an open yard, about 20 x 25 feet square.

For the reason that this house stands at the corner of two very busy thoroughfares the owner decided that a drug-store would prove a profitable venture at this point. A consultation was held with a builder, who subsequently drew plans for the following changes: The proposed store was to be located in the basement of the house, near the corner of the intersecting streets, and at the rear of the building, where

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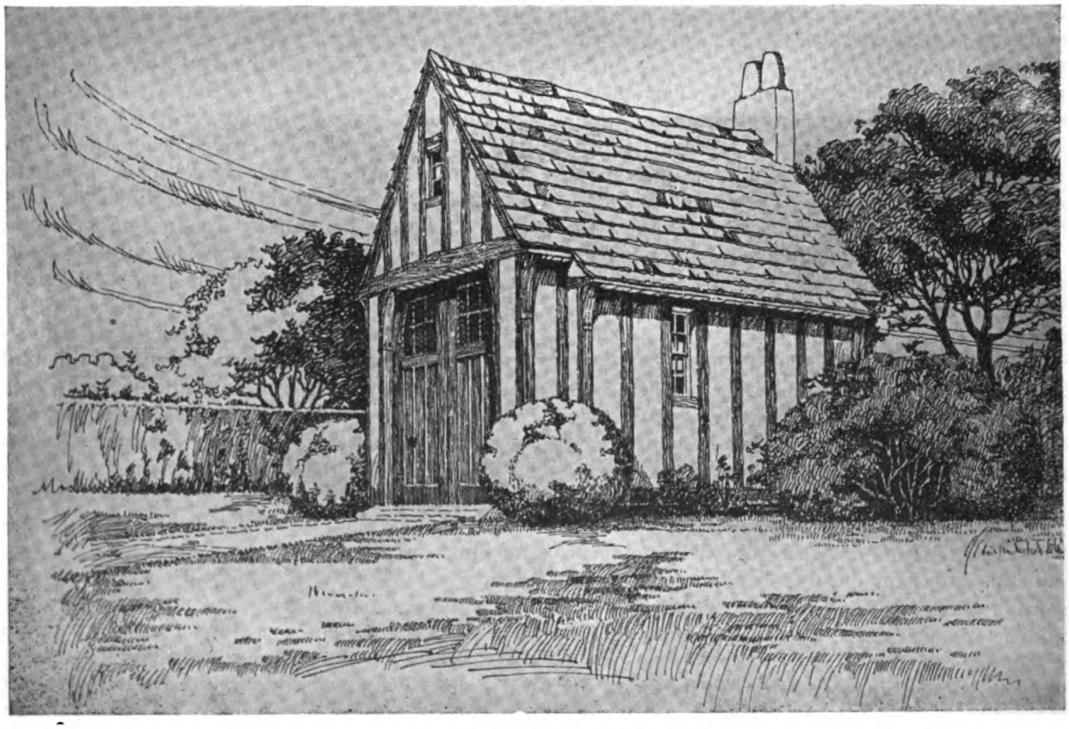
the yard stood, was to be erected a two-story addition, the street-floor to be used as a private garage, and the second floor to serve as a sun-parlor.

The owner was highly pleased over the builder's suggestions, and soon after the interview the builder was told to proceed with the work in question. The new store, private garage and sun-parlor are now completed, and while they are serving useful purposes, the changes in the building have not hurt the appearance of the property to any great extent. There is the same neat terrace front on the main street, the store and garage facing on the side street. On the roof of the newly-constructed garage and sun-parlor is an open flat which provides for clothes drying in place of the former yard.

Several builders of "The Quaker City" are specializing in the work of re-pointing the fronts of brick buildings, brick walls, stone walls, chimneys and the fronts of stone houses. These builders are continually on the search for houses and other buildings which are in need of re-pointing, and when such cases are noticed the owners are advised to have repairs made at once. The owners are given some idea as to the cost of the proposed work, and this plan often leads up to new business for the builders. On Broad Street, Philadelphia, stand a number of fine dwellings, equipped in front with spacious terraces and artistic stone walls. About a year ago a number of these stone walls were sadly in need of re-pointing —in fact, several of the walls were crumbling for the want of a little cement. An enterprising builder happened to note this state of affairs, and one evening he called upon two of the owners and explained the comparative small cost of having the stone walls repaired. The two owners were not slow in ordering the work attended to, and it was not long before the other owners followed suit.

Several other contractors are making a specialty of remodeling the fronts of old brick buildings by the process of plastering. In most cases the plastering is done in the same color as brown-stone, and the fronts are marked off in oblongs and finished in close imitation of brown-stone. Some of the work is done in gray, and this also presents a handsome appearance. In many instances the builders procure orders for this kind of work simply by asking for them, and right now many an owner is waiting for some one to suggest this same kind of work for his property.

In many cases of remodeling old brick homes the fronts are re-pointed and the face of the bricks are cleaned, the finished job looking as good as new. Are you, Friend Builder, paying close attention to obtaining such work? If not, why not? The orders are yours for the asking.



A one-car garage
Aymar Embury II, Architect

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Laying Slate, Asbestos and Asphalt Shingles

By L. S. Bonbrake

Part III

THE shingles named in the above caption present their best appearance when laid with their exposed, or lower, ends in a uniformly straight line, which cannot be accomplished without working to such a line, especially with several workmen laying shingles on the same roof.

Chalk Lines.—The diagram, Fig. 11, shows the manner of chalking on the sheeting or felt for a number of courses ahead, when desired. Lines for sizes varying from 12 x 24 in. to 10 x 20 in. inclusive are given. For any of the other sizes, proceed in a similar manner. A very good point to remember is that when the 3 in. standard under lap is used, the nail holes will be 1½ in. more than half the length of the shingle at its lower end. The shorter end will be the surface exposure when laid, for any size down the row.

As stated in Part I of this series, there is an irregularity in lines at the bottom course, the first course (shaded shingle), is nailed at the top of the eave row, with 10 in. extending on up the roof, the second course (white shingles) is nailed 13 in. from their bottom ends, as they lap over the eave course 3 in. and must extend on up, over the first course 10 in., giving a total of 13 in. The third course, shaded half shingle, will overlap the first course here with a 4½ in. lap instead of 3 in. The irregularity of spacing is taken up by the 1½ in. additional lap, and will so continue up to the comb, with nail holes 11½ in. from the bottom end, the chalk lines struck at intervals of 8½ in. unless a slight variation in the lap may be desired to graduate the courses near the comb in order to provide an average of exposed length of shingles for the space to be completed, or in other words, even up the last courses to a finish.

The same size shingle with a 2-in. under lap will have nail holes 11 in. from the bottom, will lie 9 in. to the weather and have the regular or general spacing of 9 in. with the same process of calculation for any size of shingles or lap.

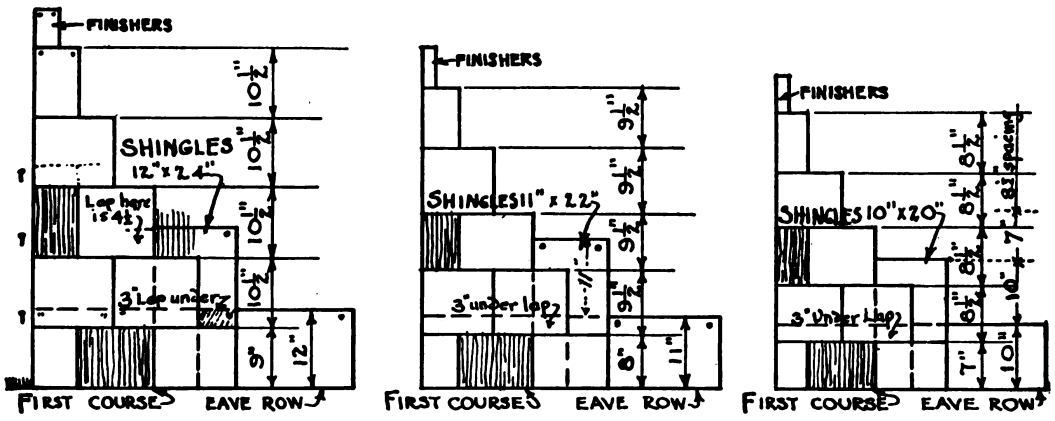

Fig. 11. Diagram for chalk lines on roof sheathing or felt

Asbestos Diamond Shingles.—The roof shown in Fig. 12 illustrates the front covering of a public building laid by the writer several years ago, and includes nearly all the more difficult conditions encountered in roofing work. The chimneys, valley and deck are treated in the manner described under their several captions, while the hips may be finished with the capping E, made of the same material as the roof, shown in detail in Fig. 14. These are made

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in short lengths, half cylindrical in form having a nail hole near the upper end through which a nail may be driven and engage a strip of metal A, which will be covered by the following cap piece at dotted lines, and completed as shown at B, by bending the

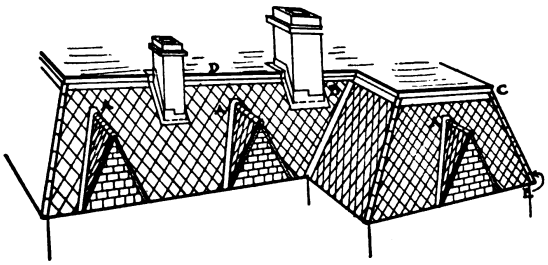

Fig. 12. Mansard roof laid with asbestos shingles, diamond pattern

strip of metal back over the front of the capping.

The top of valleys at A (Fig. 12) on each side of the gable ends is extended well above the comb, and the valley end of comb metal covered for several inches, at least a sufficient distance to prevent

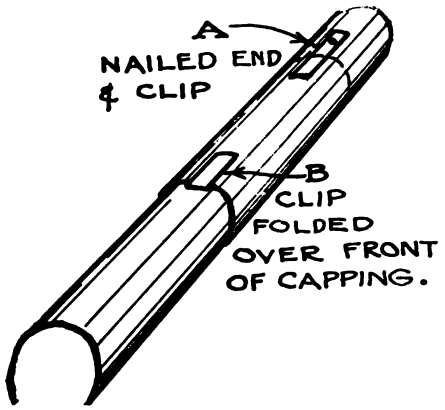

Fig. 14. Hip capping used with asbestos shingles

water flowing into it or seeping in from melting snow which is liable to accumulate at this location. If gutters are used at the eave, the bottom of the valleys should be reinforced as heretofore described.

Snow will also accumulate at the very narrow space B, between the chimney and the deck, and it is advisable to have the metal valley and chimney flashing

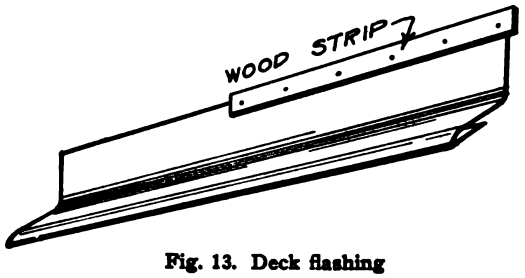

Fig. 13. Deck flashing

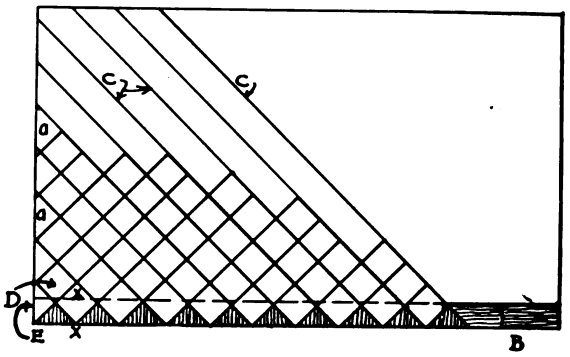

Fig. 15. Diagram for laying diamond pattern asbestos shingles

overlap here. This will require but a small amount of additional metal and may save considerable annoyance.

The shingles are laid up to and about the decks C and D, and are made secure from leakage by the deck flashing illustrated in Fig. 13. This has its bottom edge folded double with a slight break immediately back of the edge of fold making it lie smooth and hug the shingles. A section of this type of roofing partly laid up the roof is shown in Fig. 15. The straight shingles B are used to start the roof, laid lengthwise at the eave, or the triangular shingles shown shaded may be used. The latter are furnished by the manufacturer or jobber and shipped with order for shingles as required, the same as half shingles for the gable ends or comb.

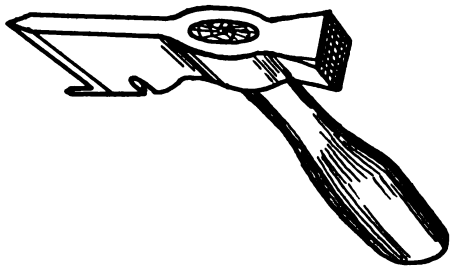

Fig. 16. A handy tool

It is very important that the half shingles over the eave, and especially up the roof, be laid straight with the gable and the chalk lines C should be struck to keep the diagonal edges in a straight line looking up the roof right and left. Generally the lines show plainly from the ground and the whole pleasing effect of this style of roofing is ruined by improper alignment or when laid by the rule of eye and guess, resulting in weaving, unsightly lines utterly spoiling its appearance.

While several methods are used for chalk lining, we have found it very satisfactory after laying the eave, to get the first gable shingle E placed straight, then lay the next shingle x with the points x-x, lay-

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ing at precisely the same distance from the gable, with the proper lap (as allowed by the manufacturer of the shingle you may be using) accounted for; then the shingle D may be laid which will give the exact pitch of the diagonal line through the roof.

A convenient gage of some character or dividers may be used to step points along the gable, while the

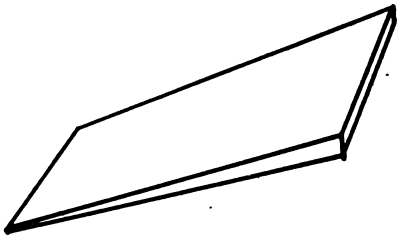

Fig. 17. Tapered style asphalt shingle

bottom may be taken off the eave row laid for chalking, lap always considered. This is head lining on the felt, by which several men may start laying at any one of the steps to the left, and continue on with a finish at the right gable. However, lower courses must be laid ahead. Frequently the shingles require cutting into proper shapes or lengths when working around decks or obstructions on the roof, such as skylights, chimneys, scuttles, etc., and is usually done

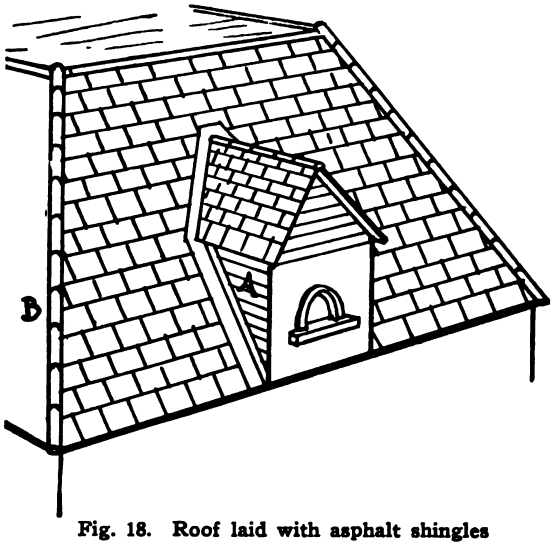

Fig. 18. Roof laid with asphalt shingles

by grooving partly into the shingle along the side of a straight edge with the larger blade of a heavy jack knife, when the shingles will break at the line.

A better and more convenient tool may be made from a plasterer's hatchet, with its front corner ground down sharp, and a slight prong, with a nail end point welded at the back corner. This tool, shown in Fig. 16, will serve for nailing, pulling nails, cutting and punching nail holes, and will make a good hatchet for slating when its point is slightly blunt.

Asphalt Shingles.—Shingles made from this material are light, smooth to the hands and easy to handle in laying. They are made in a number of varieties, such as straight flat, diamond, slabs, tapered from butt, or made in strips, four or more to the unit. The manufacturers will send instructions for starting roof or include same with shipment of shingles.

Our illustrated description for flashings, valleys, deck, hips, etc., as given in Parts 1 and 2, cover the

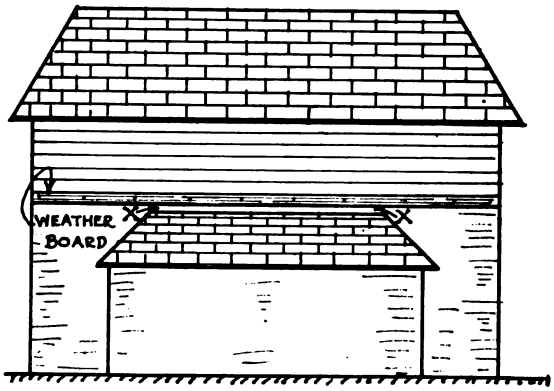

Fig. 19. Method of flashing shed roof to rear wall

difficult as well as all small details entering into the construction of an ideal roof, using any make of shingles under discussion. In order that there may be no confusion at the eave it may be well to state that when flat asphalt shingles are used, they are laid

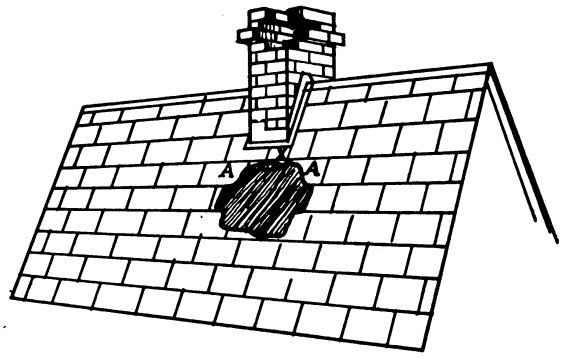

Fig. 20. Damaged roof

over a plastering lath, or the facia board extended above the sheeting an equal distance; however, when tapered (thick at the butt) as some are made (see Fig. 17), they have the proper front elevation without the use of the eave strip or lath, and are laid in the same manner as wooden shingles. Being of uniform width they may center one another by using a half shingle at the gable, on the second or top eave

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course when starting. The method of laying up the roof, metal work, etc., will come under the same general process previously described.

Fig. 18 illustrates the front of a hip roof covered with asphalt shingles having a dormer, the siding A of which abuts the roof, necessitating metal flashing under the shingles, also the siding. The end of the latter should not fit down tight upon the roof as leaks have frequently been found on a roof appearing to be in good condition. After the removal of siding such leaks were found to be caused by the ends of the siding lying too close to the shingles or metal

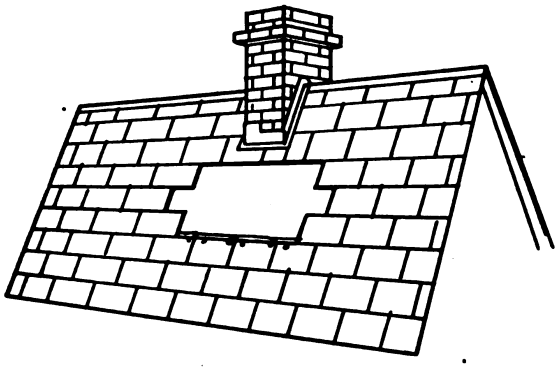

Fig. 21. Damaged shingles removed

flashing, allowing water to creep along the top edge of the board until a stud or other obstruction has been reached, and there deflect and show up inside on the wall or ceiling. This may be avoided by keeping the ends of the siding back from the roof.

Carpenters are advised not to let their work come down too close to the roof flashing as shown at xx, Fig. 19. When the bottom of the flashing is used under the finishing shingles, there should be ample room to reach the bend line in the metal for repainting. It is suggested that the bottom of the weather board be kept up from the metal flashing at least one inch, thus giving water a chance to dry out.

Accidental Damage, Repair, Etc.—A roof laid with any of the several varieties of shingles in question is liable to damage by pieces falling from the chimney as indicated in Fig. 20, or by a limb from a nearby tree, or other unforeseen accidents. However, such roofs may be repaired as readily as a roof of any other material, by first cleaning out all the broken or damaged pieces, commencing with the topmost damaged course, A. A. Fig. 20, which may be removed by cutting nails with a nail ripper, thus exposing nail heads of the course below, which may be drawn, then continue on down the roof as far as necessary. It is best to take up the small chimney shingles x also. When cleaned, as shown by Fig. 21, commence at the bottom and lay up in the ordinary way until the last course is reached, which is nailed up close to the butts of the course above as indicated at B, B, Fig. 22, showing only four nail heads exposed. These may be cemented over smoothly.

When a leak occurs in the body of the roof from

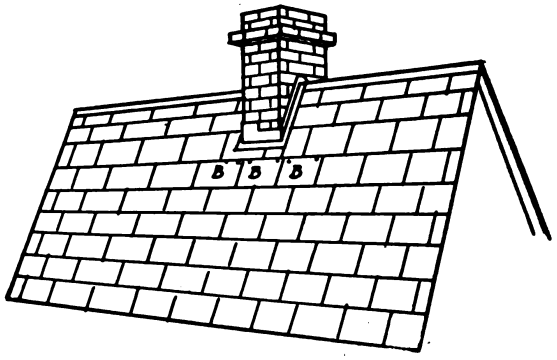

Fig. 22. Roof repaired

an unknown cause, and its exact location cannot be determined, strips of well painted tin from four to six inches wide may be slipped under the shingles, extending from their butts to the nails above. Apply these strips (centering the shingle seam) for a considerable area around the supposed location of leak, and quite often the leak will disappear.

In renewing metal gutters, when necessary, remove the second or third courses of shingles as conditions may require, using care to save the shingles when possible and proceed in the same way as illustrated and described for repair work. For repair work on valleys, proceed in a similar manner.

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"Kinks" from a Carpenter's Diary

Random Experience in Remodelling an Old House

By Ray W. Wood

DURING the process of remodelling an old house, one of the workmen called my attention to some old cupboard doors. These doors were held shut by a wooden button, the same as you would whittle out, but not like most doors

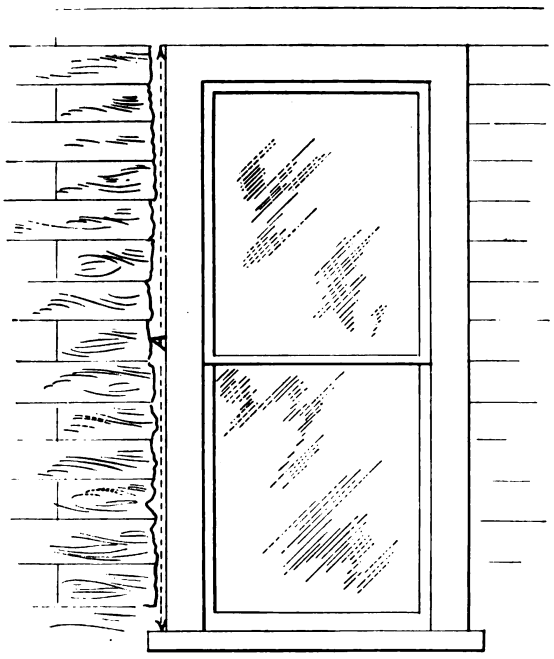

Fig. 1

fixed in this old fashioned way, for instead of the button being merely held to the stile with a screw a small bolt and washer were used, the whole piece being neatly riveted. It was almost impossible to pull the button loose.

We were enlarging the window openings for larger sash. On the back side of the house we found a piece of siding in perfect condition. This we left, cutting right through the openings where required, for additional windows. Every little while some one of the men would run his saw on a hidden spike. The owner had bought most of the material from a wrecking company. Cinders were impregnated in the boards, and the framing stuff was full of old nails so that it was a task to keep a tool sharp.

It saves time to cut openings through the weather boarding and when a little care is exercised, the joint

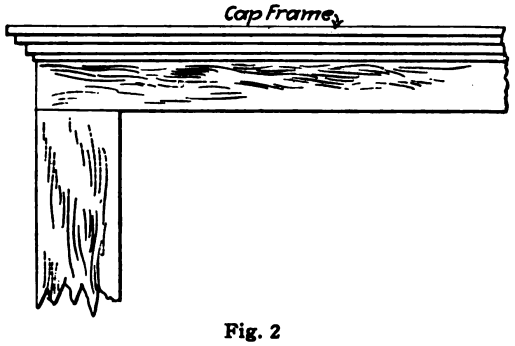

Fig. 2

along the edge of frame can be made reasonably tight. Measuring the jamb edges for length and width, adding enough for play, etc., the dimension being plumbed and leveled off on the side of building and the opening cut to those lines. Or if the building is out of plumb, it may be better to saw the hole square with the building. Then placing frame in the opening and holding it just where wanted drive

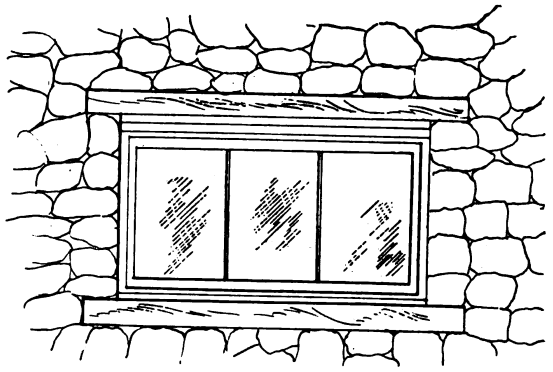

Fig. 3

a finishing nail through the frame into sheathing and mark along edge of frame on the clapboards. A straight edge tacked on this line helps to start and steady the saw when sawing off the clapboards. Novelty siding is run flush to openings and frames

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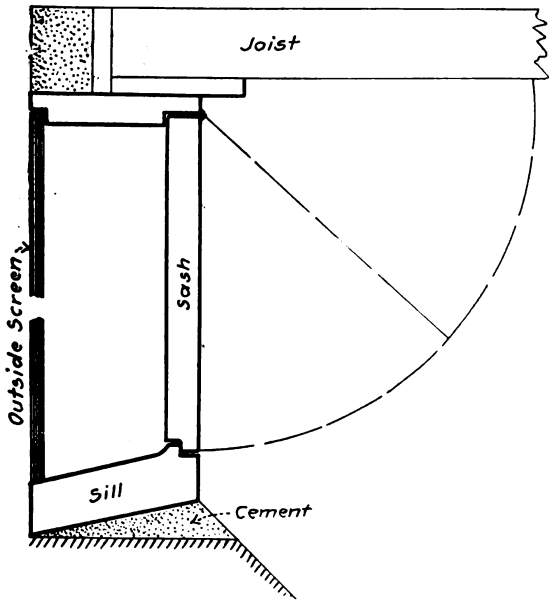

Fig. 4

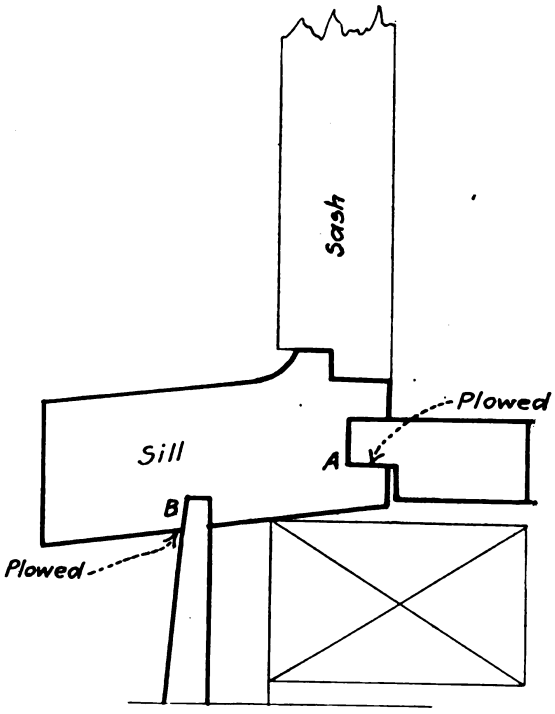

Fig. 5

placed over it, but bevel siding should be fitted tight to edge of frames.

The window of Fig. 1 is a common type of double-hung sash. At A is a crevice where the clapboards have warped away from the frame. This is often seen in old buildings. The crack is filled by nailing on a pine strip and then chiseling it out to conform to the face of the clapboards. Fig. 2 is the same style of frame except that there is a crown mould running horizontally along the top, called a moulded cap frame. There is generally a strip of moulding about six inches long attached to each frame which is mitered to 45 deg., returned and scribed to house super-structure. We placed new cellar windows in this remodelled house, the owner having stated that he once had had trouble with leaky cellar windows, and to guard against the recurrence of the trouble, he had some made as shown in Figs. 3, 4 and 5. The sill of these have a wash, a lip and are rabbeted, the sash is also rabbeted to fit into the sill, the sash be-

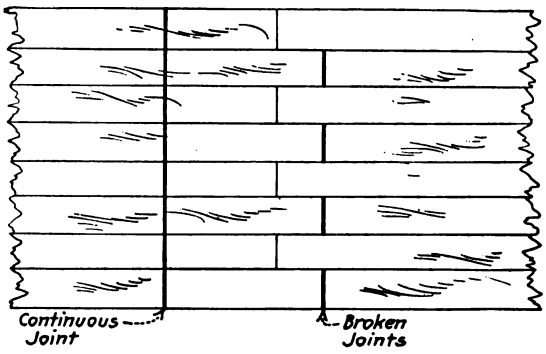

Fig. 6

ing hinged at the top to swing back and be hooked conveniently to a joist overhead. This style of window is as old as the hills and as honest. By adding a plow at A and B for stool and weather-boarding as shown in Fig. 5, the sill is adapted for inward opening casements.

At one place in this house we had torn out a bay window; two of the men had boarded up the opening and had started to nail on same clapboards, using a continuous joint in the work, that being the easiest way. The "boss" instructed them to chisel back, cutting off a few inches of the old siding, then joining on the new, thereby giving broken joints as shown in Fig. 6, making a neater job.

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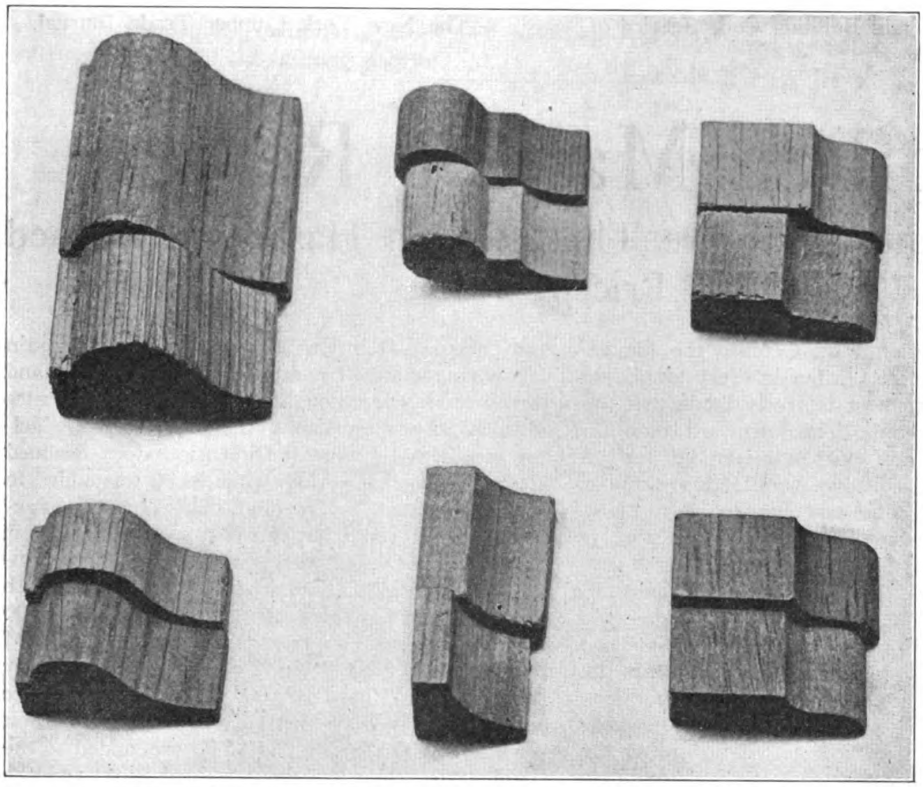
The Need of Standardization in Wood Mouldings

The photograph shown below indicates what has resulted from the present standards and methods of manufacturing moulding. Each pair of these mouldings has the same number according to the catalogue. Note the wide variation in profile. This variation in profile of the present so-called standard mouldings was developed by the regrinding of knives from time to time. This photograph shows very clearly that at present the dealer, not always ordering from the same manufacturer, accumulates a considerable variety of mouldings in stock, which although supposedly of the same catalogue number vary considerably in profile. Standardization, therefore, would not only eliminate this decidedly undesirable feature, but would furnish mouldings which could be depended upon to match up with old work and, therefore, be useful for remodeling purposes.



Variations of Contour in Mouldings of Supposedly Standard Numbers

To bring these mouldings of the same number to duplication in profile will necesitate the issuance of a national standard template for each individual form. The templates should be issued from one reliable source. The National Lumber Manufacturers' Association in its work on standardization of wood mouldings and forms contemplates the issuance of such templates to the manufacturers who desire them. This method will enable the dealer to duplicate exactly the mouldings which he may order subsequent to his original purchase of the new moulding forms.

It is intended by this standardization to reduce the number of mouldings in common use and to relieve not only the retail dealer, but also the manufacturer from being encumbered with an unnecessarily large stock of variated forms.

Assuming the necessity for standardization, why not restandardize by eliminating numerous obsolete designs as well as those in little demand and at the same time improve the profile of those in common use, giving them the proper outline and contour as approved by competent architects and designers? The new forms should be so designed as to be applicable to all conditions which may arise in con-

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struction where the present numerous patterns are generally used.

By improving the profile of many of the present mouldings a greater demand for stock designs would be assured, since architects would be attracted by good stock mouldings, and the man who uses them because they are stock items and, therefore, cheaper, would use only good mouldings. This will discourage the erection of unsightly structures.

To assist the man not familiar with the proper use of mouldings a diagram indicating their correct application will be of great assistance and it is, therefore, contemplated that such will be included when cataloguing the proposed new forms.

The Architectural and Building Code Service of the National Lumber Manufacturers' Association has been working for over a year on the development of new forms, receiving advice and assistance from the manufacturer, distributor and consumer of mouldings and the architect. The permanent committee composed of Mr. Emery Stanford Hall, of the Material and Methods Committee of the American Institute of Architects; Mr. N. L. Godfrey, secretary, Wholesale Sash and Door Association; Mr. R. G. Kimbell, of the National Lumber Manufacturers' Association, has correlated the recommendations received from the various authorities concerning this work and their final recommendations are to be submitted to the manufacturers, distributors and consumers of this product of the lumber industry.

—The New York Lumber Trade Journal.

Lumber Market Review

Present Indications Are That Bottom Has Been Reached in Price Decline

Throughout the month of October the lumber market continued to weaken but in every branch of the industry the statement is freely made that the market has struck bottom. The downward trend has not been checked by any spurt in buying, but for the simple and logical reason that manufacturers cannot afford to sell their product any cheaper. That many sawmill operators have fully realized this fact is shown by the general tendency of producers to curtail production. On the Pacific coast about 40 per cent. of the mills are now idle and unless the market stabilizes within a few weeks, many more will shut down. The same condition prevails in the yellow pine and North Carolina pine producing belts of the South, although not to such a marked degree. Numerous small mills which started up during the rapid rise in the market last winter, have closed down for the year and many of the larger mills are materially curtailing production.

The chief reductions in prices have occurred in hardwood flooring, yellow pine and Douglas fir, and for the first time in six months hemlock has dropped from the established base price of $57.

A comparison of wholesale prices prevailing six months ago and today will prove interesting, and it will be easily seen that the producers of lumber have been forced to more than absorb the additional freight rates effective in August. Taking twelve representative items in the principal woods used for construction purposes, it is seen that B & Better flat grain yellow pine flooring has dropped $32.00 per thousand feet since May 1, although the increased freight rates added $3.00 per thousand to the delivered price. Yellow pine No. 1 Common Dimension stock declined $16.50 during that period, while $4.00 was added to the freight rate. Yellow pine timbers have been reduced only 50 cents, but this is considerable when it costs $6.00 per thousand feet more now to bring timbers to New York than it did on May 1. North Carolina pine air dried roofers are selling $18.00 cheaper today than six months ago and yet the added freight rate is $2.00. No. 2 and Better Douglas fir flooring has dropped $20.00, and the freight rate today is $5.00 more than it was. Fir dimension stock is $10.00 cheaper and $5.50 was added to the freight rate. Hemlock has declined $3.00 and the new freight rate is $2.00 more than it was. Canadian spruce lath has dropped $4.50 per thousand and Canadian spruce lumber $3.50. The new freight rate on lath is 75 cents more than it was and on lumber it is $3.00 more. California redwood bevel siding has declined $7.00 and the freight rate on the ½-inch stock is $2.00 higher than it had been. The big reductions have been in hardwood flooring. Clear Plain white oak flooring has dropped $65.00 per thousand feet and the added freight rate is $2.50. Clear maple flooring is selling $40.00 cheaper than it did in May last, and yet $3.00 has been added to

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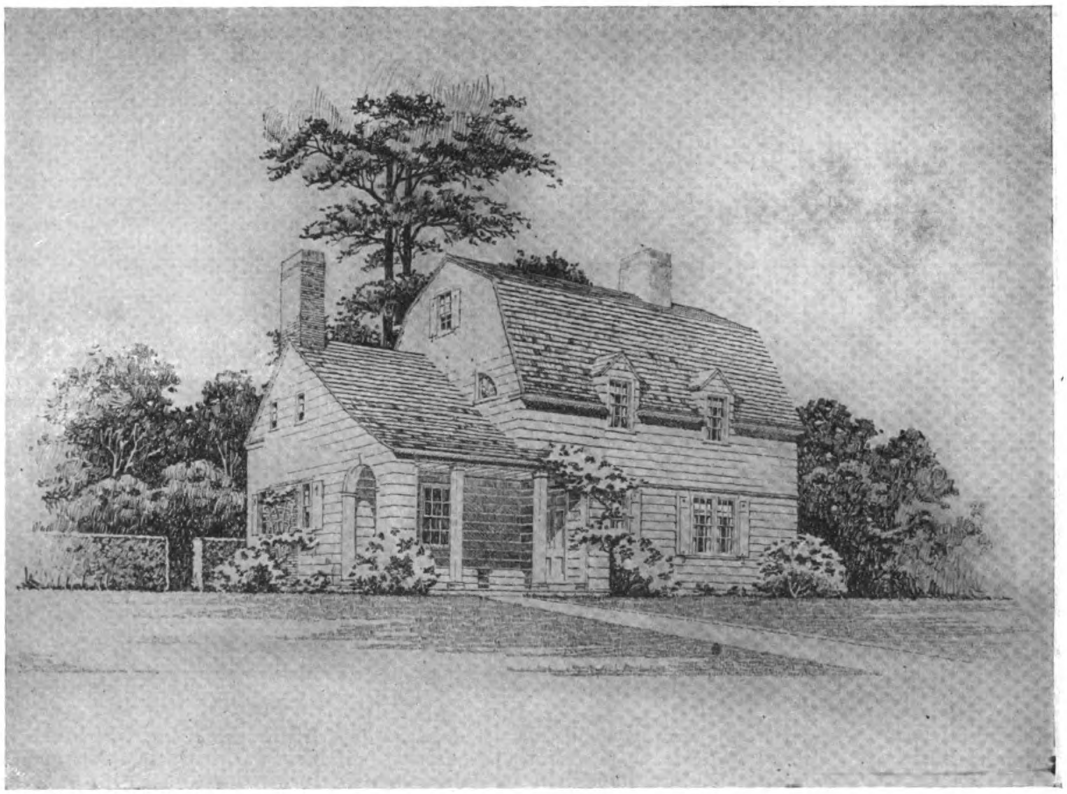
the freight cost of delivering it to the Metropolitan district. These figures are based on wholesale prices of lumber delivered to New York City, but similar reductions have occurred in all of the other principal markets. To ascertain exactly how much each item has been reduced in price at the mill, one need but add to the above reductions the additional freight rates effective in any market in the United States. For example, the actual decline in the price of plain oak flooring at the mill has been $67.50 during the past six months.

The lumber market continues exceedingly dormant in all large cities, and while there has been some activity in the agricultural sections of the West, Middle-West and South, buying of lumber has not begun to reach the volume it was expected to reach, considering the flourishing condition of crops and the resultant prosperity of the farming element.

Transportation conditions are beginning to show marked improvement, the records of the various national and sectional lumber associations showing that shipments are steadily increasing. In many instances shipments are exceeding the volume of new business. Stocks at the mills, because of the inactive buying, continue to increase, and there will very likely continue to be a large accumulation at producing points for the remainder of this year. This surplus, however, will be wiped out rapidly when spring buying begins.

From every section come the reports that labor conditions are much better than at any time since the close of the war and in some localities in the Southern pine belt actual reductions in wages have been made during the past ten days. It is more generally the rule now for the man to seek the job than for the job to seek the man.



A house at Garden City, Long Island, N. Y.
Aymar Embury II, Architect

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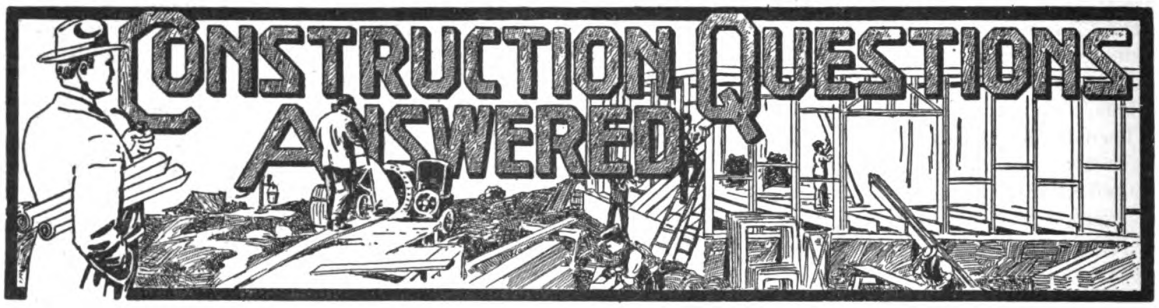
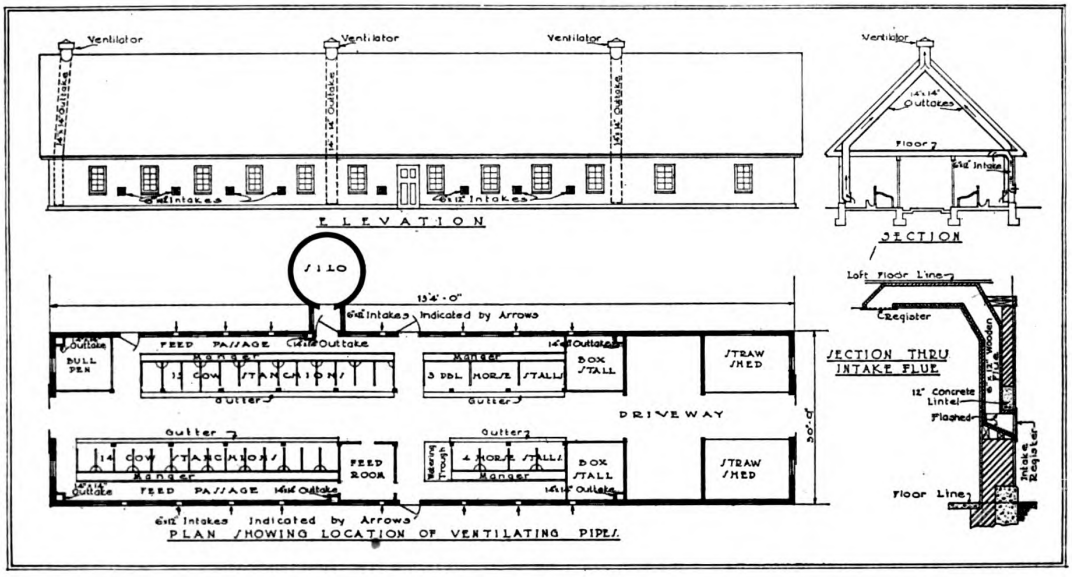


Ventilating a Barn

From P. J. W., Winsted, Minn.—I would like to have your idea of the best way of getting the best ventilation possible in the accompanying barn plan. The barn, called for, is 30 x 134.

Answer—I would call your attention to an article which appeared on page 31 of the August issue of Building Age, entitled "A Group of Farm Buildings at Lantryville, Ill." An inspection of the drawings shown on pages 32 and 33 will give you a good idea of the system of ventilation used in such buildings.



I would also call your attention to the arrangement of the stalls in this barn, which I believe to be most excellent. A system of ventilation somewhat similar to this has been worked out on the sketch you have submitted, and is shown herewith. The sizes of flues shown may be varied somewhat, depending on the wall construction and other details.

The subject of ventilation for barns has been found a most trying one, for, although the system may be carefully planned by the architect or builder, it is very difficult to get the cattle men to operate it intelligently. The system shown is commonly called the King system, and was evolved by Professor F. H. King of the University of Wisconsin. If you care to go into the matter of ventilation in some detail, it would be well to obtain a copy of Professor King's book, entitled "Ventilation for Dwellings, Rural Schools and Stables."

The theory of all exhaust systems of ventilation is to take the air out at the bottom of the room and let it in at the top. This management of the air currents creates a circulation absolutely necessary for ventilation. Foul and vitiated air falls and remains near the floor, and from here it should be removed. The fresh air is let in at the top of the room, where the air is the warmest and where the cold outside air may be warmed somewhat before it comes into the range of the individual. All this is usual practice and is sound theory.

The difficulty of these principles applied to the cow barn is that the cattle are usually dependent upon the radiation of heat from their bodies for warming the stable, and in very cold weather the animals vitiate more air with their breath than they warm with their bodies. A very positive result of this condition is in the condensation on the walls and ceilings, brought

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about by shutting the building up tight, the moisture from the animals being turned to water on the cold outside partitions. The only way to avoid this is to change the air in the buildings, to remove the moist air within and replace it by the drier air without. Unfortunately, in very cold weather, enough outside air to stop condensation will sometimes chill the stable and make it too cold. With natural ventilation depending largely on the difference in temperature between indoors and outdoors, it is not only important that enough heat be generated always to keep the temperature within well above that without, but that enough heat be generated indoors to have not only good ventilation but warmth as well, and the only way to insure such a condition during very cold weather is by artificial heat. With artificial heat all difficulties of ventilation for the cow barn disappear.

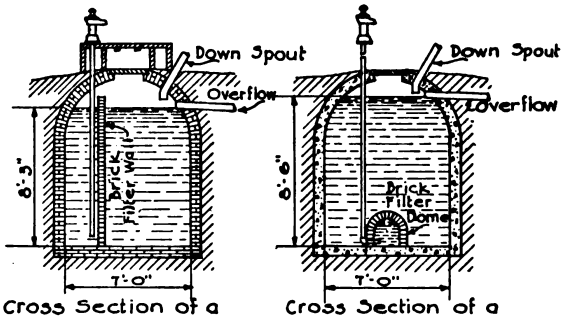
The simplest way, as it is the most efficient way, to get air out of the cow barn without opening the doors and windows is to erect a duct which will go from the floor straight up through the roof, and higher above the roof this duct is made to run the better it will ventilate. There may and should be at least two outlet ducts, and more when the number of cows requires it. The ducts should be constructed so that they are warm and tight; they will then act just like a chimney, and the higher the better they will draw.

Professor King's suggestion for allowing the air to come into the building is to arrange a series of inlet ducts whose combined cross-sections must be at least equal to the cross-sections of the outlet duct or ducts, which shall take the air in at the bottom and discharge it at the top, some six inches or so below the ceiling level. This traps the warm air at the top of the room and makes its escape impossible except to go downward through the inlet duct which it is not likely to do. While the theory of letting air into the building through the inlet duct is interesting, it has some disadvantages from the point of view of practice. The inlet duct in time becomes dusty and is impossible to keep clean, simply because it is impossible to clean it. For this reason it should always be constructed with smooth sides, galvanized iron being the best material. If the cow barn has artificial heating, the inlet ducts may be omitted; if the barn is without artificial heat, the ventilation is bettered by the inlet ducts.

Filter for Cisterns

From J. W. H., Santa Rosa, N. Mex.—Kindly give me some information regarding the brick wall in underground cisterns for filtering purposes. I am building a residence in a town where there are no waterworks, and it is therefore necessary to build a cistern. I would like to know just how this sort of arrangement for filtering should be built, what kind of brick to use and where to get them. I would also like to know if it is a really serviceable filter.

Answer—The accompanying drawing shows two types of brick filter walls for use in cisterns, which clearly illustrates just how the filter should be used. It is quite important that filters be provided in cisterns since, as a rule, the water, as it comes into the cistern, is not fit for drinking purposes due to pollution from dust and other impurities washed from the roof. Also for bathing and laundry work, filtered rain water is excellent. Filters for cisterns are usually constructed of soft brick laid in cement mortar, the face of the brick being left uncovered. A space from one-quarter to one-third of the volume of the cistern is separated by the brick partition wall shown in Fig. 1 for the filtered water. The opening at the top of the filter wall should be made large enough to admit a man since it is sometimes necessary to make repairs, or clean out the cistern as some sediment will occur even in the chamber storing the filtered water. The arrangement shown in Fig. 2 is not so generally used. In this case, the filtering action is more rapid, due to the pressure on the outside being considerably greater than that on the inside, since this inside pressure is very much reduced when pumping takes place, resulting in a partial vacuum. However, the storage space is much less and the area exposed for filtering action is also much reduced. I believe you will find the arrangement shown in Fig. 1 will satisfactorily serve your purpose.



Cross Section of a Brick Curbed Cistern with a Brick Filter Wall. Capacity 385 cu. ft.

Fig. 1

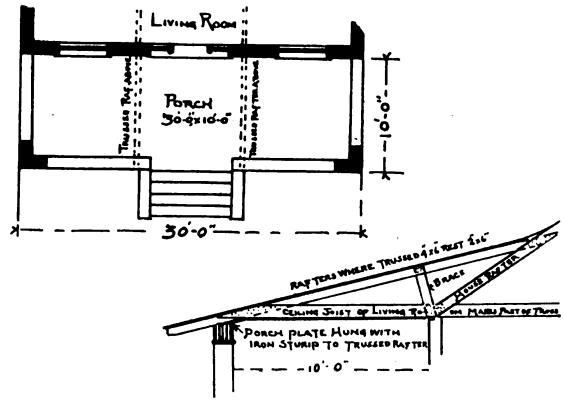
Cross Section of a Concrete Cistern with a Brick Dome Filter. Capacity 400 cu. ft.

Fig. 2

Supporting Porch Plate

From D. W. D.—The enclosed sketch shows the method I used to support a porch plate with a clear span of 26 feet between 2-foot brick piers.

I made the plate four ply of 2" x12" stock, spliced, using 14'-0" lengths. I built the plate with a camber of 2" and placed a post under the center and I did not remove the post until the house was completed. The soffit of the plate while having a slight camber looks straight.



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New Catalogs of Interest to the Trade

These catalogs may be secured direct from the manufactuer. If you prefer, write the date of this issue and the numbers of any catalogs on a postal and mail it to "Building Age," 243 West 39th Street, New York City, The catalogs will be sent you without charge or obligation.

312. SiFo Lath. SiFo Products Company, St. Paul, Minn.—Folder describing this building insulating product whose base is wool felt and asphalt. Numerous illustrations make clear the important features of SiFo lath brought out in the text.

313. For Milady's Convenience. Harvey Hubbell, Inc., Bridgeport, Conn.—Illustrated booklet pointing out the conveniences of employing electricity in the house. Locations for receptacles and current taps are suggested for all the rooms of the house. Some of the Hubbell electrical products are illustrated and described, prices also being included.

314. Modern Oak Floors Good for a Hundred Years. Oak Flooring Manufacturers' Association, Chicago, Ill. —Illustrated book giving reasons why oak floors should be used. Exteriors of buildings and attractive interiors in which oak floors have been employed are reproduced. A booklet telling how and where to use oak flooring accompanies this book.

315. Comfort and Economy with Stucco. Flaxlinum Insulating Company, St. Paul, Minn.—Illustrated booklet pointing out the need for insulation and the advantages of using Flaxlinum as an insulating material. Photographs of houses in which Flaxlinum was used are shown. Illustrations show method of application. Samples are furnished.

316. The Healthful Comfortable Home. Jewell Mfg. Company, Auburn, N. Y.—Folder illustrating and describing the construction and operation of the Jewell heat controller for steam, hot water or warm air systems of heating. Testimonial letters are reproduced.

317. Hot-Flo Electric Faucet. Hot-Flo Faucet Corpoartion, New York City.—Folder containing several illustrations showing how the Hot-Flo electric faucet serves the two purposes for which it is designed and adaptable, namely, to produce hot or cold running water, the flow being controlled by one handle, a turn for hot water, a turn for cold water.

318. Republic Fireproof Construction for Buildings. Republic Fireproofing Company, Inc., New York City. —Book pointing out the engineering features and advantages of the Republic two-way fireproof floor and roof construction. Buildings in which Republic floors were installed are shown. Many detail drawings help to make clear the construction described in the text.

319. Burglar Foils. The Yale & Towne Mfg. Company, Stamford, Conn.—Illustrated pamphlet describing this new lock which has just been put on the market by this company.

320. Federal Traffic News. Federal Motor Truck Company, Detroit, Mich.—House organ, September 15 issue, of which contains some valuable and interesting facts concerning transportation by means of Federal motor trucks. Numerous photographs of these trucks in operation, both in this country and abroad, are shown.

321. Concrete in Architecture and Engineering. Portland Cement Association, Chicago, Ill.—August-September number contains several interesting articles describing various operations executed in concrete. Illustrations show concrete structures described in text.

322. The Dutch Boy Painter. National Lead Company, New York City.—August number of house organ has many articles of interest on the subject of paint, two of the leading ones dealing with color in the office and color in the hospital. This booklet is extensively illustrated.

323. Hollow Building Tile Manual for Builders and Masons. The Hollow Building Tile Association, Chicago, Ill.—63-page booklet containing some very helpful data on the subject of hollow tile. This booklet is replete with tables, photographs of jobs in the course of construction, drawings of details, etc.

324. Electric Hoists. Link-Belt Company, Chicago, Ill.—Catalog No. 380 covers the Link-Belt line of standardized monorail electric hoists as well as overhead electric traveling cranes. Complete descriptions of the construction and operation of these machines are given. Tables of weights, clearance dimensions and speeds are included. This 96-page book is profusely illustrated.

325. Brascolite. Luminous Unit Company, St. Louis, Mo.—Catalog No. 7 fully illustrates and describes the Brascolite lighting fixtures which are made in numerous types. Special types made in any architectural period. Brascolite engineering data and charts contain some very useful information on the subject of lighting. Prices of Brascolite lighting fixtures are given.

326. Noscald Mixing Valves and Faucets. Noscald Valve Company, New York City.—Illustrated folder describing the various types of Noscald mixing valves and faucets for bath and lavatory and other uses. The construction and operation of the Noscald valve and faucet are described and illustrated. A list of a few of the Noscald installation is given, as are also list prices.

327. Human Nature and the Factory Building. Truscon Steel Company, Youngstown, Ohio.—An interesting book pointing out the necessity of studying the human element in relation to production, and discussing the basic principles of modern industrial engineering. Consideration of the human element in production must start with the factory building itself which must be so designed, both inside and outside, as to make it attractive to the employees, it is stated. The daylight type of factory building answers this purpose very admirably, and this book is profusely illustrated with photographs showing Truscon daylight sash in several factory buildings where various products are manufactured.

328. Loft and Office Buildings of Structural Concrete. Turner Construction Company, New Pork City. —Booklet pointing out the fact that reinforced concrete construction reduces the cost of building considerably. Numerous illustrations show representative concrete skeleton buildings.

329. The Bank Builder. A. Moorman & Company, St. Paul, Minn.—September issue of house organ con-

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The Better Barn Building Movement

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You will find it easier to sell more efficient Barn Door Hangers

The up-to-date farmer is becoming acquainted with the fact that a wisely planned, well equipped barn is a paying investment.

A door that sticks or comes off the track is a sort of nuisance to the farmer—and your reputation as a careful builder suffers.

The **Improved Big Four Hanger** renders every sliding door easy-working and positive in operation.

It stays on the track, does not rust and never sticks. Under pressure it swings outward, its unusual flexibility also enabling it to raise higher than any other flexible hanger.

Big Four Hanger is easy to attach, has a non-binding wheel housing and anti-friction roller bearings.

If your dealer does not carry the Improved Big Four, send us his name. Catalog mailed on request.



Showing flexible feature of "Big 4" Hanger

National Mfg. Co.

Sterling, Illinois

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tains some interesting articles, the leading one dealing with the advantage of contracting this fall for buildings to be built next Spring. An alteration job on a bank is described and illustrated. Illustrations of bank exteriors and interiors accompany the text.

330. **Indirect Daylight for Banking Rooms.** Western Blind and Screen Company, Los Angeles, Cal.—Booklet describing the construction of Western Venetian blinds which are extensively used in schools, hospitals, public buildings, office buildings, residences, etc. Illustrations show various buildings in which Western Venetian blinds are used. Some testimonial letters are reproduced. A partial list of users is mentioned.

331. **The Cleveoil Burner for Fuel Oil or Kerosene.** The Cleveland Gas Burner and Appliance Company, Cleveland, Ohio.—Illustrated pamphlet describing the construction and operation of the Cleveoil burner which is designed to burn any gravity of liquid fuel, between the ranges of light crude oil and kerosene. A comparison is drawn between the cost of burning fuel oil and coal. Price is given.

332. **Mantels.** The Fischer & Jirouch Company, Cleveland, Ohio.—Booklet showing the various types of mantels manufactured by this company, these mantels being made in either wood or art stone. Prices are given.

333. **Alpha Aids.** Alpha Portland Cement Company, Easton, Pa.—No. 23 of this house organ contains some valuable data on the subject of concrete, pointing out just where it can be used to best advantage. It is replete with illustrations which help to make the text understandable.

334. **Linotile Floors.** Armstrong Cork & Insulation Company, Pittsburgh, Pa.—Handsomely illustrated book describing Linotile and pointing out its various merits. Linotile floors can be used for offices, churches, banks, theatres, stores, libraries, kitchens, elevators, sun parlors, etc. Linotile floors are manufactured in different patterns and various colors. Information on the care of these floors is given. Samples will be furnished on request. A partial list of installations is included.

335. **Health and Ventilation.** Merchants & Evans Company, Philadelphia, Pa.—Booklet illustrating and describing the contsruction and operation of the different types of "Star" ventilators manufactured by this company. Special stress is laid on the importance of good ventilation and the factors conducive thereto.

336. **The Cast Stone System of Manufacturing Granite Veneered Concrete Building Units, Building Trim, Garden Furniture, Ornamental Work.** Bangor Cast Stone Products Company, Bangor, Maine.—Book illustrating and describing the cast stone system of making cement units as compared with the "dry tamp" system. It is claimed that the cement building units manufactured by this system are waterproof, impervious to heat, cold or moisture, are beautiful in appearance and practical in their adaptability. Several testimonial letters are reproduced.

337. **Galvanite Roofing.** Ford Roofing Products Company, Buffalo, N. Y.—Literature describing this roofing product which, it is stated, is both fire retarding and waterproof. It is also claimed that it requires no paint and no after attention and is suitable for any class of roof on any size building in any climate.

338. **Ball Bearing Butts.** The Stanley Works, New Britain, Conn.—B 35 describes and illustrates the various types of the Stanley Works ball bearing butts, and points out just what type to use for different installation conditions. A few of the more prominent buildings where these butts are in constant use are reproduced.

339. **Ezola Mats and Treads.** The Phillip Carey Company, Lockland, Cincinnati, Ohio.—Illustrated folder describing this cold-proof, damp-proof, springy floor covering for use in department stores, factories, offices, hospitals, power houses, as a shock protection before electrical switchboards and electrical apparatus, etc. Testimonial letters are reproduced.

340. **Patterns and Parts for Phonograph Cabinets.** Modern Phonograph Supply Company, Chicago, Ill.—Catalog illustrating and describing the blue prints, drawings, ready-built horns, motors and other parts for building complete phonographs.

341. **Penco Metal Ceilings.** Penn Metal Company, Boston, Mass.—Book illustrating the various types of sheet metal ceilings manufactured by this company. Several photographs show interiors of stores, churches, schools, theatres, etc., where these metal ceilings have been employed to advantage. A price list is contained.

342. **The Art-Craft Roof.** Bird & Son, Inc., East Walpole, Mass.—Folder describing this roofing material which can be applied right over the old shingles of a roof. Illustrations show houses on which Art-Craft is used.

343. **McKeown "Lattis-Truss."** McKeown Bros., Inc., New York City.—Folder describing all the advantages and benefits to be derived from the use of the "lattis-truss." Many illustrations show various types of buildings in which the "lattis-truss" roofs are used. A partial list of satisfied owners of these roofs is given.

344. **Practical Metal Weather Stripping.** The Diamond Metal Weather Strip Company, Columbus, Ohio.—Book describing the advantages to be gained from the use of Diamond metal weather strips for windows and doors. The book is replete with illustrations and blue print details.

345. **Arlington Water-Proofing.** The Arlington Mfg. Company, Canton, Ohio.—Illustrated folder describing the Arlington No. 700 Water-Proofing for water-proofing and damp-proofing of walls and floors, all surfaces below grade, plaster bonding, backing of marble, stone, terra cotta, etc., cement and stucco exteriors and wood surfaces coming in contact with masonry.

346. **Hardware.** Frantz Mfg. Company, Sterling, Ill.—Extensively illustrated catalog describing the complete line of "Frantz" products, which include all types of door hangers and tracks, various garage sets, hinges, etc.

347. **The Electric Rotary Machine.** Electric Rotary Machine Company, Chicago, Ill.—Illustrated booklet describing the construction of this device, and outlining the many uses to which the electric rotary machine may be put. Among these will be found scrubbing, surfacing, sandpapering, grinding, waxing, polishing and refinishing all kinds of floor and flat surfaces.

348 **Savill's Swan Neck Faucet.** Thomas Savill's Sons, Philadelphia, Pa.—Booklet illustrating and describing the various styles of faucets manufactured by this concern. These faucets are suitable for all types of buildings. Prices are included.

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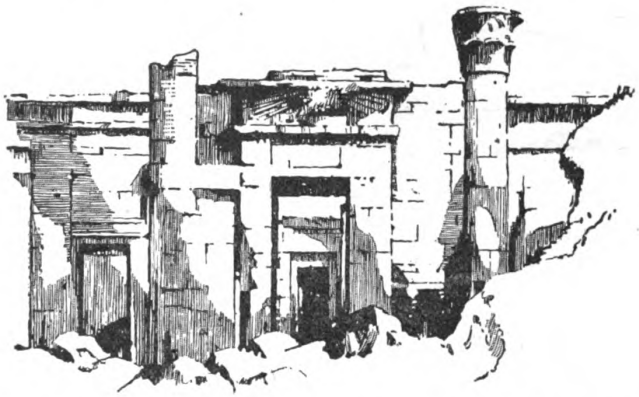
Thirty Centuries Ago



THIRTY centuries ago along the River Nile stood the city of Memphis, capital of Egypt. Today this city—famed for its architectural beauty—is being uncovered five strata below the country's present level.

Out of these ancient ruins looms a new understanding of Egyptian accomplishment. Their knowledge of lighting effects, mural decorations and building technique is a revelation. But the greatest surprise came when historians uncovered great wooden doors, swung on brass hinges. Think of it. Hinges used 3000 years ago.

Down through the ages the simple, often unnoticed hinge has remained in constant use. Today its selection is important. A creaking, squeaking, sagging hinge ruins architectural perfection—cheapens expensive workmanship and presents a discord where harmony should prevail.

For fifty years McKinney Hinges and Butts have set a standard for Architects and Builders. Those who take pride in the buildings they create realize that the name McKinney in a specification guarantees hinge success.

There is a McKinney Hinge or Butt, of proper beauty and design, to match any architectural plan. These are shown in the McKinney illustrated catalog. If this book is not in your files we will gladly forward you a copy of the latest edition.

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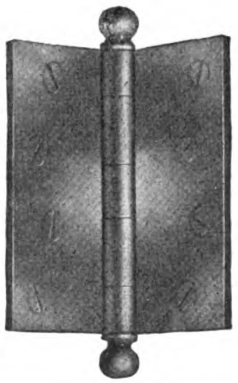

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Injury to Subcontractor's Employee

Where a general contractor employed a subcontractor to install plumbing in a building, an employee of the subcontractor, who had a safe and easy method of access to the roof through a dormer window, cannot recover for his injuries received when a scaffold built by the general contractor for its carpenters broke while he was atempting to use it to reach the roof. (Virginia Supreme Court of Appeals, Dickinson vs. Armstrong, 100 Southeastern Reporter, 813.)

Architects' Certificates and Substantial Performance of Building Contracts

The Supreme Court of California applies the just rule that provision in a building contract for an architect's certificate evidencing completion of the work as prerequisite to the contractor's right to recover a balance due on the contract will be held to have been waived by the owner where his words or acts manifest an intention to waive. And in the same case—Collins vs. Ramish, 188 Pacific Reporter, 550—it is held that requirement of such certificate, once having been waived, can not afterward be insisted upon.

Another branch of the same decision follows the well settled rule of law that a building contractor will be entitled to recover compensation provided for by his contract, although he may not have performed the work in strict conformity to his contract, provided that there has been a substantial performance. In such case, of course, the owner is entitled to a reasonable deduction to cover any damages resulting from the builder's omission to strictly carry out his contractual obligation. Accordingly the California Court holds that a contract to install marble and tile work in a theatre building at a price of $3,130 was substantially performed, although there were imperfections for which the owners should be allowed $300 as the reasonable cost of correcting the defects.

Liability to Subcontractor's Materialman

That it does not always pay to settle in full with a sub-contractor before ascertaining that those having lienable claims against him have been paid is shown by the decision of the Texas Supreme Court in the recent case of Wilson vs. Sherwin-Williams Paint Co., 217 Southwestern Reporter, 372, wherein it is held that a notice, under the Texas lien statutes, to the owner of a claim for material furnished a sub-contractor, the notice being given when the owner was indebted to the contractor in an amount in excess of the claim, and being followed by the filing and recording of a proper account, was sufficient to protect such claim, as against payment made by the contractor to the sub-contractor after the material was furnished to the latter but before the notice was served on the owner. Speaking of the Texas lien law, the court says, in part:

"The statutes embody the just conception that the rights of the contractor are inferior to those of the materialman. The duty to furnish and pay for the material is primarily imposed on the contractor by the ordinary building contract, such as that here involved. The contractor selects the subcontractor. If loss must fall on materialman, owner, or contractor, by reason of the default of one chosen by the contractor to perform his obligation, and of one whose acts are, or ought to be, directly under the contractor's supervision, surely the loss ought to fall on the contractor."

Effect of Owner's Acceptance of Building

Acceptance of a building by an owner does not preclude him from claiming deductions from the builder's compensation for improper work, holds the Kansas City Court of Appeals in the case of Hunt vs. Owen Building & Investment Co., 219 Southwestern Reporter, 138. The opinion seems to be in line with the holding of courts in other states.

Performing Work on Cost Plus Basis

"A contract to do work upon a basis of cost plus a stipulated commission does not mean that the contractor has the right to expend any amount of money he may see fit upon the work, regardless of the propriety, necessity, or honesty of the expenditure, and then compel repayment by the other party, who has confided in his integrity, ability, and industry," says the appellate division of the New York supreme court in the recent case of Title Guarantee & Trust Co. vs. Pam, 182 New York Supplement, 824. In such case the contractor cannot recover more than the reasonable value of work done.

In this case, plaintiff had acquired notes given by

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Johnson's PerfecTone Under-coat will not run, sag, lap, chip, check, crack nor peel. It has wonderful smoothness and opacity—and will not absorb the Enamel.

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Johnson's PerfecTone Enamel is very elastic—it will not fade—chip—check—crack or peel.

The stock shades of Johnson's PerfecTone Under-coat and Enamel are White, Ivory and French Gray.

Won't you try Johnson's PerfecTone Under-coat and Enamel at our expense, so that you can see for yourself what beautiful effects may be procured? Use the attached coupon.

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defendant to a contractor for work done under such a contract, but it is found that plaintiff took the notes with intimation that defendant was entitled to a set-off on account of reckless and extravagant expenditures made by the contractor's employees in doing the work. The court orders a deduction of about $50,000 from a claim of $130,000, on the ground that there were gross overcharges in the contractor's account.

When Owner Fails to Make Contract Payments

In the rceent case of Baile vs. Peerless American Products Company, 182 New York Supplement, 721, the Appellate Division of the New York Supreme Court, in affirming judgment for plaintiff, a building contractor, on account of work done under a contract which he was forced to abandon by reason of defendant owner's failure to make stipulated payments, said:

"It is well settled by authority that the plaintiff had the right of election, on the breach of the original contract by the owner, or on the breach of the contract as modified, to maintain an action on the contract for the work performed and the material furnished, and for his damages flowing from the failure of the owner to permit him to complete the contract, or, as he did in this case, to abandon any claim on or under the contract and sue on quantum meruit (to recover reasonable compensation) for the work, labor, and services performed and materials furnished."

News Notes from Various Sources

What $100 Bought in Building in 1914 and Now

The long delay in resumption of building is explained in the following tabulated figures showing what $100 would buy in the way of materials and labor in 1914 and now:

	1914	1920
½-inch electrical conduit	3,060 feet	1,230 feet
4-in. outlet boxes	1,524 pieces	833 pieces
No. 14 wire	16,000 feet	9,350 feet
2-wire armored cable	1,820 feet	1,058 feet
Steel sheets	5,243 lbs.	1,400 lbs.
Refined petroleum	746 gallons	296 gallons
Common brick	13,850 brick	3,080 brick
Yellow pine	3,233 feet	700 feet
Copper	685 lbs.	405 lbs.
Unskilled labor	55.4 days	15.4 days

High Prices of Lumber Check Housebuilding

Abnormally high lumber prices were in part responsible for the arrest of the house building movement within the last few months, according to a report submitted to the Senate by the Forest Service of the United States Department of Agriculture and made public recently.

During the latter half of 1919 and the early months of 1920, says the report, lumber prices in the United States increased more sharply and to far higher points than were ever known before. In March, 1920, average mill prices had increased 300 per cent. and more over 1914. While the costs of production and distribution of lumber likewise increased, the rise in lumber prices was wholly disproportionate. "Present prices, though somewhat lower, are still excessive and yield profits unjustified by costs," says the report.

It should be noted that present prices of lumber are considerably lower than at the time this report was being prepared.

A shortage in housing accommodations that is almost world-wide has brought home vividly the close relation of building to the comfort, health and general welfare of the public. When for any reason construction falls below normal, overcrowding, high rents, lowered standards of living, and other evils follow.

Safety Methods Employed in Building Construction

An innovation in making provision for the safety of workmen engaged in building and construction work has been introduced in the erection of large extensions to the plant of the American Rolling Mill Company at Middletown, Ohio.

At 2 P. M. each Tuesday a committee composed of foremen, mechanics and laborers inspects the entire job from sewers to roof with the one purpose of seeing that proper methods are taken to safeguard the employees against accident. This committee makes a detailed report of each inspection to a representative safety committee, which considers and puts into effect the recommendations of the inspection committee.

The plan was introduced and is being carried out by Dwight P. Robinson & Company, Inc., a large engineering and construction organization which has been making careful investigations of various plants for protecting its employees.

The success of this progress is being closely watched by various safety societies which are now encouraging day laborers as well as trained men to speed up their work. Experts in all types of building construction are agreed that the first marked reduction in building cost will come through increased production. The best features of this new safety plan are being copied by many large construction companies in the United States and Canada. The

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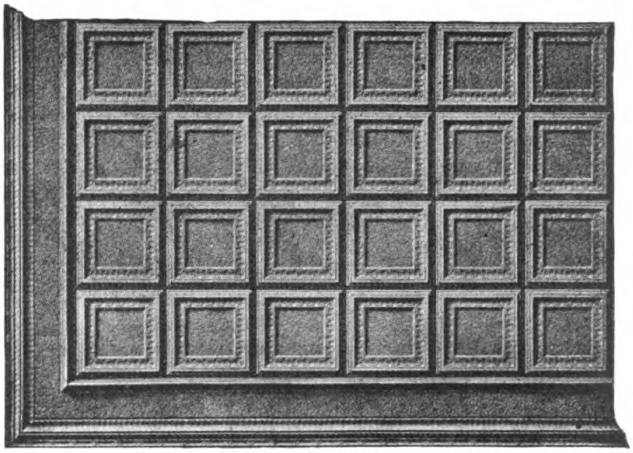
"Invisible Joint"
TRADE MARK

METAL CEILINGS
AND SIDE WALLS

Will make money for you when there is not much new building going on. We again have a large variety of designs to select from.

Repressed beads and die cut nail holes make Invisible Joint Metal Ceilings easy to erect and accurate fitting.



Greek Design No. 2435

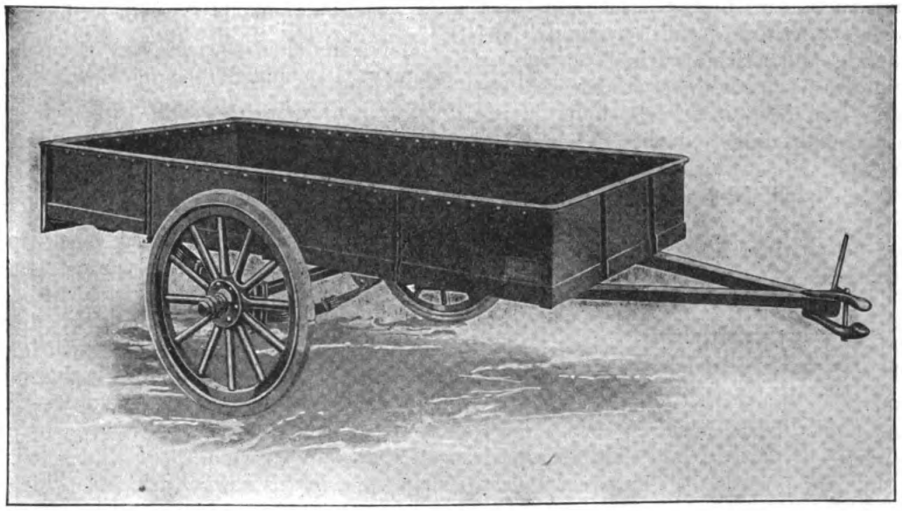
FREE CEILING PLANS
Furnished On Application

Milwaukee Corrugating Co.
MILWAUKEE, WIS.
Branch Office and Factory at Kansas City, Mo.
Minneapolis Sales Office: 929-30 Lumber Exchange

QUALITY "MILCOR" PRICES

CONTRACTOR'S HANDY AUTO TRAILER

SPEED — ECONOMY — STRENGTH



Capacity—2,000 pounds. Body—8 feet long, 46 inches wide, 12 inches high. Body and under frame built of open hearth steel. Axles—1½ inch square bed, special high carbon steel. Springs—Semi-elliptic, oil tempered and double heat treated. Bearings—Roller. Wheels—1½ inch spoke, artillery type, second growth hickory. Tires—32-2, solid rubber. Weight—534 lbs. Other models with gates at front; also extension tongue which permits carrying lumber, poles, ladders, etc., 30 feet long.

Write for Catalog A

ALL STEEL TRAILERS — EVERY TYPE — 1 TO 10 TONS CAPACITY

ROGERS BROTHERS COMPANY **Albion, Penna.**

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public is interested in the plan because indirectly it will lower rentals by reducing construction costs. This applies equally well to industrial construction, large building projects and homes.

Griffin Mfg. Company Increases Capital

At the annual meeting of the stockholders of the Griffin Mfg. Company held recently, increase of capital stock was authorized from $1,000,000 to $2,500,000. The former directors were re-elected and in order to bring some of the younger members of the corporation into closer touch with its affairs the number of directors were increased to seven.

Big Construction Contracts Pending in Uruguay

Some big contracts will probably be let for construction work in Uruguay within the near future, according to a report entitled "Construction Materials and Machinery in Uruguay," just published by the Bureau of Foreign and Domestic Commerce. Fifteen cities expect to install modern sewerage and water supply systems; an international hydroelectric power plant on the Uruguay River is contemplated; an experimental irrigation scheme is in prospect; workingmen's homes, factories and government buildings to the extent of about $40,000,000 will probably be constructed during the next few years in Montevideo. Details concerning the imported materials and construction machinery needed for these and minor works are set forth in this report on "Construction Materials and Machinery in Uruguay."

This bulletin also discusses the styles of architecture, labor and fuel conditions, and domestic resources and industries connected with the building trades in Uruguay. Illustrations show the types of roads, bridges, public buildings and water mains now in use.

Copies may be obtained for fifteen cents each from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Home Owning vs. Divorces

The contention that home owning makes for good citizenship and higher living ideals is corroborated by a recent study of divorce cases in Chicago, where out of 3,577 suits for divorce filed in a recent year only seventy couples owned their homes. In 2,171 cases there were no children.

Records shows that in Chicago in 1919 there were 37,583 marriages and between 5,000 and 6,000 divorces, an increase in divorces of 20 per cent. since 1911. The growth of the apartment habit and extravagance are given as two prominent causes for this increase. The "Own Your Home" idea would seem a good antidote.

A Building Code for Pennsylvania

A commission designated as the State Building Code Commission has spent several years in earnest study and faithful work in attempting to formulate a building code for Pennsylvania. For various reasons it was not adopted by the Legislature. That there is need for more adequate building regulations in Pennsylvania becomes more apparent each day. As a step toward securing such a code, a meeting has been called, of those interested, by Clifford B. Connelley, Commissioner Industrial Board, to be held in Harrisburg, to talk over the entire situation.

The bill as presented had incorporated within it a provision, to the effect, that separate codes for the several classes of buildings be worked out as standards of the Industrial Board of the Department of Labor and Industry—a provision which, perhaps, could be developed at this particular time. The meeting will probably discuss the advisability of the Industrial Board drafting a code, using as a basis the data already gathered, with the aid of a representative committee of persons interested in the building construction industry.

Mahogany Flooring Now on the Market

Mahogany flooring is a new commodity in this country. Undoubtedly the public will have to be educated to its use. It is now being marketed in the New York Metropolitan district by The Indiana Quartered Oak Company of Long Island City, large producers and importers of Philippine mahogany. Already several carloads of flooring cut from plain and quartered-sawed mahogany have been reported sold. This flooring is being worked from one-inch boards, thirty inches wide, being turned out in stock 13/16x2½ inches. It has been bringing $260 per thousand feet wholesale, a price which for some time was cheaper than quartered oak flooring, but the latter has been dropping for several weeks. The mahogany flooring is very attractive in appearance, and there are possibilities of its becoming a staple commodity in this market, particularly if other hardwoods hold up in price to any way near where they now are.

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Make More Money-Be a Bigger Builder

The Good Things—the Big Things—of Life are for those who will reach out for them. You can have them for the grasping—just an energetic thought—saying "I Will" and they are yours. Are you content to make a small profit slowly on hand labor or—will you make a large profit quickly by means of a modern machine? Which?

IT'S EASY

Let The Magic Mixer-Mix Your Concrete

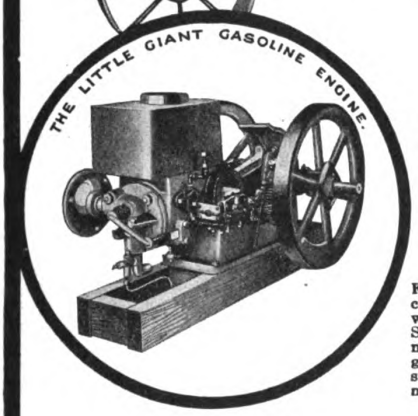


Does it faster—better—cheaper

This Mixer will put you in position to do all kinds and classes of concrete work. It will enable you to work faster, do more work, do bigger work, do better work—and will help you build up a permanent and substantial business.

$25 BRINGS IT TO YOU

Balance on Aloe's Easy Rental Purchase Plan—you have TEN MONTHS TO PAY—and the mixer will be making money for you faster than the easy payments come due. Certainly this is a rare opportunity for you to get away from the old shovel method and get into the class of the big men who are doing the big jobs in the modern way.



Your Big Opportunity For Greater Prosperity

With this wonderful machine and two men you can do as much work as you formerly did with six men. And you can do it easier, quicker and better, producing an absolutely uniform batch every time. It will mix 4½ to 5½ cubic feet per batch—can be speeded up to a batch every minute—over 2,000 cubic feet per day. It is the most practical and efficient mixer made—scientifically constructed of the best materials—light in weight, portable, simple and durable. Backed by the Aloe iron-clad guarantee to give the utmost service and satisfaction.

The Engine

Fitted with 2½ horse-power four cycle, horizontal gasoline engine with high-grade Webster magneto. Simple, powerful, reliable, economical—requires only two gallons gasoline a day. Protected by all-steel housing. Two doors at rear make it easy to get at.

Anyone Can Run It

Nothing complicated—nothing to get out of order. Can be operated by anyone who will read and follow the simple directions which are furnished with each mixer. It comes complete—ready for work the day you get it.

FREE



Free Trial Offer

So confident are we the Magic Mixer will please you in every way we will gladly send it to you for 10 DAYS FREE TRIAL on payment of only $25.00. Take it out on your jobs—put it to the most severe tests. Then, if you can be induced to part with it again ship it back at our expense—and we will promptly return your money without a word.

Get This Free Book "The Concrete Road to Success"

You ought to have this booklet of invaluable facts about the wonderful opportunities the Magic Mixer offers you. Sent FREE together with full particulars of our Easy Rental Purchase Plan by which the Magic Mixer will pay for itself and put you on the road to greater success at the same time. Get this remarkable offer.

Mail The Coupon Today—NOW

The road to success is open to you. The opportunity to make yourself a big man is before you. The simple act of signing and mailing this coupon may be the turning point of your career. Don't sit idly by while other men are forging to the front. Start the coupon on its way. Get the facts. The time to act is NOW.

A. S. ALOE CO.
622 Olive St., St. Louis, Mo.

MAIL COUPON TODAY

A. S. ALOE CO.
622 Olive St., St. Louis, Mo.

Send me FREE booklet, "The Concrete Road to Success", full description of the Magic Concrete Mixer and particulars of your Easy Rental Purchase Plan.

Name_____

Address_____

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DUPLEX TRUCKS

BUILT FOR BUSINESS

Is Transportation a Problem In *Your* Business, *Too?*

If It Is, Read This. It is Published in the Desire to be of Help in Meeting a Common Problem

HAVE you ever thought as seriously as you should of the motor truck in connection with your transportation problem?

Not necessarily of the truck *instead* of the railroads, but of the truck *in addition* to the railroads.

With the average freight car travelling only *25 miles per day* business is slowed up in spite of itself.

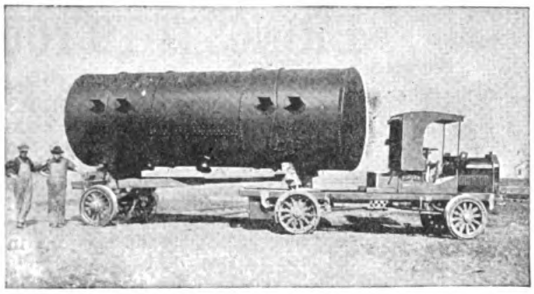
Here is a big field—big with real and potential aid in helping you to do business *without hindrance* and on terms of practical economy.

Now, perhaps, you say that this won't work out. But wait. *It is working out right now.*

Perhaps your observation or your experience has been with the *wrong kind* of truck. Nine times out of ten, so-called trucking disappointments have been remedied by *using the right kind of truck.*

Maybe you want facts. If you do—write us and we will give you real facts about Duplex Trucks—the famous Duplex 4-Wheel Drive, known everywhere as "America's Leading Heavy Duty Truck"; and also some real facts about the wonderful Duplex Limited—the High Speed, Pneumatic Tired Truck that can really haul 3000 to 5000 pounds at high speed over roads as they are.

Read the following and see if it doesn't seem reasonable to believe that these Duplex Trucks are worth knowing about. Write—and do it today.





The Duplex 4-Wheel Drive 3½-Tons Capacity

A Wonderful Truck for Economical Heavy Hauling

IF you have a heavy hauling problem and do not already know the Duplex 4-Wheel Drive, talk to the Duplex dealer and let him give you the facts at first hand.

The Duplex Truck Company is the originator of the 4-Wheel Drive principle and today its most successful exponent.

There is pull and power in every wheel—and the Duplex 4-Wheel Drive keeps going under conditions that are simply impossible for any rear wheel drive trucks.

The Duplex 4-Wheel Drive is setting new records of truck efficiency for Lumber and Logging Companies; Road Builders; Oil Companies; Coal Companies; Mining Companies; Grocery Companies; Trucking Contractors—in fact in all lines where there are heavy loads to be hauled.

The point is the Duplex 4-Wheel Drive is daily proving to be a very *economical truck* for hundreds of owners who used to say it was too big for their needs.

Write us for folders about the Duplex 4-Wheel Drive. Talk to the Duplex dealer near you. He will give you only facts

DUPLEX BUILT FOR BUSINESS

The Duplex Limited

High Speed; Full Electrical Equipment; Pneumatic Tires; Capacity 3000 to 5000 pounds at 5 to 25 Miles Per Hour on High

HERE is a photograph of the Duplex Limited that carried 3060 pounds from Los Angeles to El Centro via San Diego at an *average speed of 34 miles per hour.* No stops during the run. No relief driver. Ran through rain from Santa Ana to Oceanside. *Speed limit observed in all towns in transit.*

Another Duplex running from New Orleans to Baton Rouge with 3750 pounds, 124.6 miles in 6 hours and 55 minutes running time.

Another running from Waterbury, Conn., to Boston—175 miles in 5 hours and 27 minutes.

It fits in exactly with the universal effort to *stabilize schedules;* to obtain *quicker delivery;* and to secure *greater economy.*

4 Cylinder, enclosed type motor—water cooled—cast enbloc—Bore 4-inch, Stroke 5¼-inch. 3 Point Suspension, Pneumatic Cord Tires, 145-inch Wheelbase. Equipped with Windshield, Electric Lighting and Starting, Ammeter, Boyce Motormeter, Speedometer, Electric Horn, Tools, Jack, Rim Wrench, Front Fenders, Alemite High Pressure Lubricating System.

Just the right truck for Delivery, for Inter City Express and for all speed hauls. Get the facts about it

Duplex Truck Company

Lansing · Michigan

Largest and Most Successful Truck Companies in America

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THOUSANDS OF BUILDINGS

IN ALL PARTS OF

UNITED STATES AND CANADA

HAVE BEEN AND ARE NOW BEING STRIPPED AND CALKED WITH

DIAMOND METAL WEATHER STRIP AND CALKING COMPOUND

-- SAVES FUEL --
KEEPS OUT WIND
DIRT AND NOISE

Scientifically Correct in Principle -
Practical in Use - Always Efficient -
Exclusive Features - Last As Long As Building

PRACTICAL METAL THE DIAMOND WAY WEATHER STRIPPING

Contractors, Carpenters, Job Men

Sell and Install Them

WRITE TODAY FOR AGENCY PROPOSITION
SOME FINE TERRITORY STILL OPEN
WE FURNISH COMPLETE SELLING OUTFIT

YOU INVEST NO MONEY UNTIL YOU GET ORDERS

$13,000 PROFIT MADE BY ONE AGENCY IN ONE YEAR

ADDRESS

The Diamond Metal Weather Strip Co.

626 KERR STREET COLUMBUS, OHIO

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One of the Federal trucks owned and operated by J. W. Rooks, McAlester, Okla.

Another FEDERAL

Constant service with those heavy "dead" loads that tax a truck's power and carrying capacity but bring out the true worth of the Federal truck

Federals have the stamina to remain on the job rain or shine and the rugged power to negotiate the poor roads and steep grades encountered in parts of every section of the country.

The truck pictured here has been in constant service several seasons, twelve hours per day through the summer and ten hours per day through the winter months. The type of work it is doing speaks for itself.

Federals come in all capacities to meet all transportation needs. How usefully they are filling these needs is interestingly told in "Traffic News" which will be sent on request.

FEDERAL MOTOR TRUCK COMPANY
39 FEDERAL ST., DETROIT, MICH.



This is the sign of the Tenth Year Federal, a sign signficant of ten years of success in every field of truck transportation.

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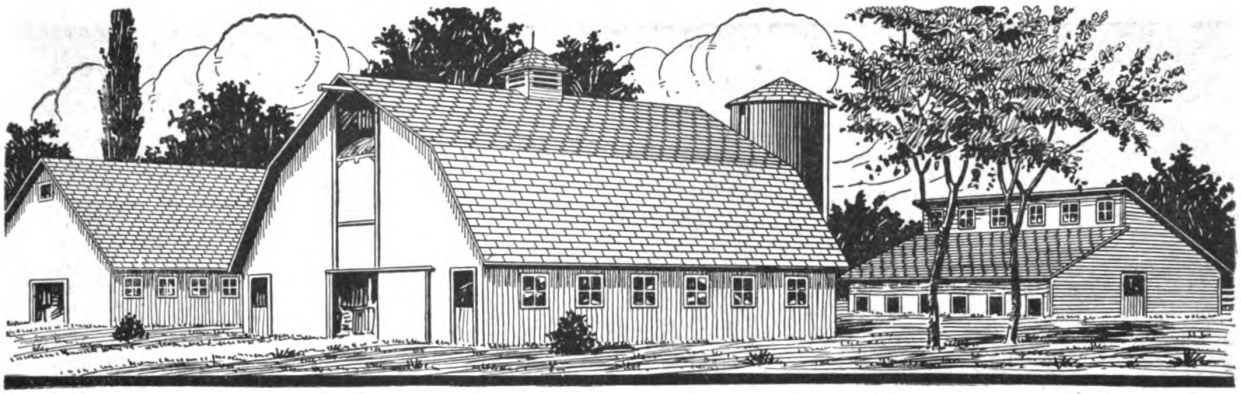


For All Farm Buildings

FLEX-A-TILE

ROLL SHINGLE ROOFING

THE Farm Owner's vision is beyond just a roof as a shelter from the rain, heat and cold. The crops under cover and the farm equipment are too valuable for him to take chances. Then again he has pride in his buildings. Economy must also be practiced on account of the many farm buildings.

Today the basis upon which the farm roofing purchases are made is—

Value, Price and Beauty

Dependable long service with no upkeep cost—and a moderate first cost—a beautiful non-fading red or green coloring together with the shingle effect are some of the qualities to be had in—

FLEX-A-TILE

ROLL SHINGLE ROOFING

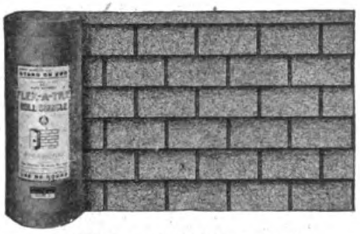
Handsome enough for the house, economical enough for the barn and other farm buildings. Flex-a-Tile dependable quality built right into every roll.

The roll form saves half the time in labor and nails. It can be laid directly over the worn out shingles or metal of the old roof.

The shingle effect is pressed in when roll is hot in the process of manufacture—not painted on—therefore no imitation pattern to wear off The rich Indian Red and Sage Green colorings coupled with the shingle effect make a house-top that any person may be proud of. As a service to your customers recommend and sell Flex-a-Tile House-Tops.

Ask for Bulletin A23 and H1511 and Free Samples.

HEPPES ROOFING DIVISION
THE RICHARDSON COMPANY, Dept. J, Chicago, Illinois
Mills at Chicago, Lockland (Cincinnati), Ohio, Rutherford, N. J.
Sales Offices—516 Fifth Ave., New York City; Candler Bldg., Atlanta, Ga.; Plymouth Bldg., Minneapolis, Minn.; 4500 Fillmore St., Chicago; Lockland (Cincinnati), Ohio; Canal-Commerce Bldg., New Orleans, La.



STYLE A is laid horizontally

JUST roll it on and follow the simple instructions for cementing the laps and nailing.

It is surprisingly easy to lay, thoroughly waterproof, fire resisting and permanently attractive.



STYLE B is laid vertically

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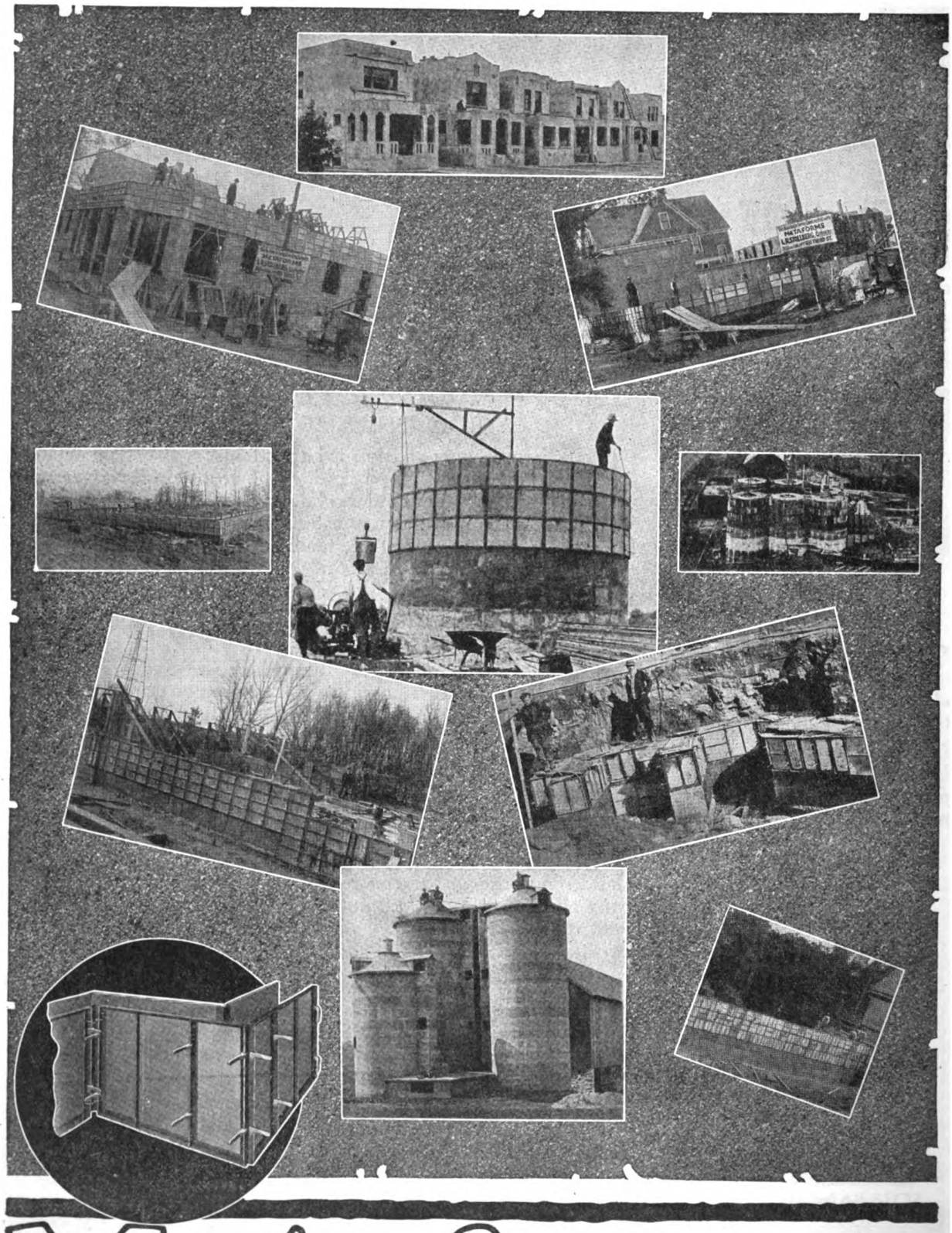

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How Much Do Wood Forms Cost You Each Year?

TAKE one substantial construction job, for example, and figure up the direct and indirect costs of wood forms on that job. Add up the payroll cost for several form carpenters. Include the heavy wastage of expensive form lumber—amounting ordinarily to 25%. Estimate the difference between the speed of construction as it actually was, and as it would have been *if the forms had always been in place, waiting on the mixer.*

Using Metaform equipment on that job, you would have almost *eliminated* form-labor costs through the substitution of speedy, almost *automatic,* form erection, for slow, cumbersome, expensive form carpentry.

You would have pocketed the extra profits that come from faster construction. A few laborers, with Metaform equipment, would have set a pace that the mixer could not possibly have held. Metaforms never hold back a mixer, they are always there ahead of the concrete.

What would the savings from such results on your work for the past several years total? Aren't Metaform methods worth investigation—immediately



Here, in fewest words, is the Metaform idea.

Metaform equipment is composed of individual form units, the number of units varying with the extent of the equipment needed. All units are standardized and interchangeable; each one is equipped with the necessary clamps and automatic locking devices. Units are two feet square, built of sheet steel, strongly braced and reinforced, and are practically indestructible.

A few fractional and adjustable units furnish the necessary variation to fit different dimensions.

A single course of Metaforms is composed of an inner and outer shell of plates. After the first course has been laid, there is no chance for the most ignorant laborer to go wrong on further set up. Three courses of units are ordinarily all that is necessary on a wall—as the work progresses, the bottom course is taken off and set on the top course.

The simplicity, versatility, and adaptability of Metaforms have never been even approximated in any other method. They are used with equal success on every class of concrete construction—the largest undertakings as well as the smallest jobs; on round construction, round tapered, straightway, and angles of every conceivable degree and variety.

Metaforms turn out smoother, more uniform jobs. They leave no ugly surface marking. Their joints are so nearly water-tight that the wettest of concrete can be poured when desired. A ten-foot wall can be built as easily as a ten-inch—any specified thickness can be followed to absolutely correct dimension.



There is nothing experimental about Metaforms. The first units, manufactured fifteen years ago, are still in daily use—any one of those first units would fit perfectly among the Metaform units that are being manufactured today. *No other building equipment has been so completely standardized!*

Metaforms have been used on some of the most extensive construction projects in the country. They are being used in every state in the Union, and in practically every country in the world. No contractor who ever tried them has failed to adopt them as standard equipment.

Right now is the time to estimate the extra profits that Metaforms can produce for you on every job during the coming season. Right now is the time to line up next season's equipment.

Metaform methods are explained in full detail in two books which deserve a place in the files of every contractor and construction engineer. They will be sent immediately upon request, without charge. Fill in, tear off and mail the coupon today.

Metal Forms Corporation
Milwaukee, Wisconsin

Mail Coupon Today



Eliminate wood form costs and speed up construction

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Neponset Black Waterproof Building Paper

"Spend $15 or $20 MORE for building paper and save fuel bills" — that's the way careful builders talk to their clients about Neponset Black Waterproof Building Paper.

It is waterproof. You can dip it in water and Neponset Black won't absorb moisture.

It forms a true and permanent barrier against draughts, moisture, heat, and cold. It takes less coal to heat a house sheathed with Neponset Black — and the paper never deteriorates.

Sold by leading hardware and lumber dealers in every state. If your dealer cannot supply you, we will ship direct.

BIRD & SON, inc., Dept. B, East Walpole, Mass.
(Established 1795)

CHICAGO **NEW YORK**

Canadian Office and Plant: Hamilton, Ont.

Makers of the NEPONSET Twin Shingles, NEPONSET Roll Roofings and NEPONSET Board

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"You Can Wash These Walls"

When you say that to a prospective home-buyer, you interest him. You interest his wife even more—and that's important, as you know.

Every woman likes the idea of keeping walls and woodwork clean by the use of soap and water.

Dutch Boy Flatting Oil

Walls painted with Dutch Boy White-Lead and Dutch Boy Flatting Oil have the soft, flat finish so pleasing for home interiors, and can be washed as often as necessary without injury.

You can carry out any color scheme you or the purchaser may desire. The painter can produce any exact tint or combination.

Helps to Sell Homes

The use of Dutch Boy products helps you to sell the homes you build, for it shows you are using materials of established reputation.

Send for descriptive booklet

NATIONAL LEAD COMPANY

New York Boston Buffalo Chicago Cincinnati
Cleveland St. Louis San Francisco
JOHN T. LEWIS & BROS. CO., Philadelphia
NATIONAL LEAD & OIL CO., Pittsburgh



Dutch Boy Flatting Oil and White-Lead

Save the surface and you save all

White Lead saves the surface

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Helpful Information on Cold Weather Concreting

The coming season will see, as previous cold weather seasons have seen, a marked increase in concrete building.

A really long list of concrete improvements can be constructed indoors, in shops, barns or warehouses, and placed later—posts, bases and small foundations, slabs, beams and other precast units, tanks, troughs, etc. And outdoor work is perfectly practical with some precautions easily observed. The probabilities of better transportation and better labor supply and the advantage of having a building ready for spring more than warrant the small additional cost.

Standard directions and specifications for cold weather concreting will be sent free of charge or obligation. Ask also for the ALPHA handbook on concrete construction—if you haven't one—and for the sheet or bulletin in the list below that is of especial interest.

Workingmen's Homes	Ice House	Dipping Vat
Walkway	Manure Pit	Tanks
Driveway	Septic Tank	Piers for Small Boats
Roads	Oil Storage Tank	Garden Furniture
Small Bridges	Tennis Court	Greenhouse
Culvert	Concrete Roof	Coal Pocket
Foundation	Barn and Silo	Fence Post
Gutter and Curb	Corn Crib	Gate Posts
Storage Cellar	Storage House	Walls, Sills and Lintels
Spring House	Smoke House	Garages
Small Dam	Hog House	Overcoating of Old Dwellings
Milk House	Poultry House	Cold Weather Concreting
Industrial Tanks		

Porch, Cellar and Stable Floors

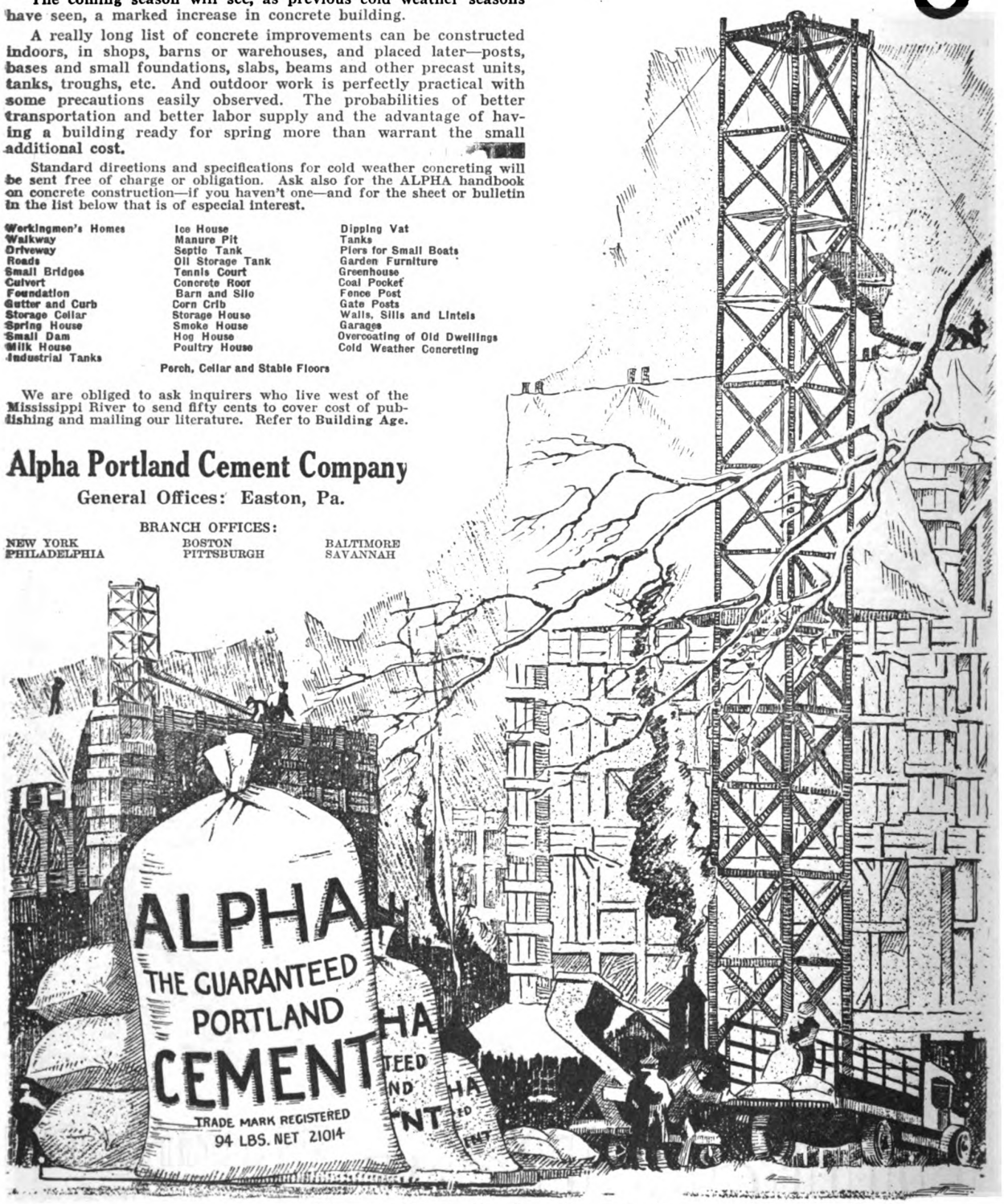
We are obliged to ask inquirers who live west of the Mississippi River to send fifty cents to cover cost of publishing and mailing our literature. Refer to Building Age.

Alpha Portland Cement Company

General Offices: Easton, Pa.

BRANCH OFFICES:

NEW YORK BOSTON BALTIMORE
PHILADELPHIA PITTSBURGH SAVANNAH



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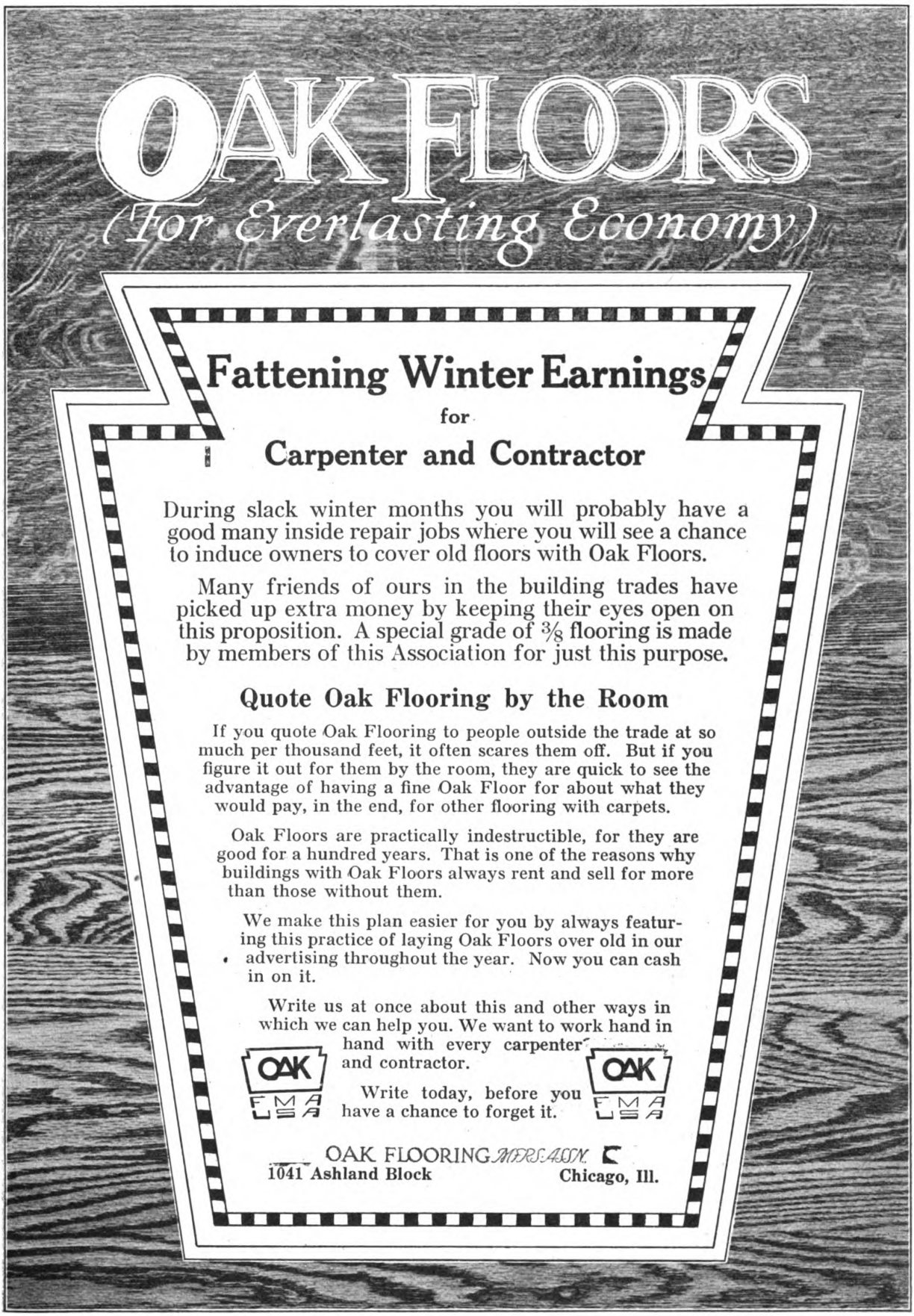

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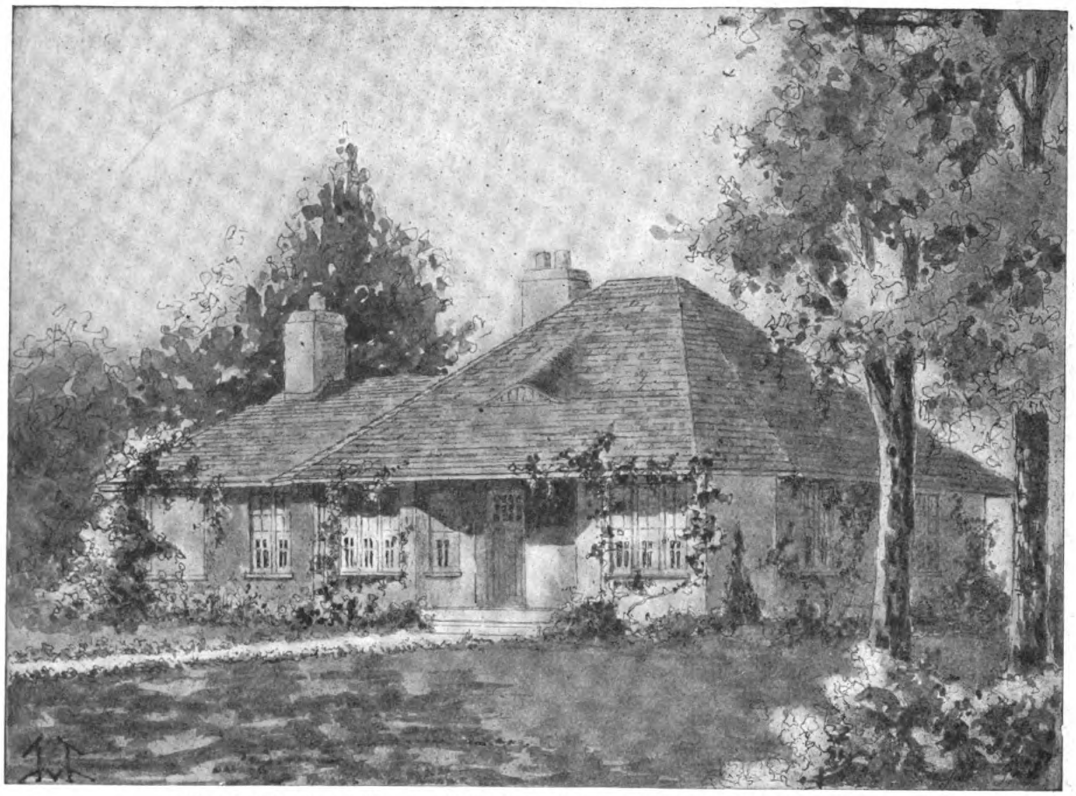

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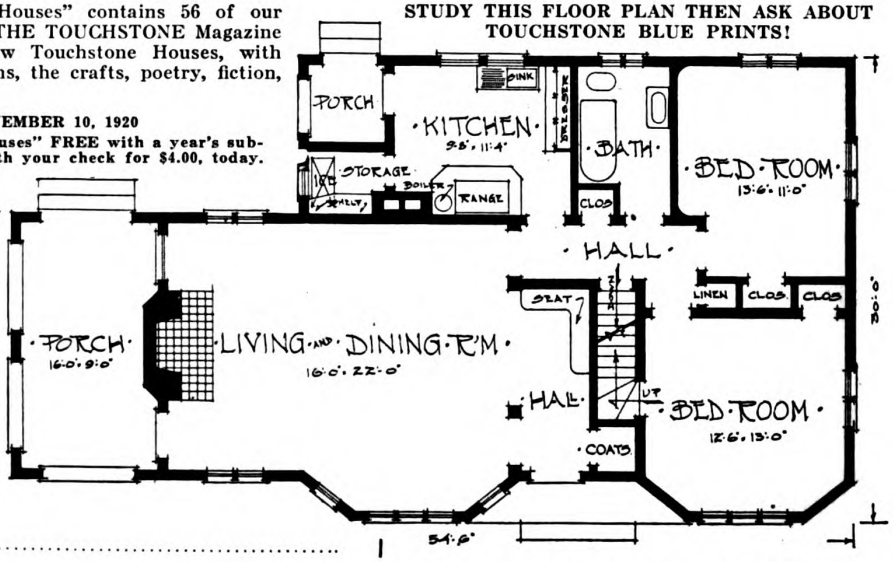

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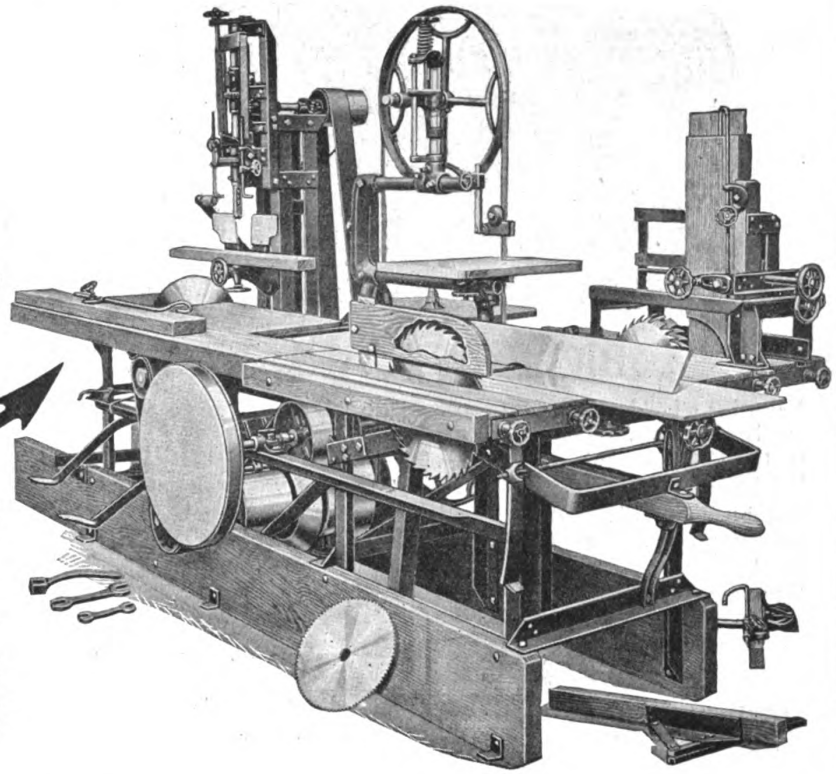

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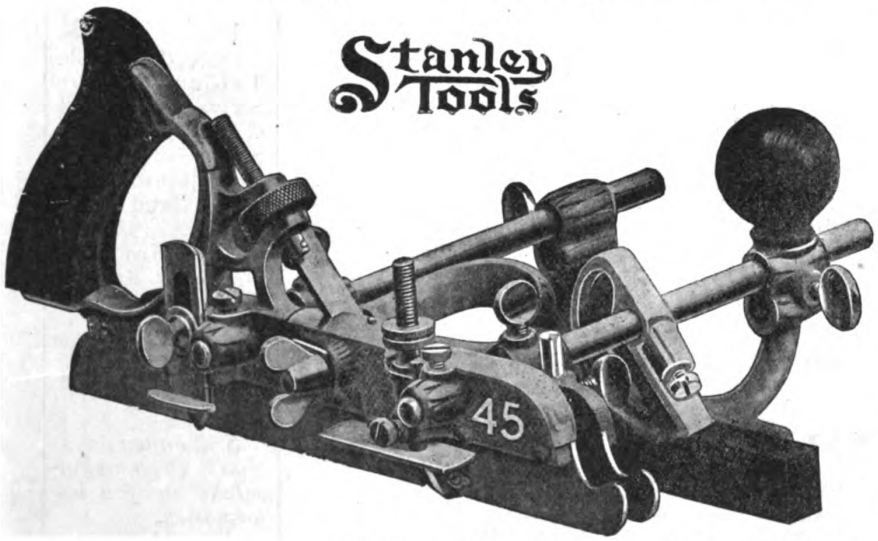

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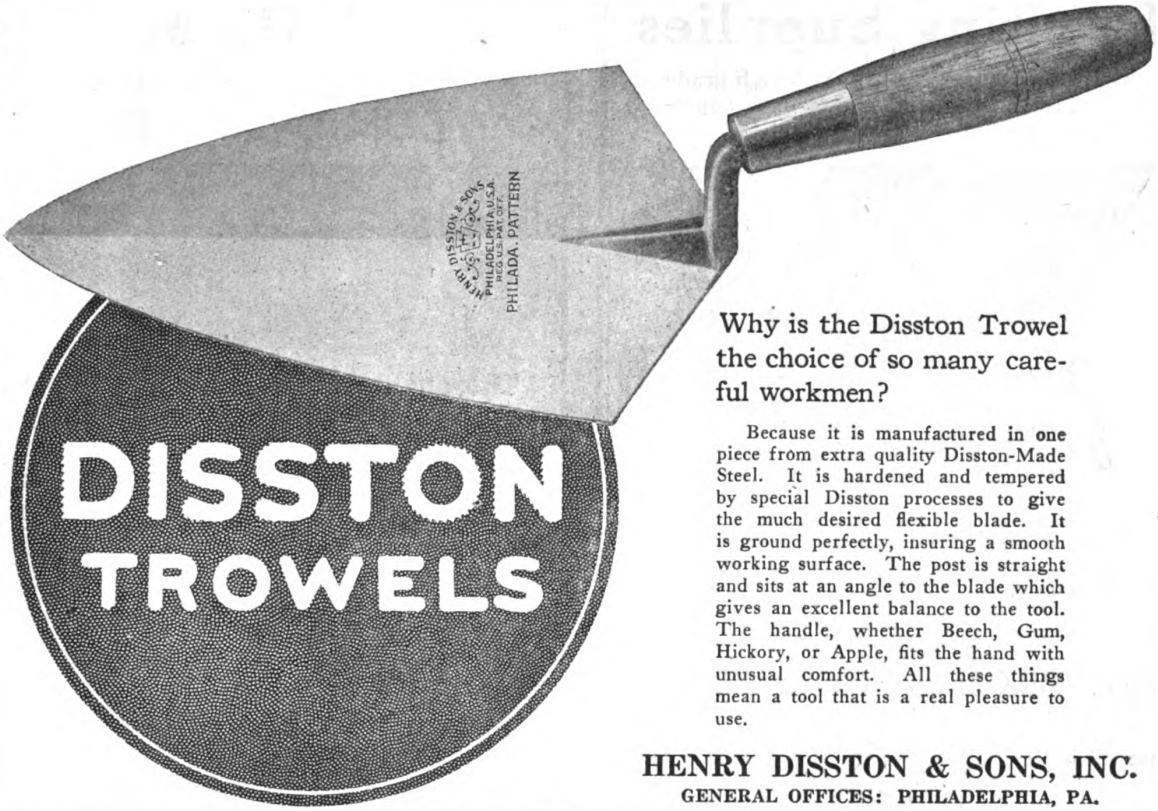

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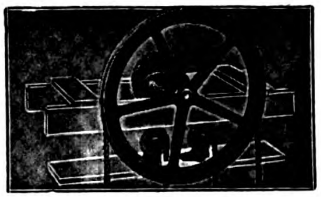

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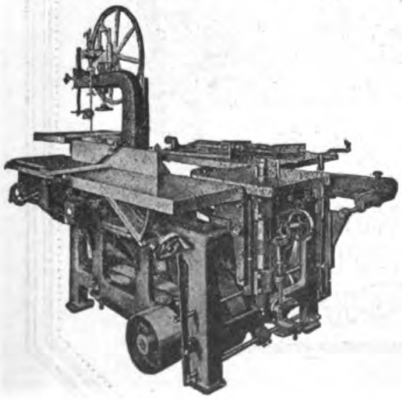

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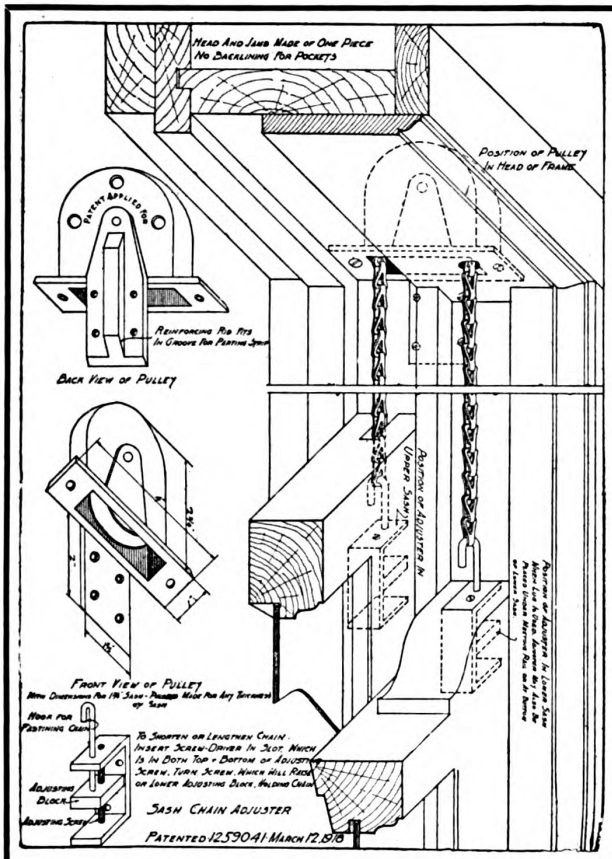

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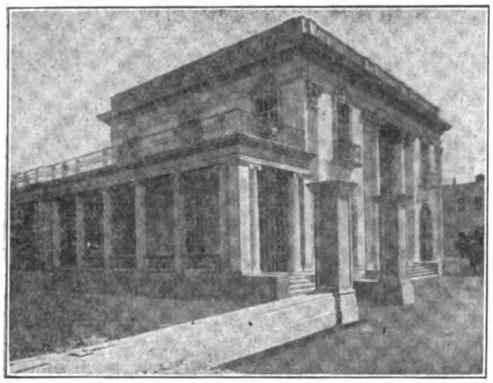

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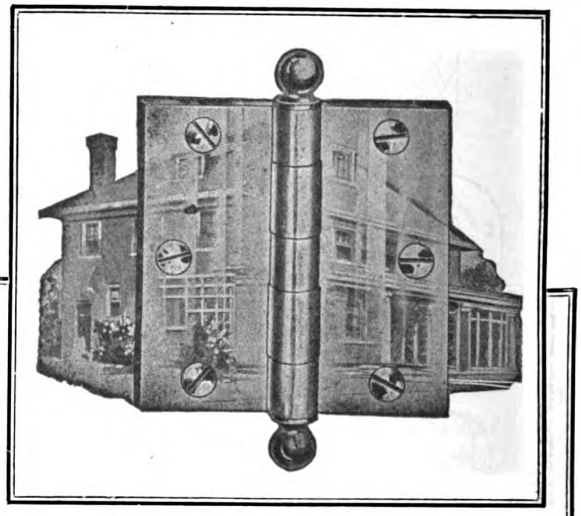

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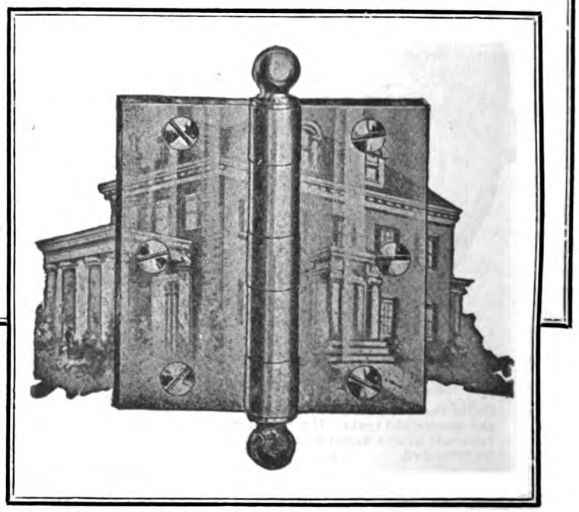

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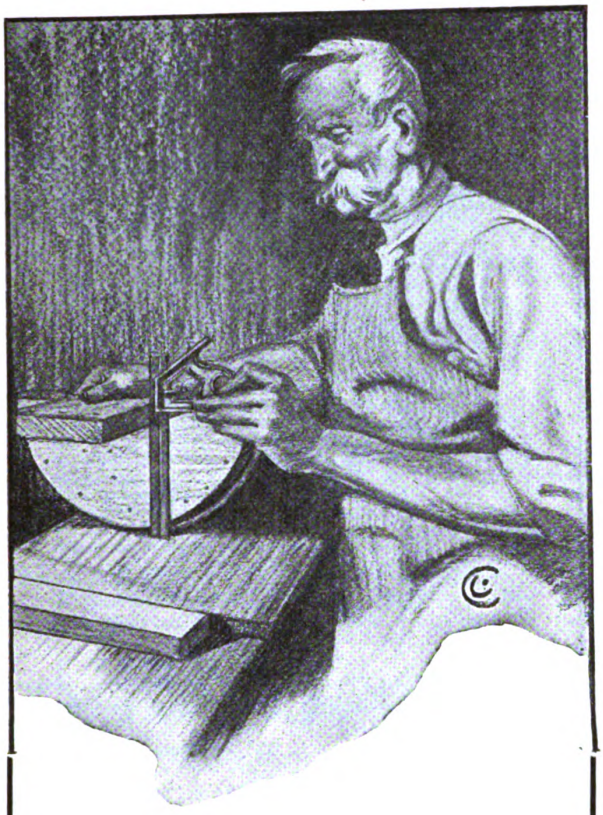

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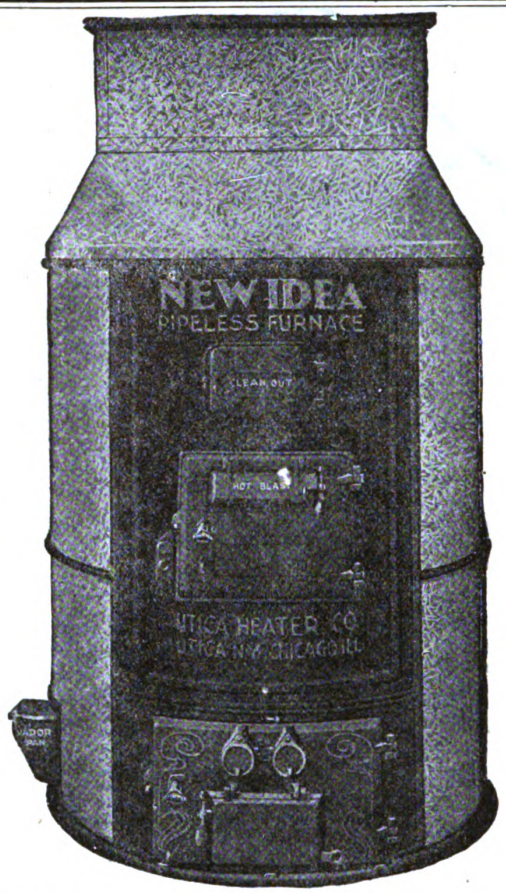

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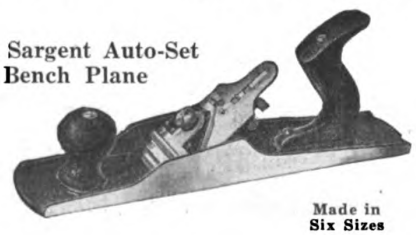

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State of New York }
County of New York } ss.:

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Edwin J. Rosencrans, who, having been duly sworn according to law, deposes and says that he is the President of the Architectural and Building Press, Inc., publishers of BUILDING AGE, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication, for the date shown in the above caption, required by Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editors, managing editor and business manager are:

Publisher—The Architectural and Building Press, Inc., 243 West 39th Street, New York City.

Editors—Edward F. Hammel, Wm. H. Crocker, E. H. Ries, 243 West 39th Street, New York, N. Y.

Managing Editor—Edward F. Hammel, 243 West 39th Street, New York, N. Y.

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E. J. ROSENCRANS, President.

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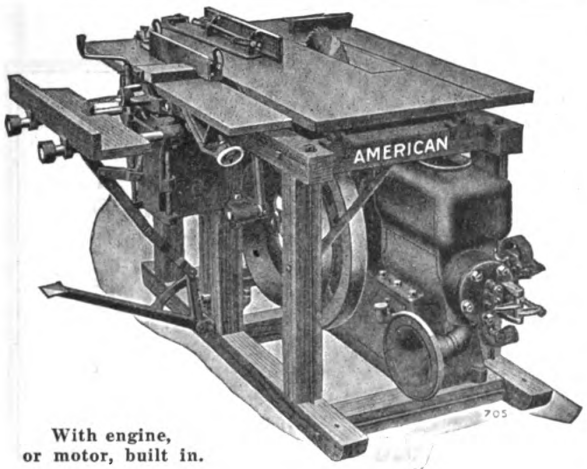

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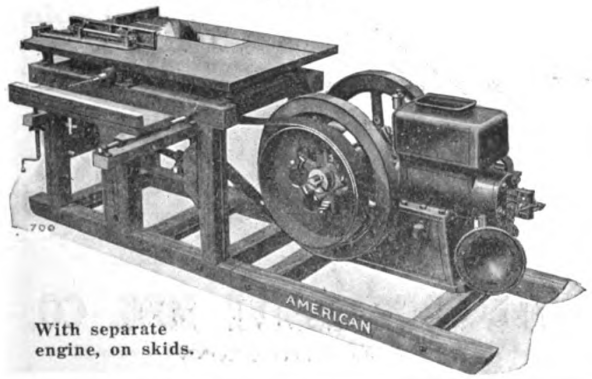

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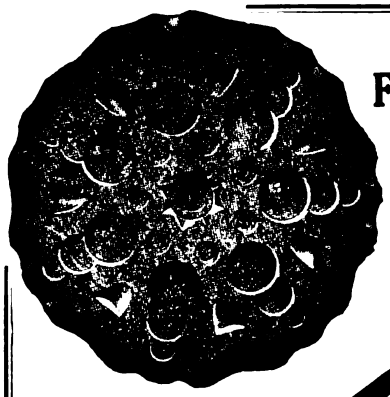

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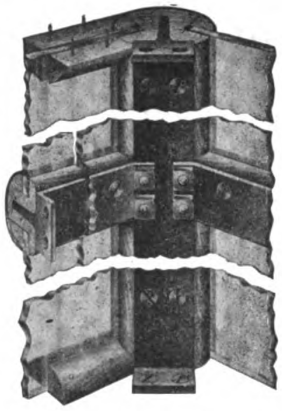

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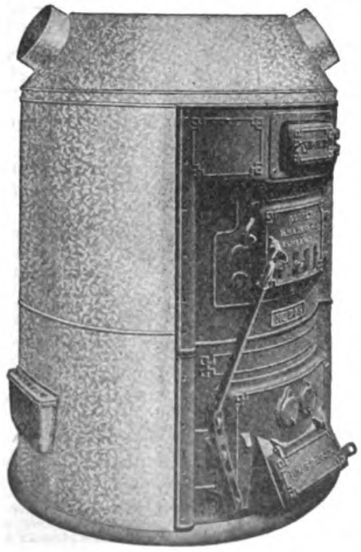

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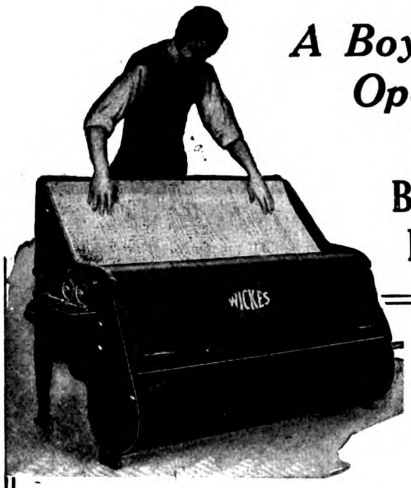

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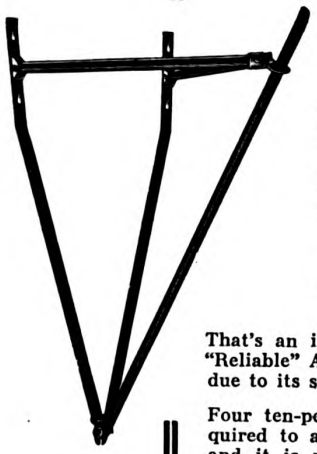

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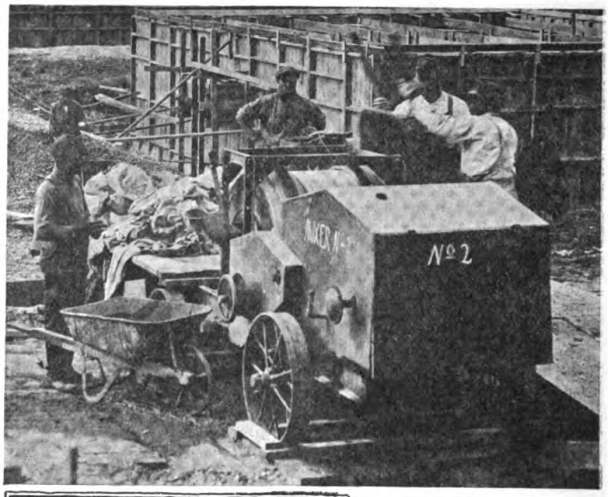

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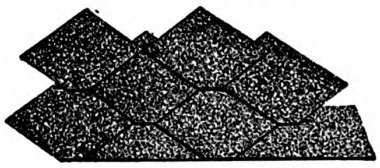

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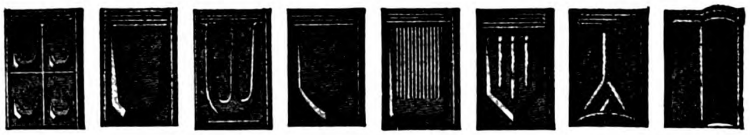

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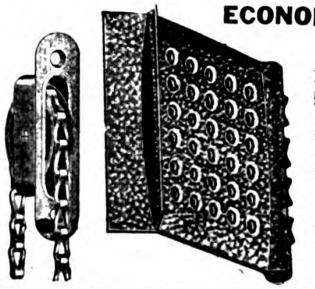

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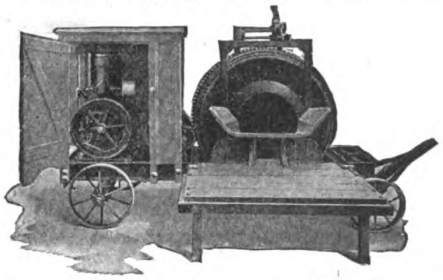
"THE STANDARD"

Low Charging Concrete Mixers



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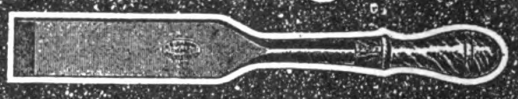

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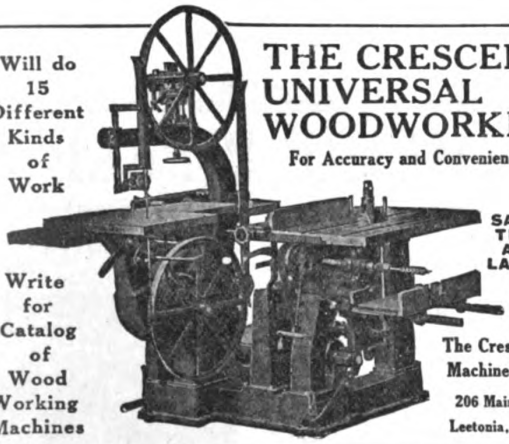

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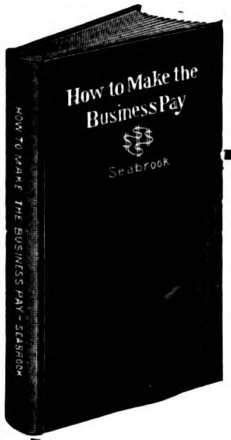

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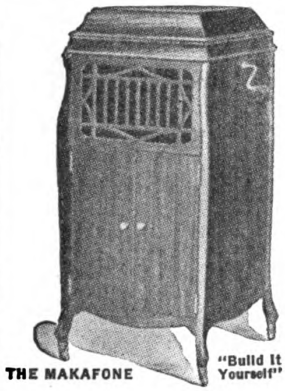

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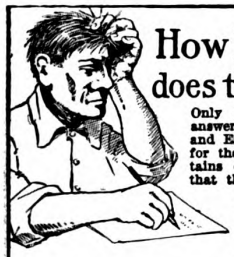

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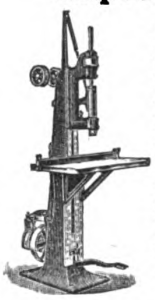

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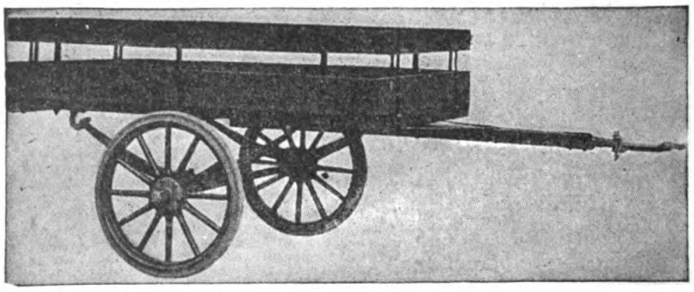

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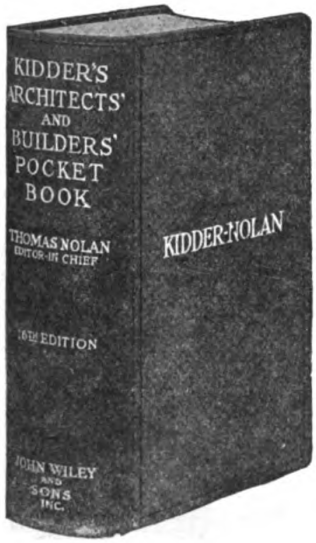

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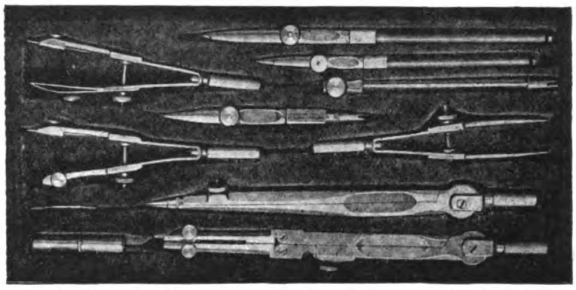

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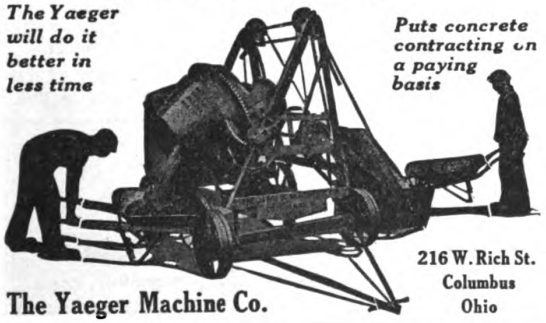

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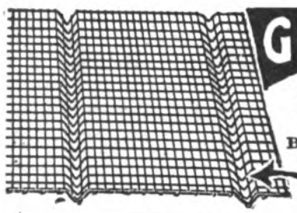

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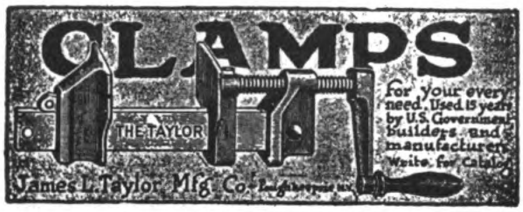

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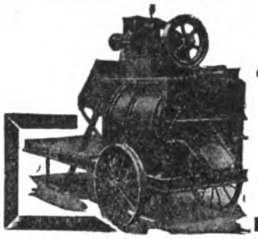

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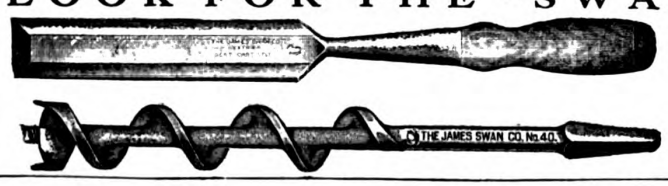

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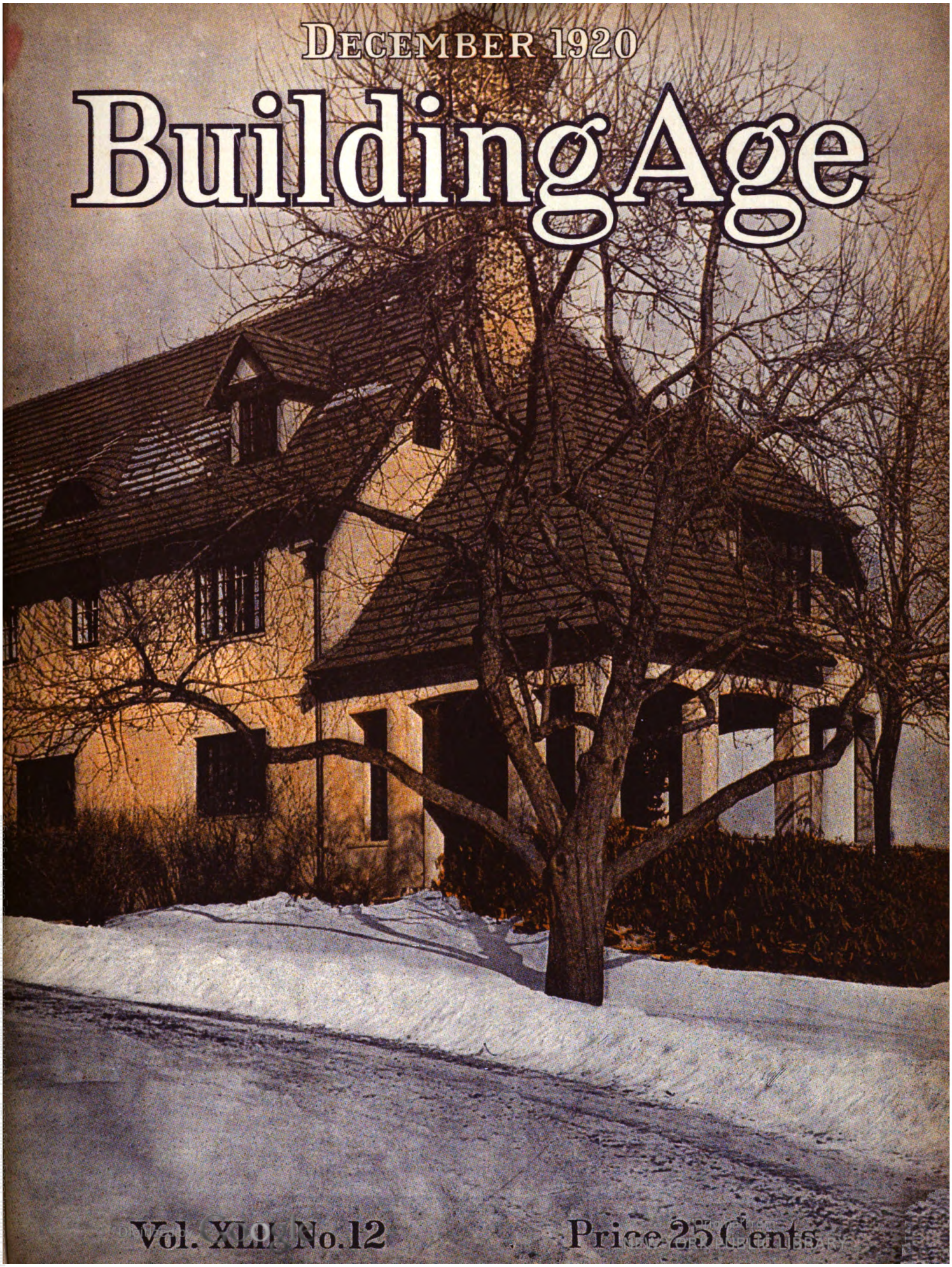

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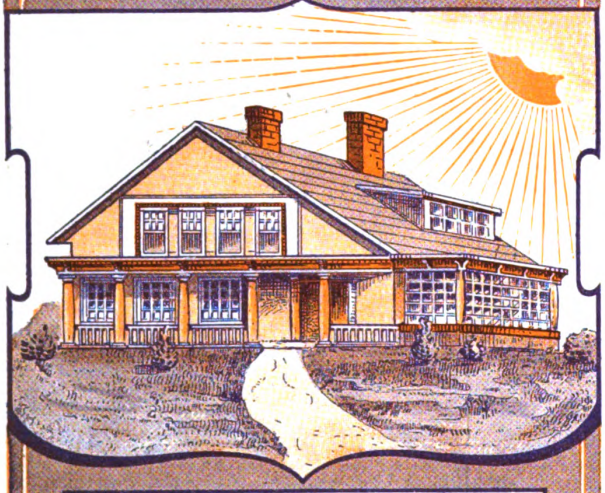

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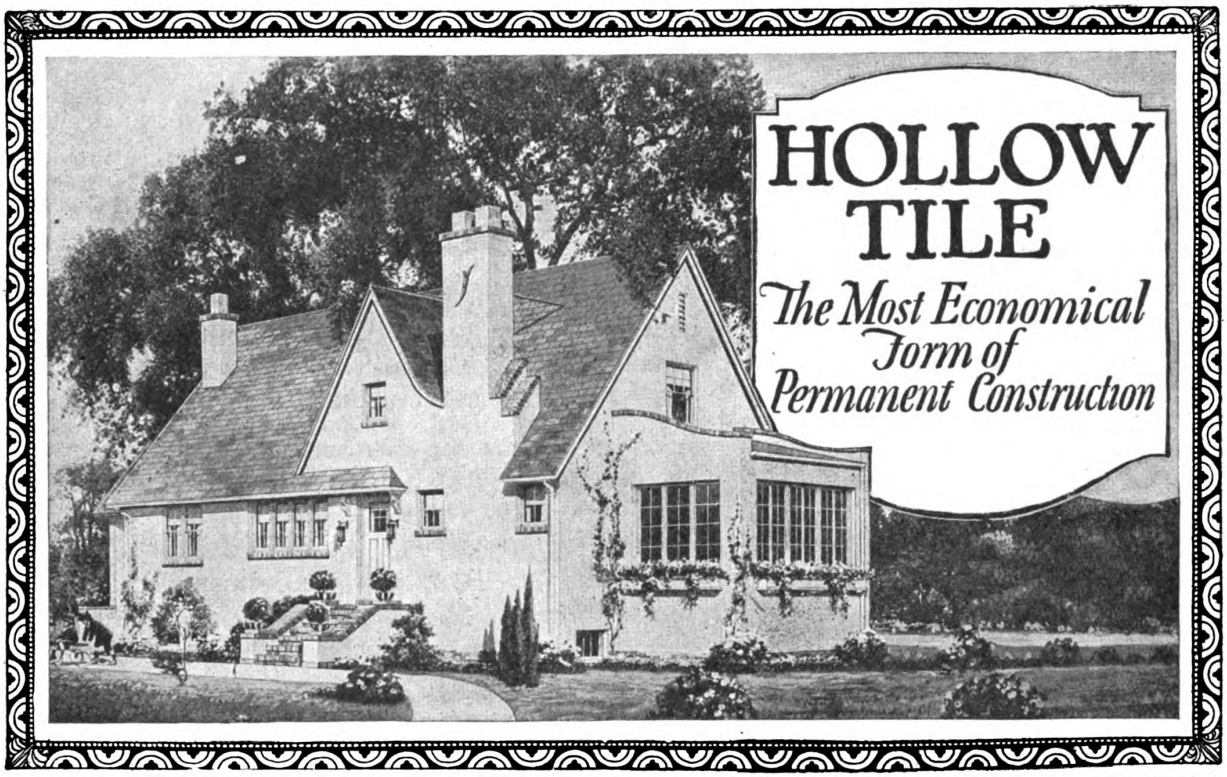

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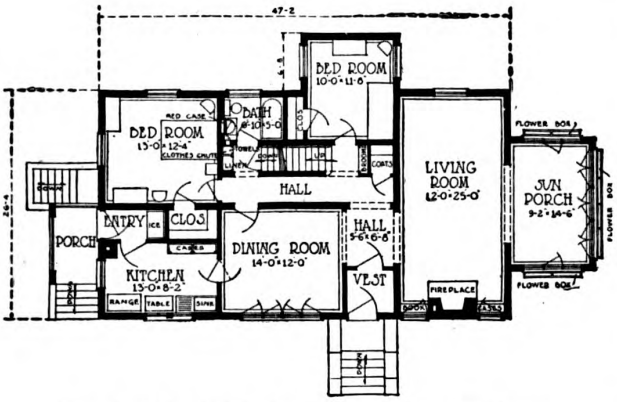

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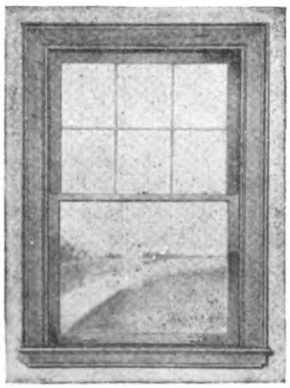

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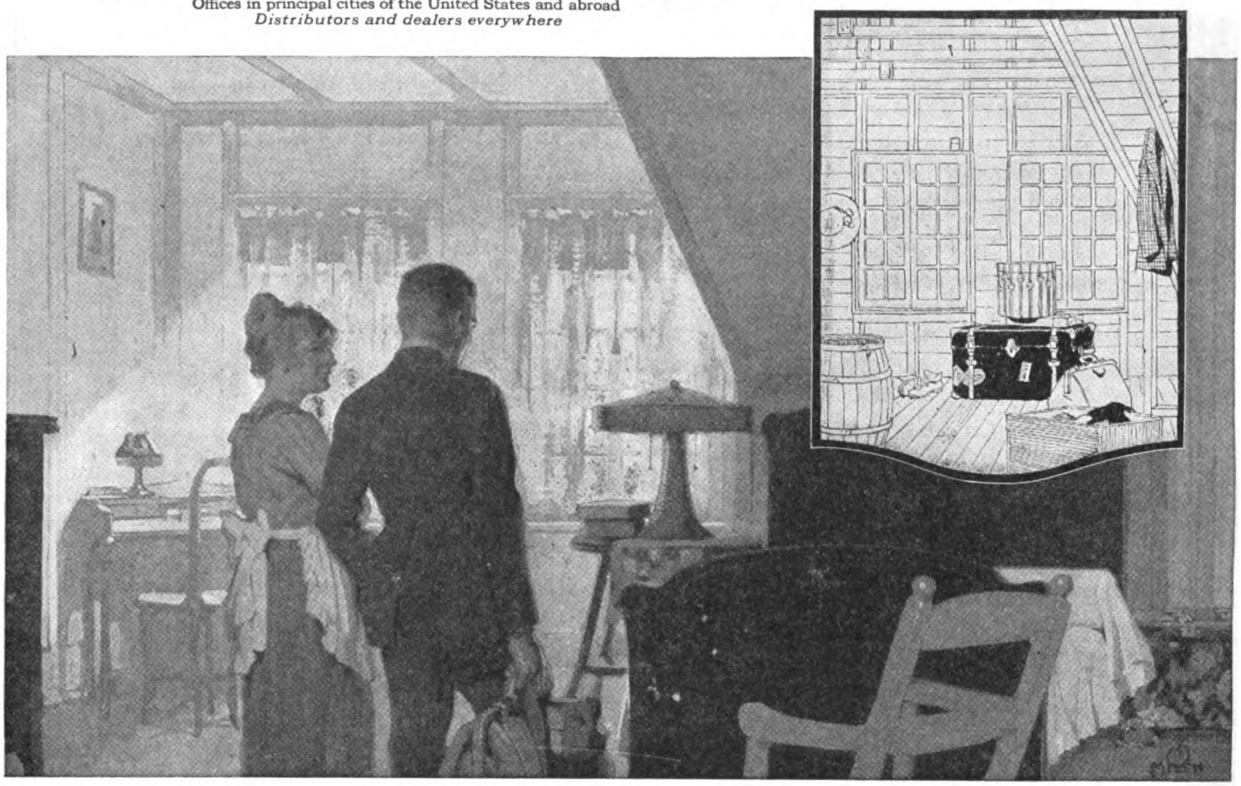

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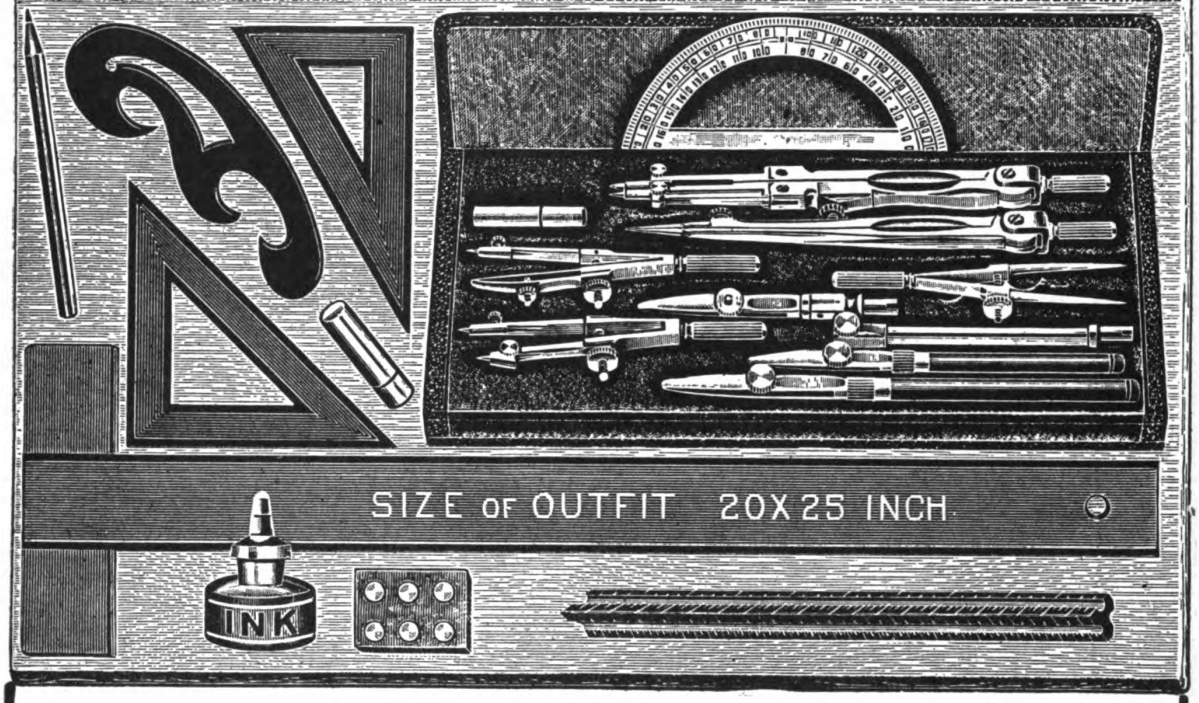

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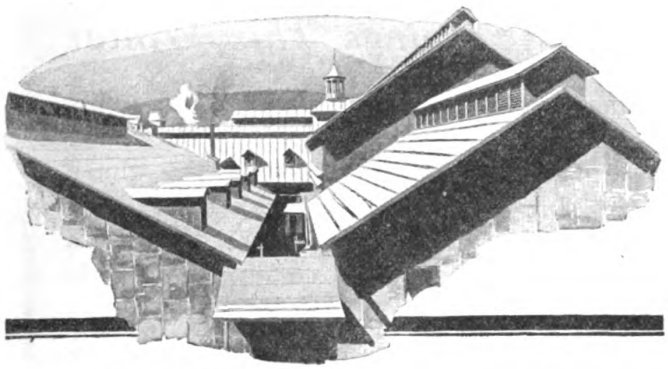

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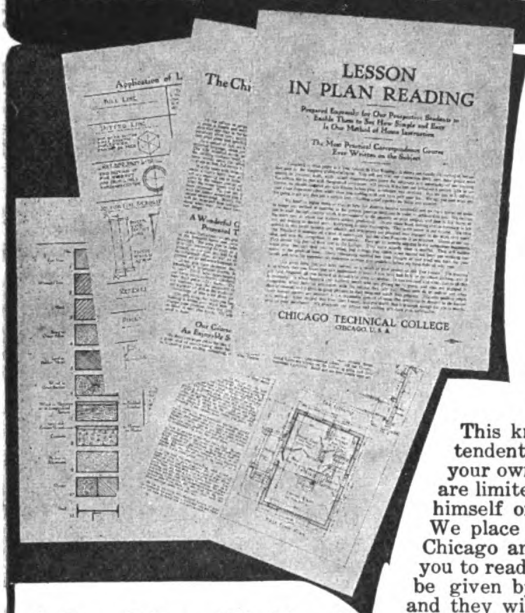

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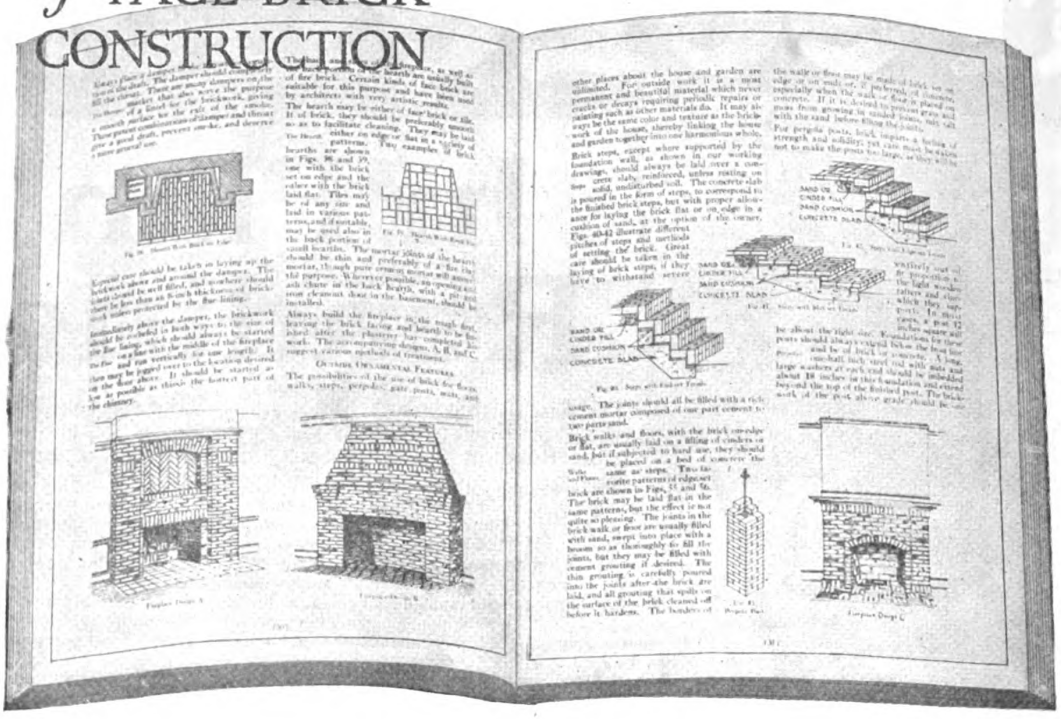

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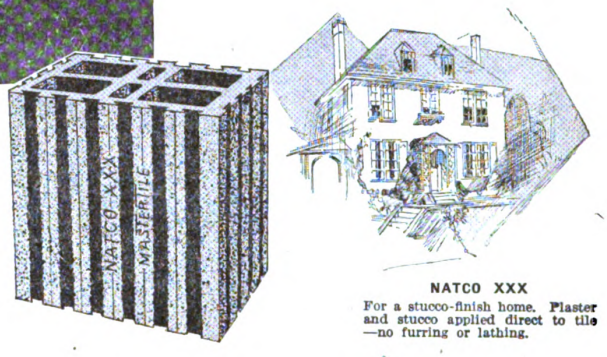

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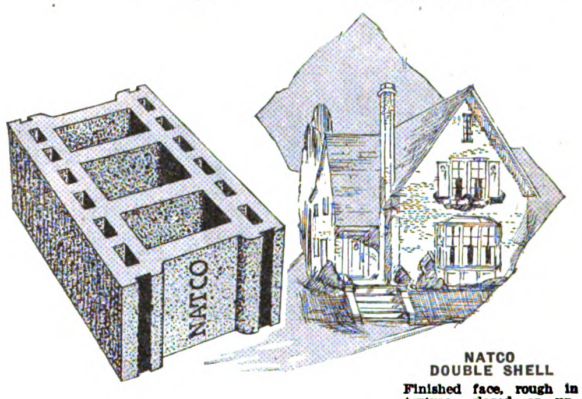

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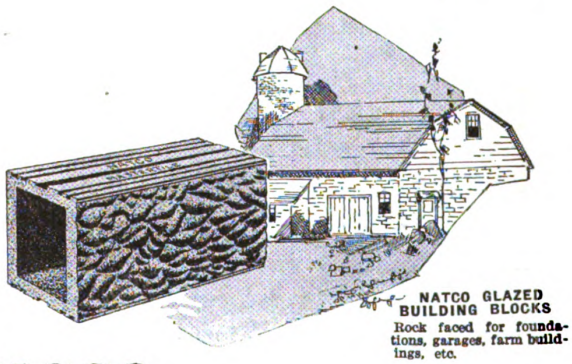

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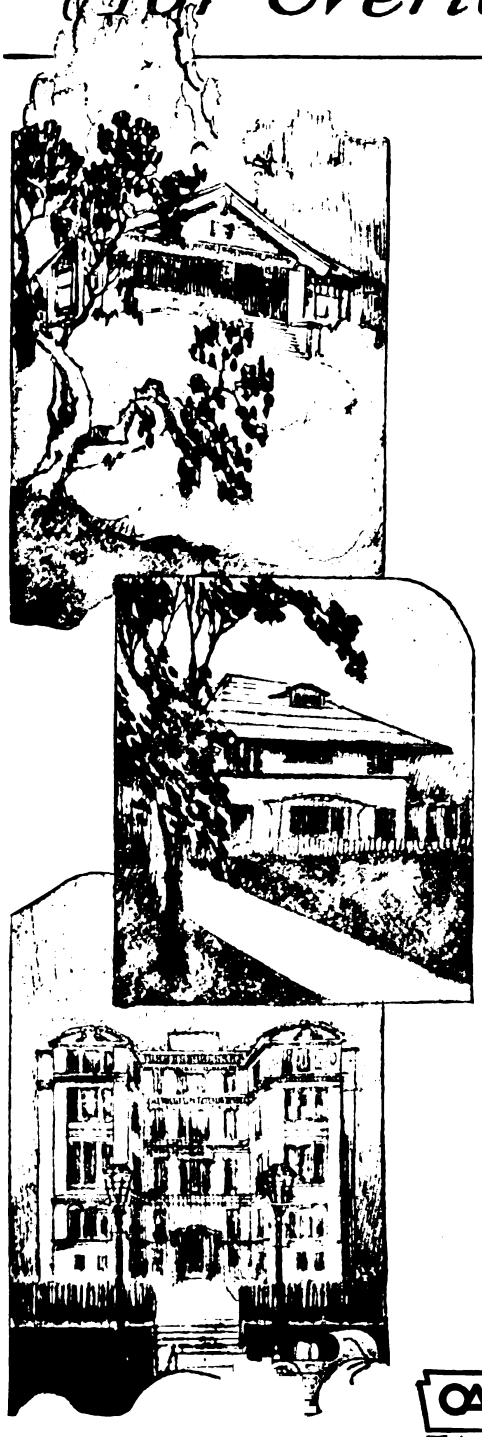

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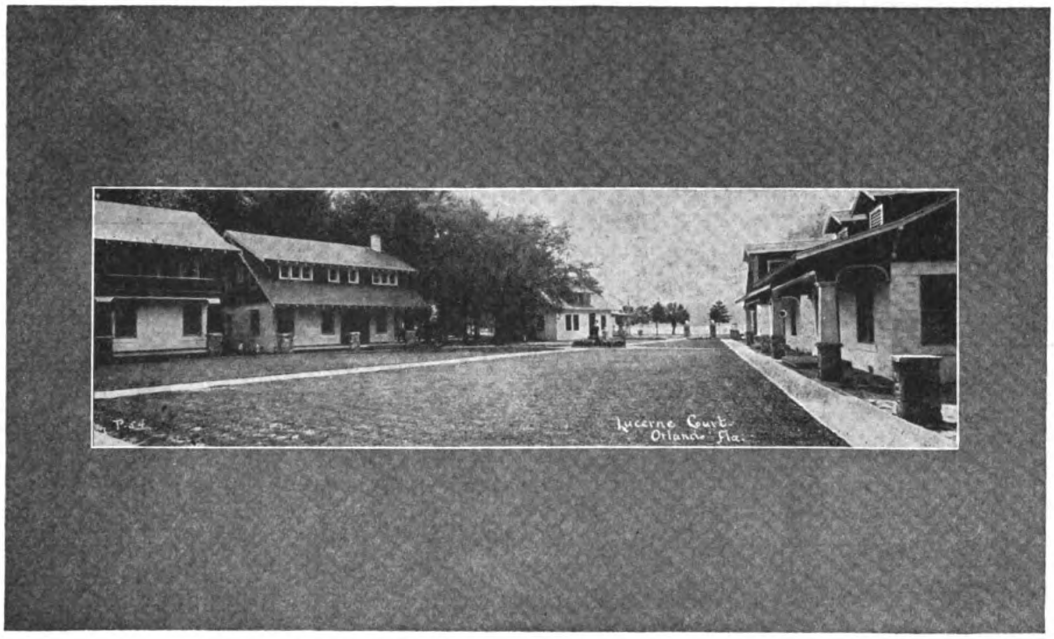

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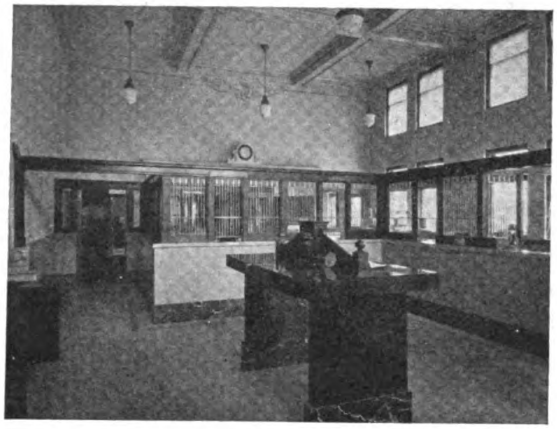
BUILDING AGE

NEW YORK, DECEMBER, 1920

Planning the Modern Bank Building

THE prosperity of the country may be accurately judged by the condition of its banks. The public impression of the standing of any individual bank is formed largely by the nature of the bank structure. Banking men are familiar with this fact, and the psychological effect produced by the physical structure, is, to some extent at least, responsible for the excellence of the design and construction of many of our bank buildings. In fact, not only an opinion as to the condition of the bank alone, but often one of the entire community is formed from the character of the bank building.

Banks must have money to stay in business. Persons in the community in which a bank is located must therefore be induced to deposit their money therein. Different persons can be appealed to in different ways. The hard-headed business man may be more interested in the bank's financial statement than he is in the beauty of its structure, but yet, if he finds the financial statement entirely satisfactory, and the bank remains in quarters far from modern or attractive, doubts are bound to arise in his mind as to why an institution showing such an excellent financial condition should remain in such a building. But there are individuals, and their name is legion, who take an individual pride in *their* bank. The fact that the checks they write bear the name of the "finest bank in town" or perhaps in the state, engenders a feeling of gratification. Then, again, one likes to stroll in the building in which he banks, transact such business as may be necessary, admire the architecture and furnishing of the building, which somehow imparts a sense of security to those who do come into contact with it, and depart, knowing that those who see him so doing will instinctively feel that his account must be O. K.



Banking Room, Security Bank, Tyndall, S. Dakota



Security Bank, Tyndall, S. Dakota
Designed and Constructed by A. Moorman & Co.

Considering these things, a large amount of responsibility must rest upon those who are retained to design and construct such buildings. Several bank buildings presented in this and previous issues have been designed and constructed by A. Moorman and Company, of St. Paul, and it might here be pertinent to say something of this firm, which has made a specialty of bank buildings.

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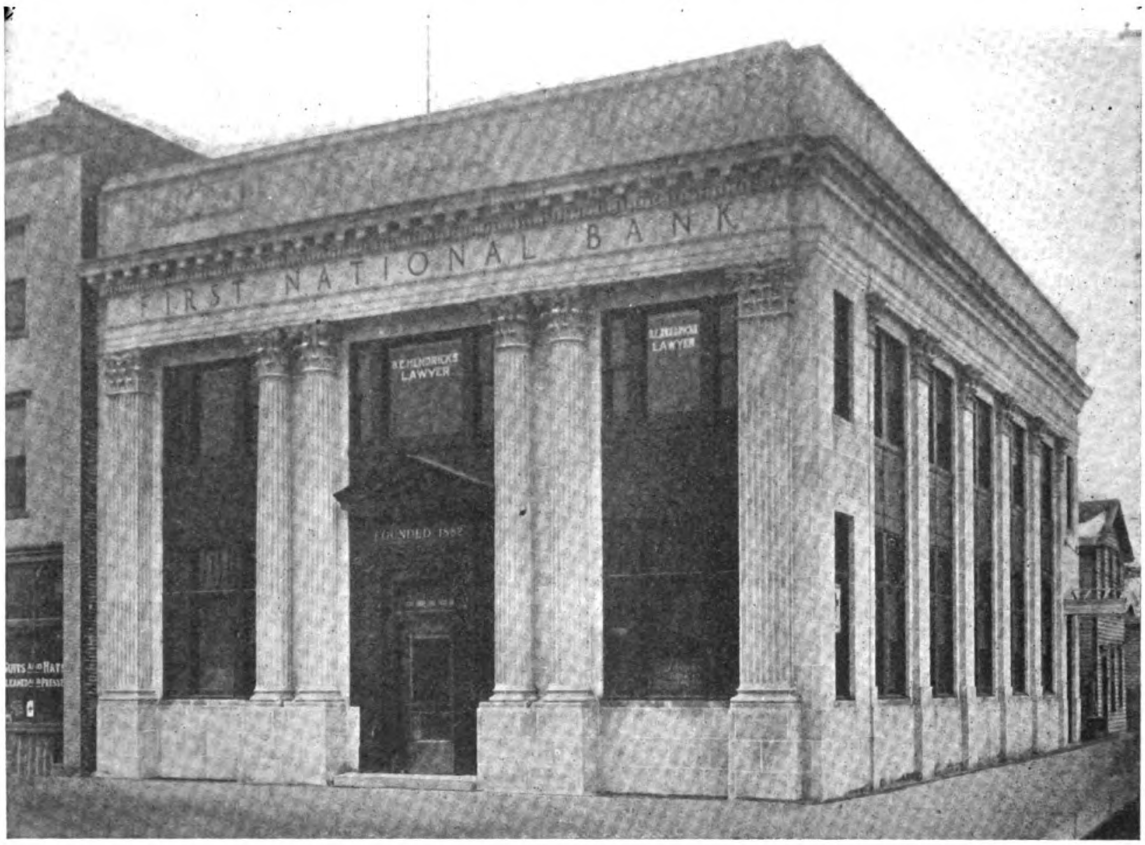
The present organization had its beginning many years ago in a small cabinet shop turning out bank fixtures. But Mr. Moorman, the proprietor of that shop, was not satisfied to limit his efforts to this work alone. He had a broad vision. He hitched his wagon to a star and, so it seems to us, he has made good progress to date.

Many a reader of BUILDING AGE probably has a shop as extensive as that just mentioned. What is needed to reach out to larger things is a vision backed by the ability to work hard, surmount obstacles, refuse to be discouraged, practice the Golden Rule, for such a business must build a reputation along with its buildings, and keep everlastingly at it, and not to try to be a jack of all trades. No one but genius can master a dozen arts and sciences.

In the case in point Mr. Moorman conceived the idea that the coming age of keen competition would be an age of specialization. With this steadfastly in mind, turning naturally to bank buildings, he slowly and painstakingly built up around himself an organization of younger men, full of the zest of life and the ability to do, until today A. Moorman & Company's activities cover most of the central and western states and the former cabinet shop has, although tripled in size, become but a small portion of the bank building organization.

During the slow but constant growth of the company, so states its head, one thing has been kept continually before every department—"build honestly and well, for future reputation is more precious than present profits—and with this in mind we have built up a reputation for honesty and integrity which we cherish very highly. We sincerely feel that it is our greatest single asset."

This firm maintains an architectural department composed of men who, having a knowledge of the proper operation of each particular bank, gained through experience in the design of many banks, are familiar with all those many conveniences that can be incorporated into a banking structure; and of the proper arrangement of the building so that it will best



FIRST NATIONAL BANK, WAHOO, NEB.
Designed and Constructed by A. Moorman & Co.

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serve the public, and thus serve the banker. Naturally the extensive work of this firm has given its staff a practical knowledge of costs.

The planning of a harmonious interior and exterior of a banking structure, requires careful study. Not only must a pleasing appearance be attained, and one that will inspire confidence, but a building which efficiently fulfills its purpose is necessary. It is not alone an artistic, but a utilitarian structure as well, which must be produced. For instance, take one factor in banking alone—the woman depositor.

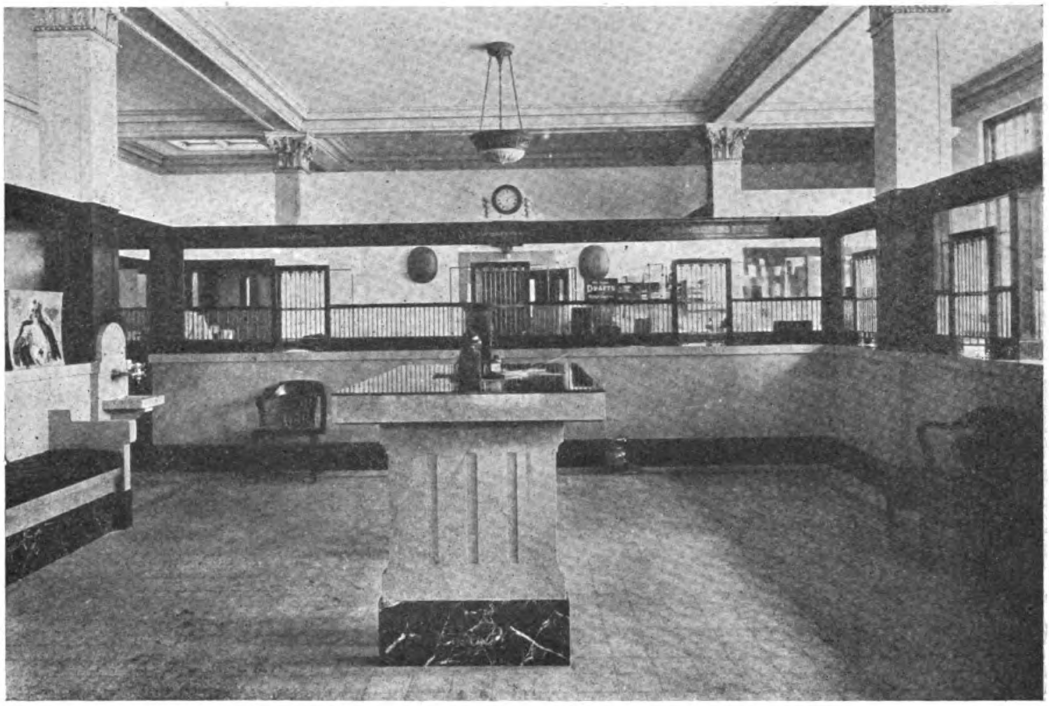
Women are rapidly becoming accustomed to their new freedom. One of the evidences of the broadening of their interests is particularly noticed in the banking world.

The increasing number of accounts opened by women, both in the savings and checking departments, has been a matter of wide comment by bankers all over the United States. It is this movement that makes the woman a factor in bank building and planning, declares H. T. Underwood, president of the Underwood Contracting Corporation of New Orleans, another firm of specialists in bank construction and equipment.

The bank officer who desires to make his institution of real value to the community and who seeks to promote the efficiency of his organization, increase the facilities for serving his customers and gain in prestige in providing new quarters for the bank, will fail to reap the maximum results of this important step if he does not give adequate space and thought to the part that women play in modern banking.

The so-called "stocking room" which was the first concession of our bankers to the interests of their women depositors called forth much humorous comment. Conservative bankers, fearing ridicule, were reluctant to add this "room of mystery" to their institution, and the very women whose need for such service called for this department hesitated to avail themselves of its facilities for privacy.

But the real need for a department of service for women was greater than the temporary attention called to this innovation and gradually the movement spread until today the bank which does not provide special facilities of some kind for its women customers has just cause for hesitating to apply the term "modern" to its service.



FIRST NATIONAL BANK, WAHOO, NEB.

The interior is arranged with a view to the utilization of every foot of space consistent with comfort and convenience. The materials are imported and domestic marbles, combined with quarter-sawed oak

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The crude "stocking room," often no more than a curtained space in one corner of the bank lobby, has grown into a well-furnished room, sometimes a suite, many times with a maid and a woman with title of assistant cashier assigned to the duties of advising women on banking affairs. Telephones, desks, tasteful stationery and writing materials are provided. Easy chairs, and charming draperies form a part of the furnishings. So, instead of hesitating to become conspicuous in a busy bank, the moden woman finds that these facilities dignify her and form an expression of a recognition of her growing importance in banking.



Jackson National Bank, Jackson, Minn.
Designed and Constructed by A. Moorman & Co.

In the modern bank building, consideration of the woman should enter even before plans are drawn.

Beauty in architecture makes a conscious appeal to women. To men the appeal is more unconscious, more in the atmosphere that is created than in the thing itself.

The bank structure, the interior decorations and furnishings come in for a much more critical examination by the woman depositor, and on her verdict rests the whole appeal of the bank to her particular needs. In the design, construction and furnishing of new banks adequate attention should be given to the beauty of their quarters as well as in the matter of providing facilities which promote comfort and efficiency for all its patrons.

That there is a real dollars and cents return from this policy has been shown, by innumerable financial institutions, both in large centers and the smaller towns.

Here is an opportunity for many builders, and a suggestion as well. Specialize, learn to do one thing better than any one else in your community—pick out one nail and keep pounding it, and you *will* arrive. If you are steering in the right direction, that



Jenkintown National Bank, Jenkintown, Pa.
Heacock & Hokanson, Architects

arrival will be termed "success" by your neighbors, but *you* will know that it was the result of hard work plus intelligent direction backed by a determination to win out.

(See page 46 for additional illustrations.)

Laying a Brick

Seventy feet or more above the little knot of watchers he stood, trowel in hand, unaware of our focussed glance.

Presently a happy thought seized him, and, stooping carefully lest a bone should break or a button yield, he picked up a brick and looked it well over, turning it about in his hand. Then reverently he laid it down on the brick pier that was level with his shoulders.

Gradually it dawned upon him that something was wrong. Removing the brick he bent over it and appeared to be arguing it out of some fit of cussedness. After allowing himself and the brick time to cool down he tried again, and seemed a little more satisfied. By slow degrees, as if learning drill "by numbers," he spread a layer of mortar, and once more adjusted the brick. A few taps and squints and twists of the head, and a contented and proud look, as of one who would say, "I could cackle if I liked," and the bricklayer took a well-earned "straight back."

—London *Daily Chronicle.*

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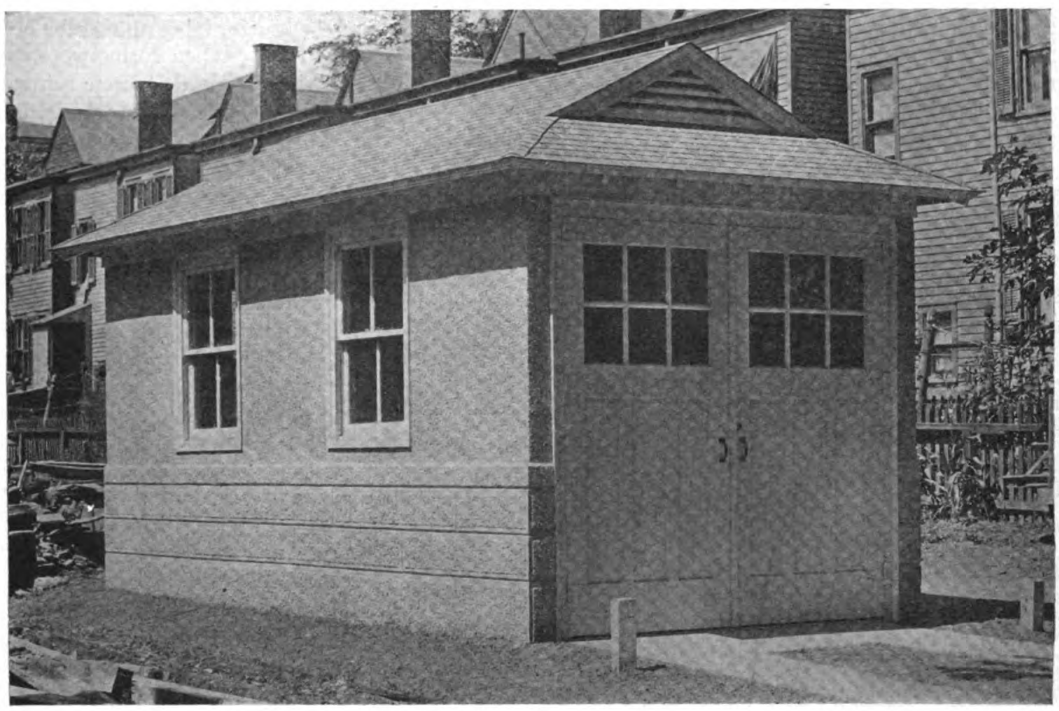

The Completed Garage

A New System of Concrete Construction Making Use of Standard Wood Forms

THE use of concrete in industrial construction has grown by leaps and bounds. In the field of the small house, however, progress has been more slow. Of late years many types of standardized forms have been developed. These tend to lower the cost of such buildings for the reason that they may be used over and over. Some stimulus was given to the efforts of those advocating concrete as a suitable material for small house construction by the National Conference on Concrete House Construction, held last February. It is expected that a second conference will be held early next year.

In the present article a type of standardized form as developed by Samuel S. Colt, an architect, will be described and illustrated. Mr. Colt has spent over twenty-five years in designing and building structures of various types, as well as in the development of real estate. According to his statement, he has designed and built over one thousand buildings, the majority of which are of the type known as the small house. Out of his wide experience, we should, therefore, expect the method of construction developed by him to be of a practical nature. Regarding this he states:

"Like many others I went into the patent office and have had many important features of my system patented, such as forms, methods of erection of same, window frames, method of finishing, etc. The forms are of wood, inexpensively and permanently made non-distortable. They may be used over a great number of times. Here lies the basic principle of low cost concrete construction. Some of my form sections have been used fully twenty-five times and are practically as good as new. These forms are easily

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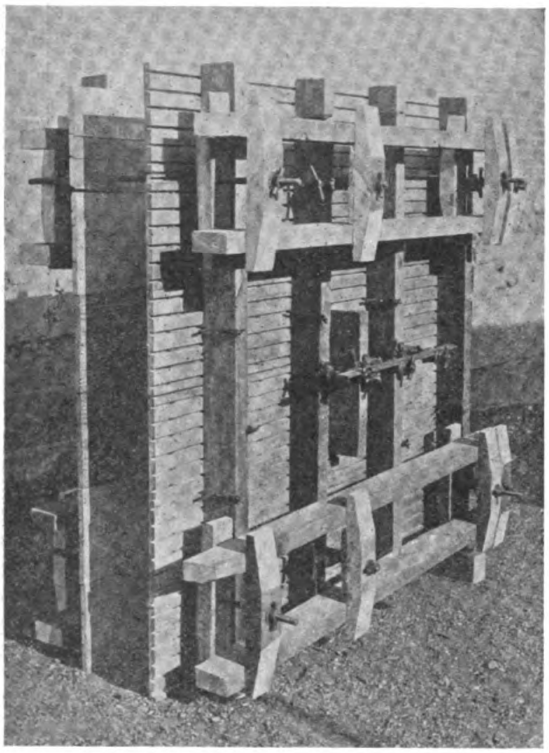
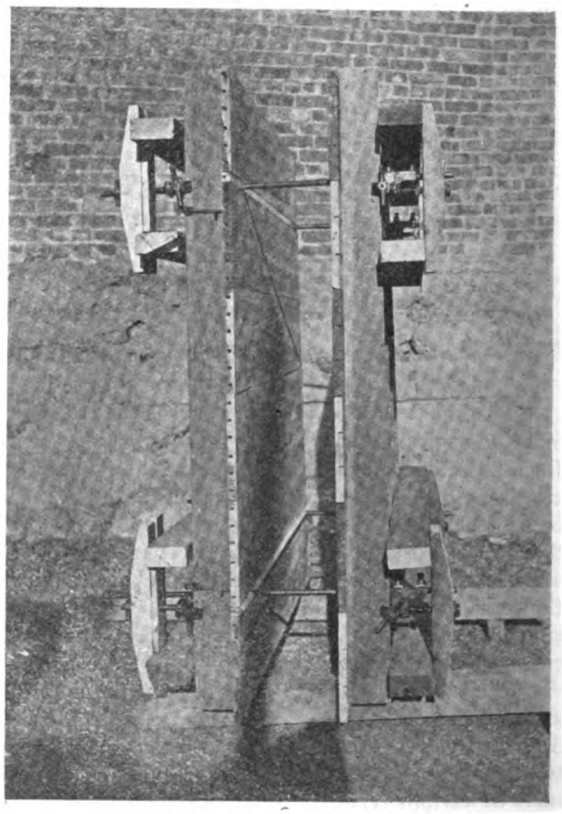
erected without the use of nail or wood screws, the two opposite forms are held in position by a special arrangement and are so made that the forms can be easily aligned. All special parts pertaining to the forms are inexpensive."



View showing section of standard forms assembled

One of the illustrations shows an attractive garage built by this system. This building is 10 ft. x 20 ft. outside dimensions. The complete forms were set, and concrete poured without stopping until the entire concrete portion of the building was poured. The mixture used was 1 part Portland cement, 2½ parts sharp sand, and four parts ¾ in. cracked stone, as required by the local building code. The foundation walls extend 3 ft. below grade and are 12 in. thick, mixed in the proportions of 1:3:5. All concrete was machine mixed. Above grade the wall is 5 in. thick to a height of approximately 3 ft., and above this level is 4 in. thick. All vertical walls are reinforced with ¼ in. square reinforcing rods placed not over 20 in. on centers, both horizontal and vertical. The reinforcement is located in the center of wall, and was doubled at the plate line. The facia directly below the projecting rafters is of wood ⅞ in. thick, with cross battens on the side next to concrete. Wood screws placed in the battens are firmly bedded in the concrete. This facia forms a part of the cornice and was set on top of the last form board, thereby becoming a part of the forms. When forms were moved this piece remained in place, the concrete being flush with its top. A 1 x 5 in. spruce piece was set on top of the wall, the outer edge of which was kept flush with the outside of facia board and nailed to its upper edge, thereby forming a nailing plate for the plain lug rafters. The space between rafter lugs was filled in with a moulding wide enough to cover the opening between facia and roof boards and properly nailed to both. The door jambs are of 4 in. x 4 in. stock, having lag screws projecting on the side adjacent to the concrete, the screws being bedded in same. A back moulding is nailed on the outer edge of jambs to receive the concrete base and dash finish, and a back moulding is also placed on the window casings to receive the dash finish. The window frames are of special construction—note the projection to sill, no cutting of forms being necessary to get this result. One week after pouring the forms were removed. The walls were well formed or moulded, as can be seen in one of the illustrations, and could have been left without further finish, had this been desired. Since this garage was built near the street line, it attracted a great deal of attention, and was given a fin-



End view of assembled forms

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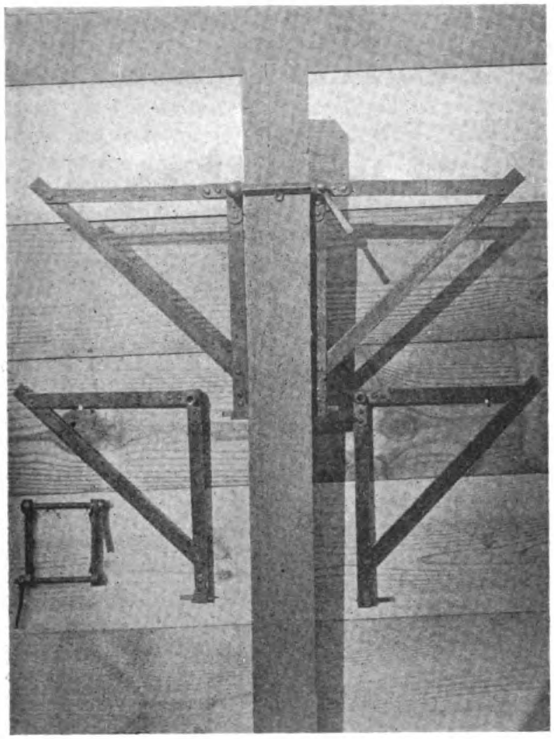
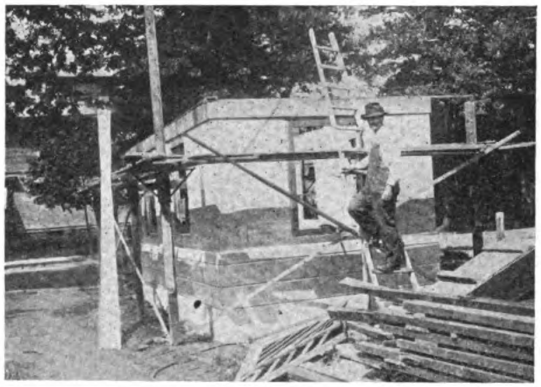


"Close-up" of scaffold brackets, both in position and knocked down

ishing coat. The roof is of frame construction, sheathed and covered with red asphalt strip shingles, with a "Boston" ridge and hips of same. The exterior finish of the concrete walls above the base is a medium heavy dash or stipple finish. The base, including depressions forming the blocks, was given a very heavy dash or stipple. The dash coat was composed of white cement and yellow sand, mixed half and half. When the dash was sufficiently hard (four days after application) it was ground from the joints or depressions, after which a 1 in. margin was formed around the edges of the block formation by grinding away the dash coat to the cement surface. Because of the dash being heavy on the face of blocks, after the margins were ground away, the remaining dash stood out in bold relief, presenting an artistic appearance. The result thus attained proved inexpensive, since all grinding was completed by one man in one-half day. Mr. Colt states that the dash grinds easily and leaves all corners well formed. A close account was kept in every particular as to labor, materials, cartage, depreciation, etc. It was found that the actual cost was a trifle less than good wood construction—studding, sheathing and wood over sheathing. Windows are provided with a plain wood trim on the interior. No ceiling was provided. All woodwork is painted, while walls, from window sills to plate, were given a coat of white cement wash, and from window sill level to cement floor they were given a gray cement wash, thus giving the interior of walls a wainscotted effect.



Concrete walls completed and forms removed. In many cases walls would be left as shown. In this instance they were given a dash finish. Note use of scaffold brackets

In figuring the cost of any concrete structure in the construction of which standard forms are to be used, a certain proportion of the initial cost of the forms must be charged to each job. What this should be each contractor must determine for himself, since it will depend on his peculiar conditions. He must take into account the probable number of times such forms will be used in a year, the cost of repairs, if any, length of service they will give, etc.

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Designing the Reinforced Concrete T-Beam

By E. A. Kunz, Architect

IN the following analysis we will attempt to criticize the reinforced concrete T-beam with a view to laying down some recommendations which it is hoped will lead to safer if not more economical design.

The majority of tests on T-beams have been confined to the single span, freely supported at the ends, and the results of such tests agree quite closely with calculated values. However, very little practical information can be gained from these results, since a simple beam of this type is rather the exception than the rule in ordinary building construction. Tests on the continuous and restrained beam generally show considerable difference between actual performance and calculated values, but whereas this difference is on the safe side, it nevertheless indicates a lack of economy in design.

Not so long ago it was the practice of some engineers to design their continuous beams for a moment of $\frac{WL}{8}$ at the center, assuming thereby that the added stiffness would reduce the bending moment at the support, only enough steel being introduced at the support "to tie the beams together." This can easily be proved to be not only a dangerous but a highly uneconomical design. In all continuous beams a definite moment exists at the supports and enough section must be provided to take up the stresses developed.

It is very commonly recommended that the unit compressive stress in the concrete at the support end of a continuous beam be increased to say 750 pounds per square inch when the normal value is 600, with the explanation that the moment changes very rapidly at this point and only a small section of the beam is affected. It is somewhat doubtful whether this assumption is warranted. Since the shearing value of the concrete at this point is somewhat disturbed due to the tension cracks which must necessarily occur to bring the steel into full action, and the proper inspection of the installation of the concrete in this location is likely to be overlooked, it would seem that a lower rather than a higher than normal unit stress should be adopted. With a view, however, to the rapid growth of our knowledge in the mixing and placing of concrete and considering the fact that the usual maximum safe stress allowed in the steel is as much as one-half the elastic limit whereas the stress in the concrete is based on a factor of safety of 4 or 5, it would seem that the time is not far off when the allowable safe unit stress in the concrete will be placed at about 700 pounds per sq. inch.

On the basis of quantity of materials, economical design calls for haunched beams. In so designing, the flanges at the center of the beam can more fully

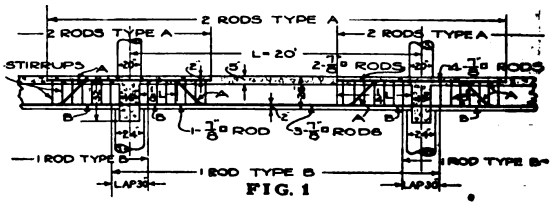

FIG. 1

be brought into action and with the increased depth of beam at the support a more economical section obtains throughout. This type of beam, however, requires more complicated form and rod work and on the whole a beam of constant section throughout the span may very well prove more advantageous. In this case the flange of the T-beam holds very little theoretical importance and in the continuous girder may be almost entirely neglected. Our theoretical section, therefore, is rectangular throughout. If we introduce 1 per cent. of steel in the tension side and 0.5 per cent. in the compression side the compressive stress in the concrete is about 650 pounds per square inch. This condition obtains where we bend up one-half the rods in each span and carry them over the support. One-half of the rods would remain in the bottom and form the 0.5 per cent. of compressive reinforcement at the supports. At the center of the span we would thus have 1 per cent. of steel. Considering the rectangular section throughout, the moment of resistance at the center of the span becomes approximately 100 per cent. of the moment of resistance at the support. That we have approximately 760 pounds per square inch stress in the concrete at the center of the span is of no consequence, since we have the flange to reduce it. We have assumed our steel stress at 16,000 pounds per square inch. It

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will be seen that this stress is somewhat reduced, due to the flange raising the neutral axis.

If we were to introduce more steel than here specified we would increase our concrete stresses at the support, and if we were to reduce the steel we would have a less economical beam throughout. It will be seen that the girder so designed for interior spans would fulfill the moment requirements recommended by the Joint Committee on Concrete and Reinforced Concrete, that is, $\frac{WL}{12}$ at both the support and center ot the beam.

It is somewhat doubtful, by the way, whether these moment recommendations will stand in future practice.

It seems to the writer that for interior spans the moment at the center should be assumed at say 75 per cent. of, or at least somewhat less than the moment at the support. On account of the actual span between columns being less than the theoretical span (center to center of columns), the moment at the ends of the beams and girders framing into interior columns may be taken at $\frac{WL}{12}$. For beams framing into girders, however, the moment at the support should be fixed at $\frac{WL}{10}$, it being assumed that the tortional deflection of the girder will make the actual and theoretical span practically identical.

Were the continuous girder resting on knife edge supports, the moment at the center of an interior span would be approximately $\frac{WL}{12}$ and at the support $\frac{WL}{10}$ for maximum conditions of loading. Were the span framed into inflexible columns it would become a beam with fixed ends, our moment at the center being $\frac{WL}{24}$ and at the support, $\frac{WL}{12}$. Two cases mentioned are extremes. Between them lie the cases where the continuous girder is partially restrained by the columns. In the majority of cases the maximum moment at the center of the span is substantially less than the maximum moment at the support. Add to this the fact that the shear considerations at the center of the beam are of no consequence in complicating the internal stresses at that point and reason would seem to dictate that a reduction of moment in the center as against the moment at the support would be amply warranted.

The design of the outside span should be governed by the special consideration usually existing at that point but the moment at the center of the span framing into columns should not be taken at less than $\frac{WL}{12}$ nor less than $\frac{WL}{10}$ where it frames into a girder. Considering all the points mentioned we may finally make the following recommendations for the beam of constant cross section (the beam without haunches). The bending moment at the support for interior beams framing into girders shall be $\frac{WL}{10}$ and for interior beams and girders framing into columns $\frac{WL}{12}$.

The effective section of the continuous beam and girder shall be rectangular throughout. There shall be 0.75 per cent. of steel at the center of the span, 1 per cent. of steel in tension and 0.25 per cent. in compression, at the support.

By so arranging the steel we will have very closely a compressive stress of 640 pounds in the concrete and a tensile stress of 16,000 pounds in the steel at the center of the beam, and 700 pounds in the concrete and 16,000 pounds in the steel at the support. On the same basis the moment of the resistance at the center of the beam is very closely 75 per cent. of the moment of resistance at the support.

In designing it will only be necessary to calculate the section at the center of the span.

The center moment of interior beams framing into girders is to be calculated for a moment of

$$M=0.75 \times \frac{WL}{10} = \frac{WL}{13.33}.$$

The center moment of beams framing into columns is to be calculated for a moment of

$$M=0.75 \times \frac{WL}{12} = \frac{WL}{16}.$$

By introducing the unit moment of resistance into these equations we have for the effective depth of the beam in the first case $d=\sqrt{\frac{WL}{1400b}}$ and for the second case $d=\sqrt{\frac{WL}{1700b}}$.

The total load applied to a girder may be considered as uniformly distributed.

In the following example (illustrated in Fig. 1, we will design an interior beam framing into girders.

The distance center to center of columns is taken as 20 ft. 0 in. in both directions.

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The beams are spaced 6 ft. 8 in. center to center.

The live load is 200 lbs. per sq. ft.

The slab weighs 60 lbs. per sq. ft.

The stem of beam weighs 300 lbs. per lin. ft.

The total assumed dead and live load on the beam is thus

$W=(260 \times 20 \times 6\,2/3) + (300 \times 20) = 40{,}666$ lbs.

Assuming the width of the beam to be b=12 in. the effective depth becomes

$$d = \sqrt{\frac{40{,}666 \times 20 \times 12}{12 \times 1400}} = 24 \text{ in.}$$

The rod area at the center of the beam is thus $0.0075 \times 24 \times 12 = 2.16$ sq. ins., or three ⅞-in. square rods. Two of these rods are bent up and together with the two bent-up rods from the adjacent span make the required 1 per cent of reinforcement in tension at the support. The remaining rod at the bottom of the beam forms the 0.25 per cent. of compressive reinforcement at the support. The rods in tension at both the center and the support are thus stressed to 16,000 pounds per sq. inch. The compressive stress in the concrete at the support is 700 pounds per sq. inch.

The distance from the face of the girder to the upper bend in the two rods is one-eighth of the span and the distance from the face of the girder to the end of the two rods from the adjacent span is one-quarter of the span. A few stirrups are introduced to take up the excess longitudinal shear.

Building Operations in October

Building operations throughout the United States during October showed little, if any, change over the preceding month. The slump that has marked building during the past month has continued, and while conditions as to labor, transportation and the availability of material might be said to be better, the effect of these conditions has not yet become sufficiently noticeable to show any pronounced improvement.

A comparison of building permits issued during October with September shows they are so nearly even as to not warrant the assumption of any real quickening in building. The average per city for September and October was nearly $200,000 below the average for the eight months preceding during 1920. This, however, is not unusual, the same condition holding true in almost any year, at this period. In spite of these figures, there is an apparent tendency in building circles of a more hopeful view of the future. The general belief appears to be that there is no real monetary advantage in longer postponing essential building.

Indications point to better conditions in the money market and it seems to be assumed that when Congress assembles next month, legislation will be had to materially reduce the factors that now prevent building activity.

In six great sections of the country, the October permits were principally for public works and utilities (New York State and Northern New Jersey, Pittsburgh District, and the Northwest); secondly for residential buildings (New England and the Central West), and one for industrial buildings (the Middle Atlantic States). Expressed in percentages, this means that about 38 per cent. of the total October contracts were for public roads and utilities, 34 per cent. for residential buildings, and 28 per cent. for industrial buildings. This shows an increase in the proportion for public roads and buildings, a decrease for residential building, and a stable condition for industrial buildings.

From statistics gathered from a large number of cities it is seen that the average valuation of permits per city in September was $941,277, as against $1,082,810 for October. The total of permits issued in these cities (200) show an increase in 115 cities, among which are Minneapolis, Hartford, New Orleans, St. Louis, Omaha and Pittsburgh, and a decrease in 85 cities, among which are Boston, San Francisco, New York City, Chicago, Akron and Philadelphia.

The figures for the month are as follows:

	Contracts, Oct., 1920	Contracts, Sept., 1920
Minnesota, North and South Dakota	$8,726,000	$7,126,000
Middle West	50,699,900	53,699,000
Ohio, West Virginia and Western Pennsylvania	36,276,600	41,266,067
Eastern Pennsylvania, South New Jersey, District of Columbia, Delaware and Maryland	14,896,000	11,826,000
New York and Northern New Jersey	49,207,000	59,306,000
New England	17,987,000	25,937,000
Pacific Coast (Los Angeles, San Francisco, Tacoma, Seattle, Portland)	10,462,913	11,402,077
	$188,255,413	$216,562,144

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Fig. 10. Detail of a House at St. Davids, Pa.
D. Knickerbacker Boyd, Architect

The Possibilities of Brick as a Home Building Material

PART IV

By Victor D. Abel

IN no type of building more than a dwelling house is the necessity for close attention and study of detail of so much importance. The greater part of the average person's time is spent there and the house is subjected to critical examination at close range. It is also frequently impossible to see a house in the mass as is the case in a larger building. The detail must, therefore, be carefully studied, that it shall assume its proper relation to the rest of the building in mass, and that it shall also give the necessary interest when one is close to it and has but the one point to look at.

It should not, however, be assumed that the detail must be of one material. Rather it is the combinations of materials and their relation to each other which make for the excellence of the detail. The endeavor here has therefore been to show the complete detail instead of only the brick and its laying, no matter how important a part that may be.

Because of the small size of its units brick has somewhat of an advantage in thus working out these spots of interest and design. Furthermore, it is possible so to vary the detail with brick that, while the wall surface in the mass is unchanged, a close analysis of the wall reveals a difference in laying, bonding or jointing that forms a delightful spot.

The treatment of large wall surfaces is obtained chiefly by the study and disposition of openings and structural effects in combination with the materials used, and, in the case of brick work, with the bond carried throughout the main body of the wall. In the individual feature, whether opening, terrace, coping, panel, fireplace, etc., more liberties can be taken with the way in which the brick may be laid. And it is in these interesting spots, which give color and character, that the architect has the best opportunity of using the brick and the joint to its greatest value.

Again, the brick detail need not necessarily be con-

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fined to a house entirely of brick. Particularly in the informal type of house where a great latitude in design is permissible and a place can be made for it a spot of color with brick may be quite desirable, just



Fig. 1. Detail, Fraternity House, Philadelphia, Pa. Mellor & Meigs, Architects

as in a brick home a plaster panel or perhaps some other material introducing a spot of color or texture lends additional interest to the design.

The very interest of brick is enhanced by the fact that there can be no fixed rule as to its use. The many variations possible by the use of different bonds, joints, etc., is nowhere better illustrated than in the details of entrances to various types of houses shown. Fig. 1, for instance, is a detailed view over the entrance doorway to the fraternity house by Mellor, Meigs and Howe, architects, illustrated also in Part III of this series. The brick, rough in form and texture, is laid in the garden wall bond, with very wide joints, struck off flush with the trowel as the wall is laid. This is an excellent illustration of the results obtainable by attention to detail. In connection with this entrance, note the study in the door itself, the cut stone frame and the iron lamp and then even the strap on the rain conductor has received its share of attention, the whole being well brought out by the charm of the brick wall as the background.

In the entrance to the house at Rydal, by Wilson Eyre and McIlvaine, architects, shown in Fig. 2, the brick entrance is relieved by the unusual use of cut stone. While the main brick work of the entrance is laid in Flemish bond with pure white joints, note that the bricks directly surrounding the opening, including also around the arch, are all laid with a darker joint than the rest of the wall, thus accentuating the door itself.

Fig. 3, showing the entrance to a house at Haverford, Pa., by D. Knickerbacker Boyd, architect, is shown as a good illustration of a purely formal entrance to a house correct in design. The rough dark red brick wall, laid in the Flemish bond with a five-eighth inch white joint forms an excellent background for the fine and elaborate detail of the entrance doorway and porch with its iron railings and the white woodwork of the window over which is carried up to, and tied in with, the cornice. Note in this case how the arches over windows have the tops and bottoms of the bricks ground to a horizontal line.

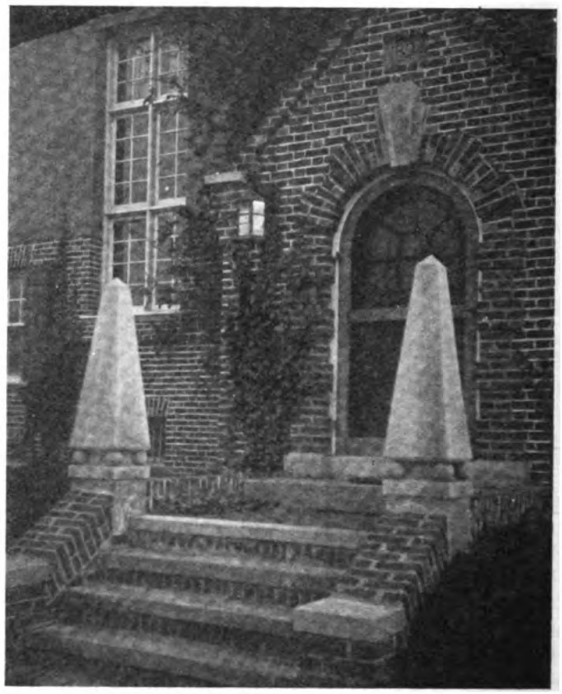

Fig. 2. House at Rydal, Pa. Wilson Eyre & McIlvaine, Architects

The horizontal band courses under and over the second story windows, are laid in running bond so as to give a different texture from the balance of the wall. The corners of this building, not shown in the photograph are finished with brick quoins, thus carrying out the formality of the building.

The entrance to the house at Wilmington, Del.,

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Fig. 3. Detail of House of George S. Robbins, Haverford, Pa.—D. Knickerbacker Boyd, Architect



Fig. 4. House at Wilmington, Del. Savery & Sheets, Architects

shown in Fig. 4, is another very formal type of doorway. The brick is laid in Flemish bond with concave joints. A projecting "soldier" course is used over the first story windows, and a "rowlock" course acts as the sills to the second story windows, adding interest and variety to an otherwise plain wall surface. The floor of the terrace in front of the door is also of brick, laid flat, with wide joints separating every two bricks into a square.

A very different treatment of an entrance is shown in Fig. 5 of a city house in Philadelphia by Duhring, Okie and Ziegler, architects. The brick is laid in the English bond, alternate rows of headers and stretchers forming a plain, unrelieved wall surface to receive the plaster and half timbered projecting bays and gables. The panel in the doorway is a combination of brick and tile, while the terrace steps and walk are entirely of brick.

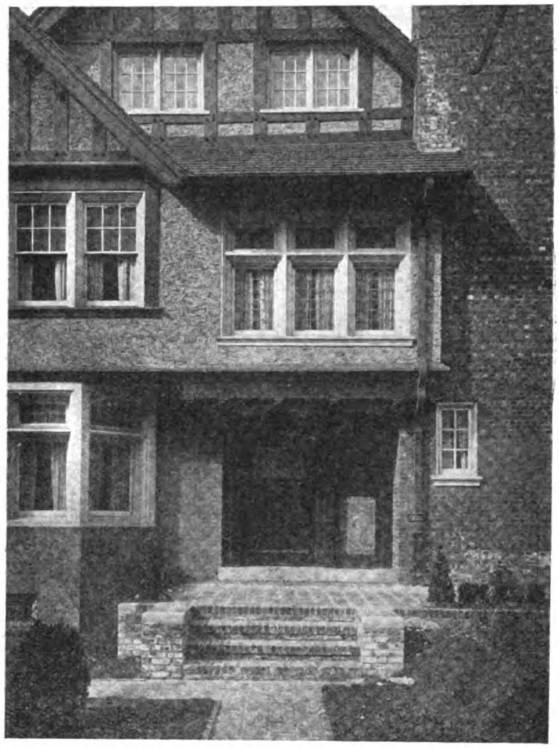

Fig. 5. Detail of a House in Philadelphia, Pa. Duhring, Okie & Ziegler, Architects

The sketch illustrated in Fig. 6 is of an entrance to an apartment house designed by Andrew J. Thomas. While the detail of the brickwork unfortunately cannot be shown in a sketch, enough is indicated to show the interesting use of the material in combination with iron grilles and balconies in connection with the arcades leading into the interior courts of an apart-

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ment house. Apartment houses are and will be one of the largest fields for the use of brick and the study of such interesting details as this shows how possible it is to add charm to a type of building often uninteresting without any increase in expense.

Fig. 7 shows a view along a rather informal terrace and door. The brick of the wall is laid in garden wall bond, with wide flush joints. The combination of white woodwork on the doors and windows with the dark wood lintel over the windows and the white plaster above forms an effective design. Added to

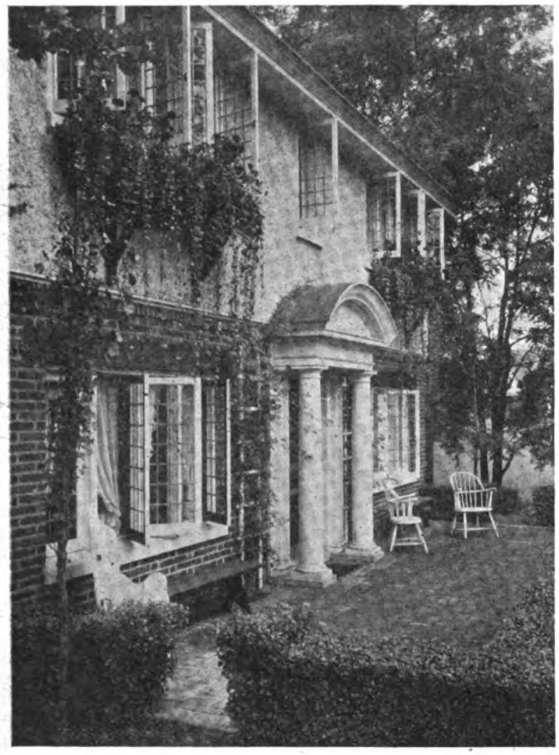

Fig. 7. Detail of a House at Wyncote, Pa. Dearmond, Ashmead & Bickley, Architects

this, the brick floor of the terrace, laid without any mortar in the joints, as in the earliest of Colonial days, results in one of the most effective and practical walks, with minimum of expense in laying.

The house at Chestnut Hill, Pa., designed by Walter T. Karcher and Livingston Smith, illustrated in Fig. 8 shows how the entire treatment of walls, floors, terraces, etc., of an extensive house group can be carried out entirely in brick without any loss of interest or character. The walls are laid in English bond, with relieving soldier and rowlock courses at windows and openings. The copings of areas and of terrace walls are also of brick laid on edge. The floor of the terrace is brick laid flat and divided into



Fig. 8. House in Chestnut Hill, Pa.—Walter T. Karcher and Livingston Smith, Architects

squares, with wide joists between the squares, as described in Fig. 4.

Another field in which brick is also very extensively used is in garden treatments. A very good detail of such use is shown in Fig. 9 of an interesting type of pergola piers entirely of brick laid with wide concave joints. The floor under the pergola is also

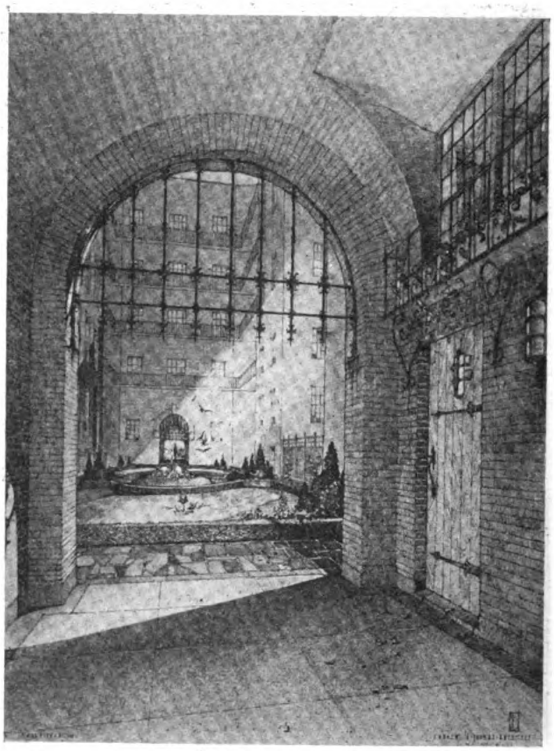

Fig. 6. Sketch Detail of an Apartment House in New York City—Andrew J. Thomas, Architect

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of brick without mortar joints, but with an outside edging of brick on edge laid in cement, with wide, white joints.

The effectiveness of brick in combination with stone to relieve an otherwise uninteresting wall is

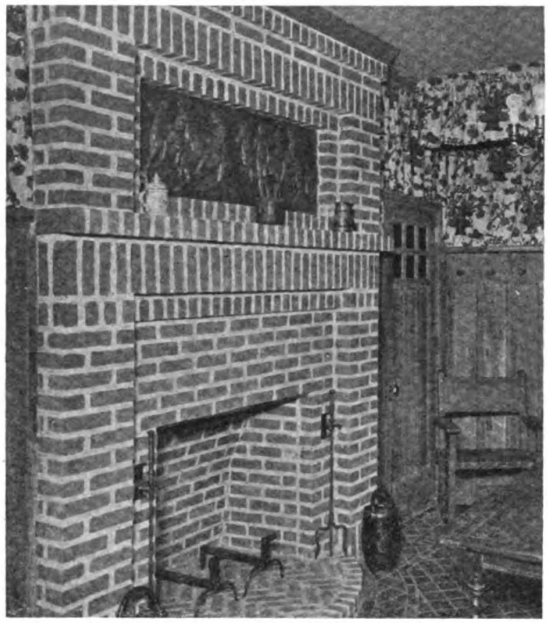


Fig. 9. Garden at Bryn Mawr, Pa.
Louis H. Push, Architect

well illustrated by the detail in Fig. 10, showing a portion of the wall of the billiard room in a house at St. Davids by D. Knickerbacker Boyd. The panel inserted in the stone wall is of rough brick, with flush scraped joints, with the circle formed of brick on edge. This brick on edge is also carried to the adjoining openings with a flat band course under. Brick on edge is also used to form the copings of the buttress at the end of the wall and again under the cut stone coping at the gable end.

Illustrations showing the possibilities of brick would not be complete without at least one photograph of a fireplace, where brick is so often used and for which it is so well adapted. The one in Fig. 11 is in the smoking room of a large house. It is built of tapestry brick, with very wide joints. The brick is laid in common bond, with courses of brick on end and on edge. The hearth is of brick on edge laid in a herringbone pattern, with a plain border.

This presentation of possible details and combinations of brick must of necessity be very incomplete. The proper use of brick, as of any other material, must be studied in each individual case. There can be no question as to the results obtainable with brick when properly used, and it is to show its possibilities and to help those whose natural inclination is to use a material as readily available in all sections of



Mantel in a House at St. Davids, Pa.
D. Knickerbacker Boyd, Architect

the country that this series of articles was written. The illustrations can, therefore, do no more than illustrate in the briefest manner the very great possibilities of its use as pointed out in the descriptions of brick, what it is and how to use it.

Many New Citizens

The unrestful conditions and constant revolutions in Europe have resulted in the asking of citizenship papers by a great number of immigrants over here. Many of them wish to visit their old countries after the war and eventually stay there. They, therefore, did not care to become American citizens, but now they seem to realize that they are better off here than over there and are making up for lost time. People think that this rush for citizenship papers will last as long as conditions do not better themselves in Europe, and this may be for quite a while.

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Truck and Trailer Used to Move Long Timbers

The Trailer as Applied to the Building Trade

THE strongest arguments in favor of the adoption of the trailer as an auxiliary to the truck are, first, increased carrying capacity; second, reduced hauling costs. Economy and efficiency in truck-trailer operation are insured if due consideration be given the character of the material to be hauled in its relation to the trailer equipment, loading and unloading methods, etc. This statement is based on the presumption that a preliminary study of the local hauling conditions has shown that the roads are hard-surfaced and that the maximum grades do not exceed ten per cent.

On long hauls the lowest hauling costs are obtained where the tonnage moved per trip is greatest. In such case the additional hauling capacity afforded by the use of trailer assumes prime importance. If the truck hauls three tons working alone, when with trailer equipment it might just as well haul six or more tons at a very slight additional operating expense, the value of the trailer is apparent.

On long hauls the question of speed is an important factor. The trailer should be built to run just as fast as the truck can pull it. A slow speed trailer, by limiting the speed of the truck, nullifies the advantage to be gained by carrying the double load. If, however, it is impossible to operate the truck at its normal speed in districts where the traffic is congested the use of a trailer will offset the loss occasioned by the reduced speed.

Where the hauls are short the item of lost time, i. e., the time spent in loading and unloading truck, assumes first importance. It is imperative, therefore, that this lost time be reduced to the minimum. The truck, to be a profitable investment, must be kept moving. It is too costly an article to be used as a loading platform, and should be kept under pay load as much of the time as possible. This may be accomplished by the use of one or more trailers. Extra trailers may quickly be put in or taken out of service, and when not in use represent a much smaller investment than the same carrying capacity in motor trucks.

If only one trailer is used it can be loaded while the truck is making the trip alone, and be picked up by truck every other trip. Two trailers can be used to still better advantage, while a fleet of three trailers makes a very efficient hauling unit, especially where loading and unloading take up a large part of the truck's time. In the latter case it may be found good practice to use truck only as a tractor and keep it in motion almost continually. One trailer can be kept at each end of the haul, while truck is in transit with the third trailer.

To illustrate the utilization of the trailer, the experiences of several important building concerns who

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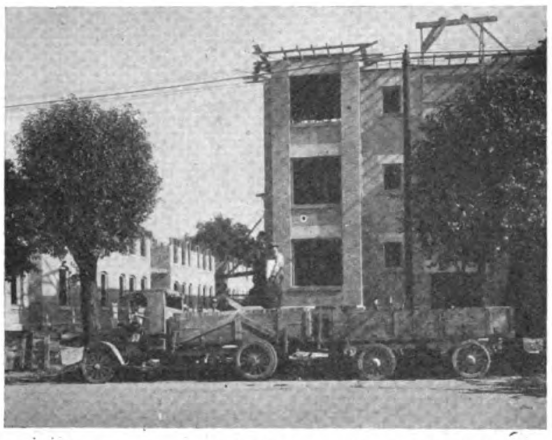

By the use of these trailers hauling cost of brick was reduced from $1.70 to 95c. per thousand.

are authority on the trailer as applied to their particular line of business will be given.

The Salt Lake Pressed Brick Company, of Salt Lake City, Utah, was using a four-ton truck to haul brick six miles from its plant to an apartment house under construction in the city. The truck made four round trips a day with 2,500 brick to the load, or 10,000 daily, at a total cost of $17 per day, or $1.70 per 1,000.

The company then added three trailers for use with the truck and hauled 5,000 brick at each trip. While the truck was intransit with one trailer, another was being loaded at the brick yard, and the third was being unloaded at the apartment house under construction. By this system of loading and unloading the truck was kept on the road as much of the time as before and was able to make the same number of round trips. The operating cost with the double load, weighing ten tons, was increased to $19, but the delivery cost of each 1,000 brick was only 95 cents, a saving of 75 cents. As the job called for the delivery of 230,000 brick, the saving effected on this one job amounted to $172.50 in 12 days.

"The use of motor trucks facilitates deliveries, satisfies customers, and our outfit of three trucks and as many trailers, is doing the work of from eight to twelve teams each, which we figure cuts our hauling costs in two," is the way in which John H. Miller, manager of the Washington (D. C.), Brick & Terra Cotta Company, expresses his opinion of this method of laying down his ware on the job.

This concern, which put one truck in service in September, 1915, and has since added two others, reports that many of its customers do not want their deliveries made any more with team, but insist on having them made with the trucks.

Perhaps the most interesting feature of the company's motor-driven delivery equipment is that trailers are freely used. Mr. Miller thinks that this plan has solved the motor truck problem, in so far as he is concerned, for his enthusiasm was greatly increased upon the addition of the first trailer, which made a large increase in the truck's hauling capacity. With the aid of this addition he firmly believes that it is a very effectvie means of lowering delivery costs.

In September, 1915, as above stated, the Washington Brick & Terra Cotta Company put into service a three and one-half ton truck. This was operated for some time, when Mr. Miller had the idea of using a trailer presented to him. He purchased one with a capacity of two and one-half tons, running the cost of his "train" up to $3,768, but giving him unusually large delivery facilities, considering the amount invested. The first car cost $3,000 for the chassis alone, while the price of the trailer was $768. Bodies for both the truck and trailer were built by the company at its yard.

When the trailer was added—the capacity of the truck being almost doubled, things looked brighter to the management for bigger savings from its new departure. Then, in February, 1916, a five ton truck was purchased, together with a five ton trailer. This was followed by the acquisition of another truck and trailer and of the same capacity, completing the "fleet" of the Washington concern to date.

Concerning the capacity of these trucks, the first one purchased, holding three and one-half tons, with the two and one-half ton trailer, has a capacity for common brick of 2,600, the truck carrying 1,600 and the trailer an even 1,000 brick. The five ton truck and trailers have a total carrying capacity of 3,400 brick for each "train," the truck holding 1,800 and the trailer 1,600 brick. In addition to commons these trucks and trailers also carry the company's "Harvard" face-brick, and, occasionally, hollow tile.



Truck and Trailer used in lumber transportation

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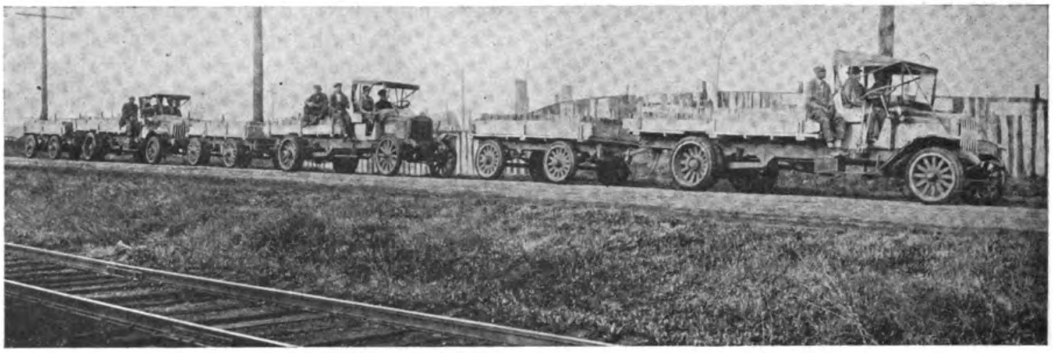


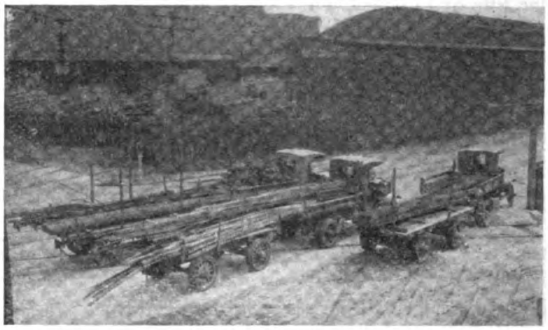
These Trailers Have a Carrying Capacity of Three and One-Half to Five Tons

While the company has three yards operating in the vicinity of Washington with a total daily capacity of 200,000 brick, the trucks and trailers are used for the most part in making deliveries from its Potomac yard at Addison, Va., a distance of about four miles from the Capital City. There is somewhat of a grade between Addison and Washington, but this does not cut down the speed of the trucks to any extent.

Each truck carries a crew, consisting of a chauffeur and four men, for unloading the brick. There is an ordinance in Washington against the dumping of brick, so that all of this ware has to be piled, except in special cases. While at first thought it would seem that this obstacle would rob the trucks and trailers of much of their efficiency and ability to lower delivery costs, yet this is not the case.

Teams have not been able to make more than two trips a day at any time. In contrast to this performance the trucks make four and five trips a day, the large ones carrying 3,400 brick, while the best a team can do is to carry a little less than 1,600 brick each trip.

Many individual cases similar to the foregoing might be cited, but these illustrations are sufficient to show the value of the trailer as applied to the transportation of building materials. Accompanying this article are photographs showing the trailer and truck efficiently hauling various materials used in building construction.



A fleet of Trucks and Trailers delivering long lengths of reinforcing steel

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The Principal "Setting" in "Bunty Pulls the Strings"

Building Problems of the Motion Picture

By Jerome Lachenbruch

DURING the last few years patrons of the motion picture have begun to realize the extent to which photoplay producers have gone to present on the screen living reproductions of the backgrounds of various generations. The word, backgrounds, may be a little inaccurate, for the physical surroundings of an acted scene in the motion picture studio is something quite different from a background. The motion picture set is a three dimensional piece of construction. In the early modern history of both the stage and the screen, pasteboard drops and walls were used to present a suggestion of reality. We accepted the suggestion, and our imagination filled the gap between canvas and pasteboard on the one hand and wood and stone on the other.

The stage owes Mr. David Belasco a debt for discovering the fact that an objective thing, such as a room, could be shown on the stage as a room, and not as a poor imitation of one. But the stage has gone beyond Mr. Belasco's passion for realism in stage settings; and has given us the atmospheric sets of Robert Edmund Jones and his group of artists of stage decoration.

The motion picture has not yet attempted to use the atmospheric setting in any appreciable degree. We have seen it occasionally; and no doubt when the story material in which this type of setting can be used appears, the art directors concerned with planning motion picture sets will know how to obtain the wished-for effects. However that may be, all motion picture sets entail a definite, difficult building job. Whether a dim, half-lighted scene is to be photographed for its atmospheric value, or a stone house transplanted to the screen, each set must first be constructed with nails, boards, stone and other materials that are used to build the very houses we live in. The problem is much the same.

Every branch of the building contractor's business is represented in the motion picture studio. Every craft engaged in outside building operations finds a place there. But within the studio, the ingenuity of the individuals engaged in the construction of sets is exercised to a far greater extent than in the world of streets and trolley cars. Carpenters, bricklayers, foundation men, plasterers, painters, decorators, and a host of more highly specialized craftsmen are steadily employed in the studios. In

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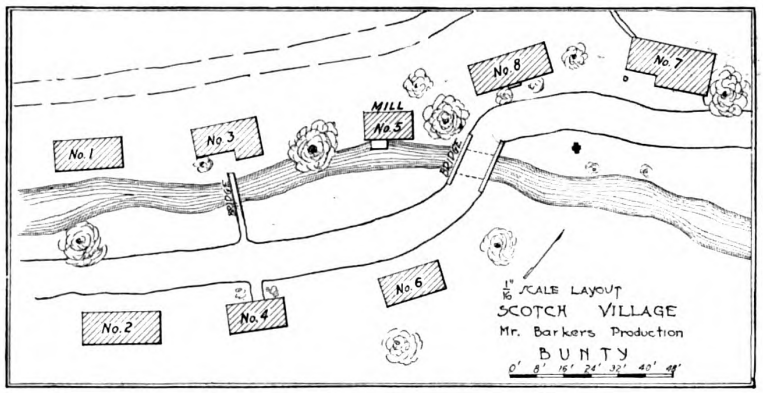

Culver City, Cal., where the Goldwyn Pictures Corporation have one of the best equipped studios in the world, some three hundred men are continually engaged in building operations alone.

As proof of the eagerness with which the producers of motion pictures seek to maintain the verities between life in the objective and its screen representation, the Goldwyn company recently erected an entire Scotch village in order to present adequately a photoplay version of the Graham Moffatt play, "Bunty Pulls the Strings." The village consists of a kirk, a tavern and several thatched-roofed Scotch houses, straggling along a village street. A little stream runs through the village. For pictorial effect, the course of the stream itself was changed. Moreover, a small stone bridge was erected over the brook, and a host of characteristic "properties," such as a broken cart wheel and a stray goat, were brought into the range of the camera lens.

The houses erected in the Scotch village seen in "Bunty Pulls the Strings" were reproduced from actual photographs furnished by the Art and the Construction Departments of the Goldwyn Company. The art director, Mr. Cedric Gibbons, supervised the planning of the village, the making of drawings and color details. The actual construction work was done under the supervision of Mr. Charles Wilhelm, the head of the construction department. The houses were built in sections, of compo board; then covered with burlap and finally plastered. Each section was plainly marked; and all were matched up on the site selected for the little village. The roof was made of eighteen-inch thatches that were firmly wired to the walls of the buildings. Not often are complete buildings erected for motion picture purposes; but in this case the walls and the thatched roofs were completed before a single view was taken. This was necessary as distance as well as close views were taken.



Cottages 1 and 3



The "Inn"—Building 8

The length of the village, from the Robert Burns tavern to the kirk, is about four city blocks. Between these important structures are the dwellings of the cotters, separated by rock dykes and well-kept front gardens. The flowers are the result of transplanting rose vines from the lawns and hot-houses of the

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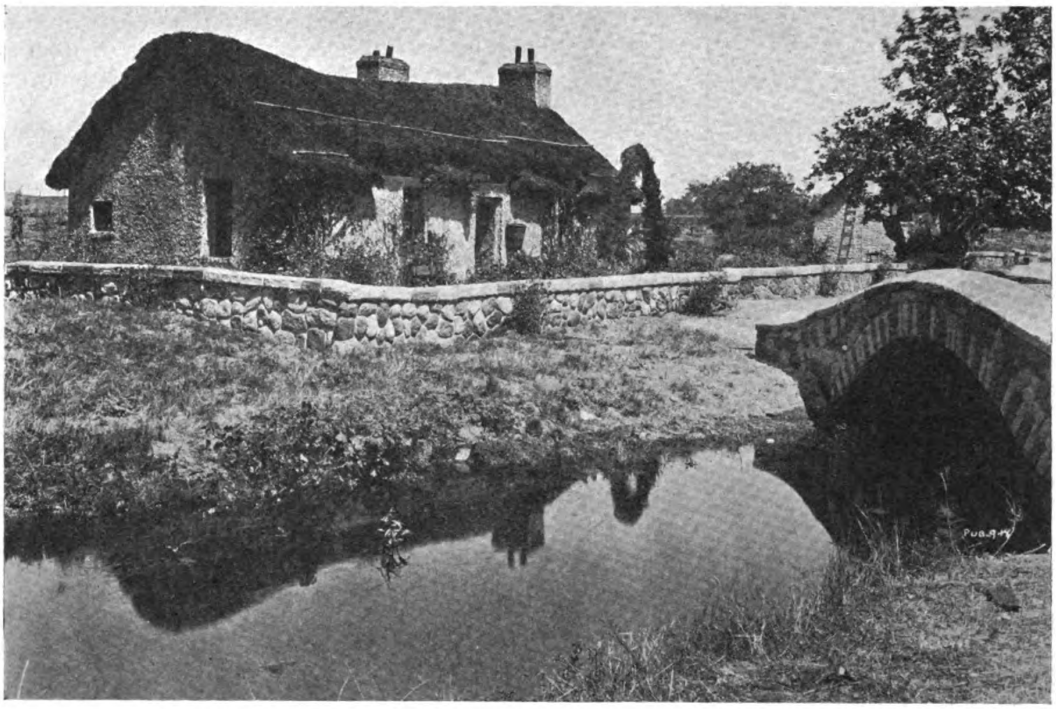
Goldwyn-Studios. As the Scotch village is a little distance from the studios, all the vines had to be transported about a mile from where they were originally cultivated. Then a pumping outfit was installed so that water from the stream could be used in keeping the newly made gardens in bloom.

In the accompanying photographs, the success of this work of rapid construction is evident. It required just fifteen days to transform several acres of thickly weeded, untilled land into a rose-blossomed Scotch village marked with the age of centuries. So successful has this piece of construction work been that the Goldwyn Company has decided to lease the property on which it stands for a year so that visitors may see for themselves how closely the producers of motion pictures try to imitate actual conditions in the world of real things.

Considering the speed with which the Scotch village came into being, the number of men who worked on this enterprise was comparatively few. Only one hundred and eight men, all regularly employed at the Goldwyn studios, helped in the construction work. Divided according to crafts, there were sixty-five carpenters and plasterers, twenty-five laborers, ten property men and eight foremen. These men handled in all, three hundred truck loads of material. The result is a village built with sufficient solidity to stand the mildness of the California climate and of such fidelity to the Scotch original that Bunty herself could feel quite at home.



A Faithful and Artistic Reproduction of a Scottish Motive

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Securing a Dry Cellar*

By George M. Warren
Hydraulic Engineer, Bureau of Public Roads

Part I

"IS the Cellar Dry?" is one of the first questions people ask when considering the purchase of a home. Real estate dealers say that a good cellar adds $500 to the selling price of an average dwelling. Be that as it may, a good, dry cellar is a valuable asset, nor can its true value be measured in dollars. Rather, its value is determined by the convenience,

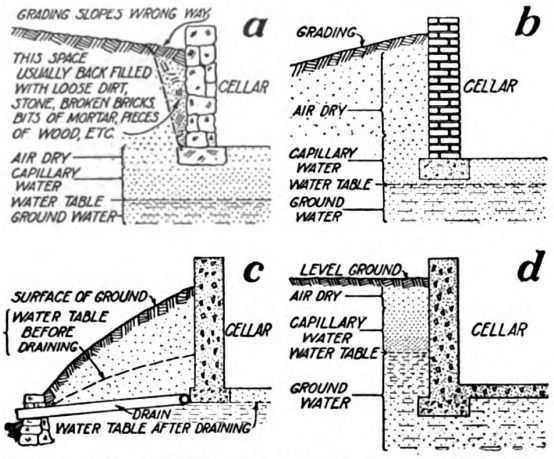

Fig. 1. Four classes of ground and ground water conditions

These diagrams comprehend the causes underlying nearly all damp and wet cellars.

comfort, and health of those who dwell in the home.

It is well-known that dry air is a poor conductor of heat or cold and it promotes evaporation, which is a cooling process. It is well-known also that moisture favors decay, corrosion, and the growth of many forms of life which are objectionable or harmful to man. For these reasons a dry cellar is better insulated and is less subject to outside temperature changes than a damp cellar. In brief, a damp cellar is unfavorable for the storage of fruits, vegetables, and foods, is destructive of sills, floors, pipes, tools and utilities; is productive of unsanitary conditions, and without much doubt aggravates or is a contributory cause of certain well-known ailments of man.

New Sites

As it is better to avoid mistakes than to correct the consequences, it is fitting at the outset to speak briefly regarding selection of new building sites. The most important points to be observed are as follows:

(1) The site should be moderately elevated, so that a fall in at least one direction from the building is obtained. Many prefer a "perched" site because of commanding view, better movement of air, greater depth to ground water (that is, the surface of the water showing in a well or pit and often called the water table), and superior surface and underground drainage. Others prefer to forego some of these advantages and to select a site sheltered from strong winds, especially those likely to bring stormy or cold weather.

(2) The ground should be so open and porous that air and water are admitted readily, as for example, sands, gravels, or soils capable of good cultivation. The vegetation should not be profuse, and the soil



Fig. 2. Unsatisfactory cellar wall

Sectional view of an 18-inch rubble masonry cellar wall built in Westchester County, N. Y., November, 1919. Note the joint work, the overhanging face, and the loose character of the backing where the mason stands. The site slopes sharply towards the face against which the mason is standing. In excavating for the cellar, the earth was cut down approximately to the slope A–B. As the masonry progressed, loose earth was thrown in for backing and to serve as a footing or platform for the mason. Obviously, much unused stone and bits of mortar found their way into the backing, the whole forming an excellent medium for the passage of surface water and seepage to and through the cellar wall.

and subsoil should be clean, that is, contain little or no organic wastes of either animal or vegetable origin.

(3) The site should be well and deeply drained. During the wet season of the year the ground water should be at least 10 feet below the surface of the ground, and a depth of 15 feet insures still better

*From the latest annual report, Department of Agriculture.

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aeration and ventilation of the ground. As to the distance between the cellar bottom and the ground water, much depends on the character of the intervening earth and the type of floor used. In precisely the same way that oil rises in a lamp wick or ink spreads over blotting paper, water will pass through the minute space or pores existing in all kinds of soil and many varieties of solid rock. This capillary rise in coarse sands and gravels may be no more than 2 or 3 feet, but in very fine sand, silts, and clays it may range from 5 to 8 feet.

(4) No site should be chosen without first determining the source of the domestic water supply, its purity and abundance, and fixing upon the location of a suitable plot of ground in which to waste sewage or other foul drainage.



Fig. 3. Inside face of wall shown in Fig. 2

Walls of this character abound in nearly every stone-producing locality. If the joints on both faces are well pointed and if the pointing is kept in thorough repair, such walls may be fairly secure against rats and mice.

Damp and Wet Cellars

Studying the Causes.—The causes of damp and wet cellars group naturally into four classes represented diagrammatically in figure 1.

(*a*) Where the cellar bottom is above the capillary reach of the ground water, but, because of faulty walls, backing, or grading, eaves water, melting snow or other surface drainage passes into the cellar. (See figs. 1 (*a*), and 2 and 3.)

(*b*) Where the cellar bottom or walls are within reach of capillary water, producing merely a damp cellar.

(*c*) Where the cellar bottom is below the water table, but the ground slopes so that the water table may be lowered by drainage.

(*d*) Where the cellar bottom is below the water table and a drainage outlet cannot be secured.

Applying the Remedies.—(*a*) Where a cellar, by reason of poor construction and grading becomes a sump or basin for the periodic collection of water from eaves, down spouts, snow banks, or other surface sources, a number of simple remedies are employed. A surprisingly effective method, and one that improves the appearance of every low-set building, is to place additional filling against and near the cellar wall and grade down to a smooth, sharp slope that shall extend at least 8 or 10 feet from the wall. After seeding with a good lawn grass and raking, the surface should be rolled or otherwise firmed. Since the object sought is the quick shedding of surface water, steepness of the grading is very important. If

Fig. 4. Shedding water from cellar walls

A sloping pavement of Portland cement concrete is useful for shedding water from foundation walls and forms a convenient walk. *A*, well-tamped cinders (not ashes), slag, coarse sand, gravel, or stone foundation thoroughly wet just before placing concrete. *B*, pavement; for two-course work proportion the concrete 1:2½:5 or 1:3:5; use sufficient water so that under moderate tamping it shall just flush to the surface; lay a base course 4 to 4½ inches thick; follow within 15 minutes with a one-half to three-fourths inch coat of 1:2 cement mortar worked to a smooth hard finish with steel trowels.

For one-course work prepare the foundation as above; proportion the concrete as rich as 1:2:4; lay a course 4 to 4½ inches thick; with steel trowels, promptly work the surface to produce a hard non-absorbent finish. *C*, wall surface abutting the pavement to be cleaned, brushed, roughened with a stone hammer and, just before placing the concrete, thoroughly wet and well smeared with neat cement paste. *D*, cove or fillet of cement mortar.

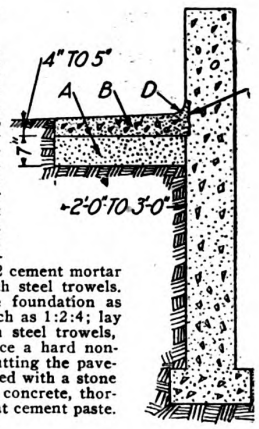
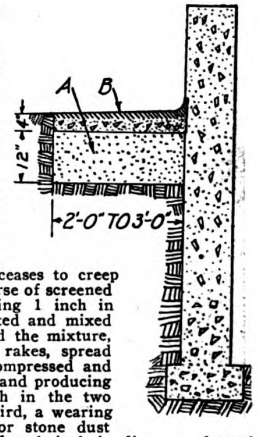


Fig. 5. Shedding water from cellar walls

A sloping pavement of bituminous concrete for shedding water from foundation walls. *A*, twelve-inch foundation of materials similar to those specified in Fig. 4. *B*, four-inch pavement of bituminous (best quality gas-works coal-tar refined of light oils and other matters affected by atmospheric influences is specified frequently) concrete put down in three courses: First, a base course of coarse gravel, broken stone, or slag 1½ to 3 inches in greatest diameter, partially covered with hot bituminous composition, spread evenly, well tamped and rolled until the stone ceases to creep under the roller; second, a binder course of screened gravel or broken stone not exceeding 1 inch in diameter, heated and thoroughly coated and mixed with hot bituminous composition, and the mixture, while still warm and workable with rakes, spread evenly over the base course, and compressed and rolled into the base, filling the voids and producing a smooth surface and a total depth in the two courses of not less than 3 inches; third, a wearing course or surfacing of clean sand or stone dust graded from very fine to about one-fourth inch in diameter, heated no more than necessary to make it work easily when mixed with bituminous composition, and the mixture while still hot spread in a 1-inch layer on the binder course and thoroughly compressed, followed by a sprinkling of fine sand or hydraulic cement well rolled in.



necessary to grade as high as the cellar windows, a curved or rectangular well or hatchway of concrete or brick should be built about them. Hinged covers for closing the hatches during heavy rain or snow should be provided. Handled in the manner described, the beneficial effects of a sharply-sloping, well-sodded zone around a building are surprising.

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Another method frequently used is to lay a sloping pavement, walk, or gutter 2 and 3 feet in width and composed of Portland cement, coal-tar, or other bituminous concrete. Such protection is illustrated in figures 4, 5, and 6, the gutter in the latter figure being useful for conducting surface water along a cellar wall.

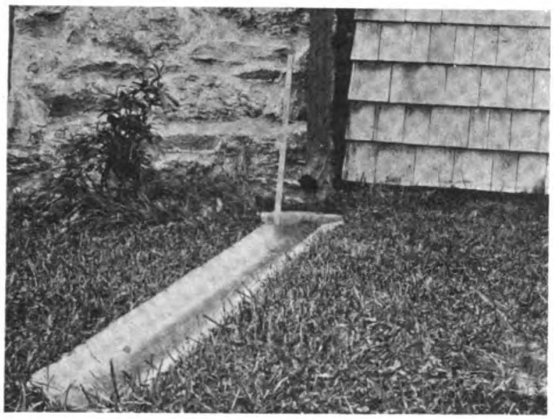

Fig. 8. How to lead roof water away from the house

Home-made, half-round concrete gutter about 8 inches wide and 6 feet long. The edges next the grass are about 2 inches thick and the waterway beneath the down spout is widened to resemble a shallow platter. A kennel is at the right of the down spout and at the left a 2-foot rule leans against the cellar wall.

Where no use is made of the rain water, it is always desirable to connect the down spouts with dry wells located 15 or more feet from the building or to pipe to a suitable surface outlet. Figure 7 shows the use of a dry well. Despite the well-graded

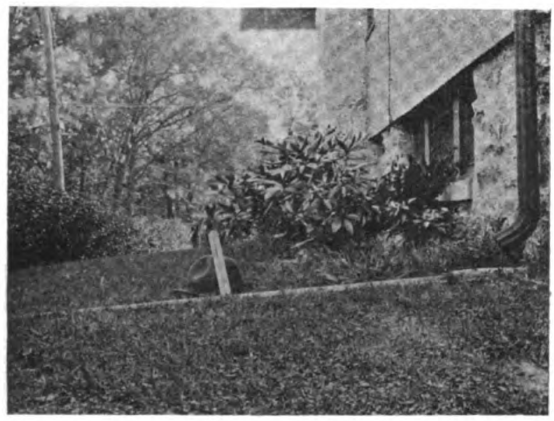

Fig. 9. Looking across the gutter shown in Fig. 8

Note that the gutter is almost flush with the ground surface, and hence is slight obstruction to the foot or to a lawn mower. The hat, with a foot rule leaning against it is about midway of the length of the gutter.

grounds at a certain New York house, after heavy rains water worked into the cellar. The trouble was readily traced to one of the down spouts, which curiously was on the lower side of the house, where the slope away was excellent.

The trouble was removed entirely by laying a small half-round concrete gutter about 6 feet long, as shown in figures 8 and 9. The same end often is secured by laying on the surface of the ground a U-shaped trough or gutter of wood, brick, or stone, a piece of galvanized-iron pipe, or a few lengths of vitrified channel pipe. The purpose of all these measures is to throw surface water away from the cellar wall quickly. Where this can be done the chances are good that the water will sink to the great reservoir

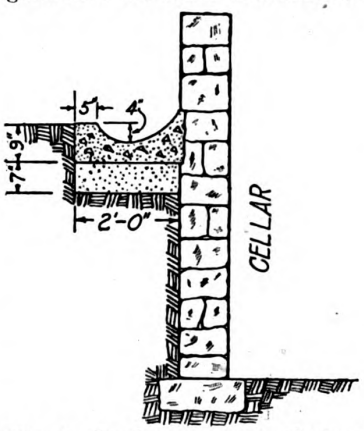

Fig. 6. Conducting water along a cellar wall

Where water from the eaves and sides of a building must be conducted along a cellar wall, a concrete gutter of the cross-section shown and laid to a smooth slope or fall of one-eighth inch or more for each foot of length will prove of service.

Fig. 7. How to waste roof water

Showing use of a dry well or an abandoned well in which to waste roof water. *A*, dry well; located 15 or more feet from the cellar and on lower ground; carry excavation to a porous stratum, preferably one lower than the cellar bottom; curb excavation with field stone, rubble, or brick laid without mortar; cover the curb with a concrete slab, covering stone, or heavy cross planking 1 foot below the surface of the ground; sometimes an excavation is merely filled with coarse gravel, boulders, broken stone, brick, slag or other similar waste materials. *B*, four-inch drain tile or vitrified sewer pipe, closed joints, laid about 2 feet below the ground surface. *C*, concrete bedding to hold elbow in place. *D*, short piece of 4-inch cast-iron pipe. *E*, rain conductor or down spout.

of ground water before it can spread laterally to the cellar. As between the vertical movement and the horizontal movement of percolating water, the former, especially in porous soils, is likely to be much the more rapid. For example, water applied at the surface of a very dry, undisturbed, sandy soil penetrated to a depth of 6 feet in twenty-four hours, but the lateral movement was only about 2 feet.

(To be continued)

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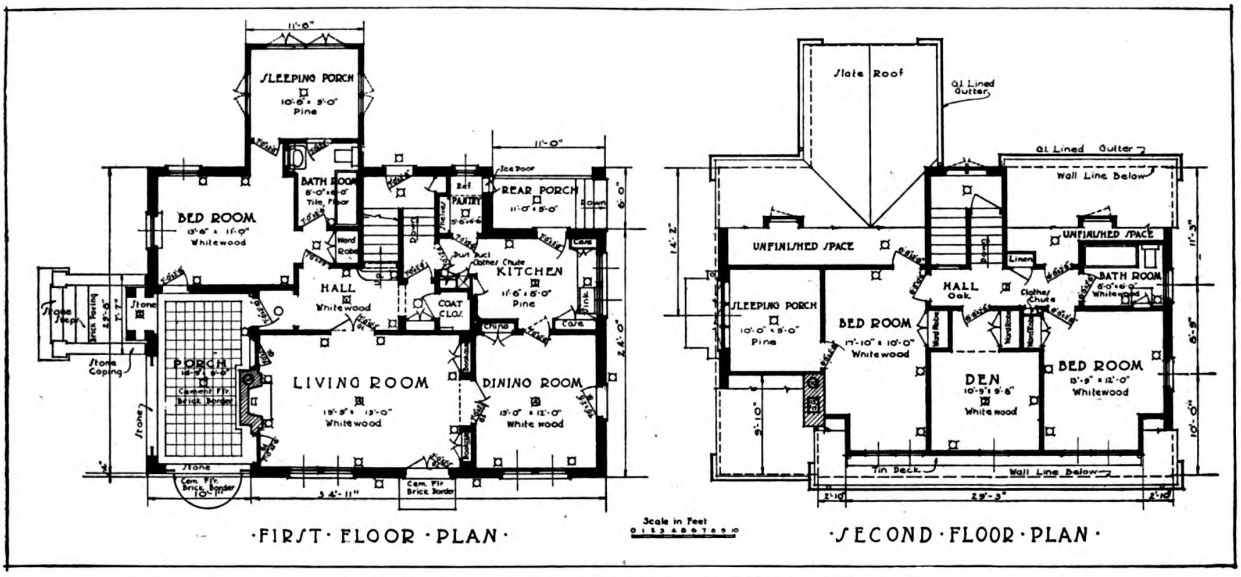
Front View (for rear view see page 60)



HOUSE OF MR. JONES, JR., DETROIT, MICH.

Harry Muehlman, Architect

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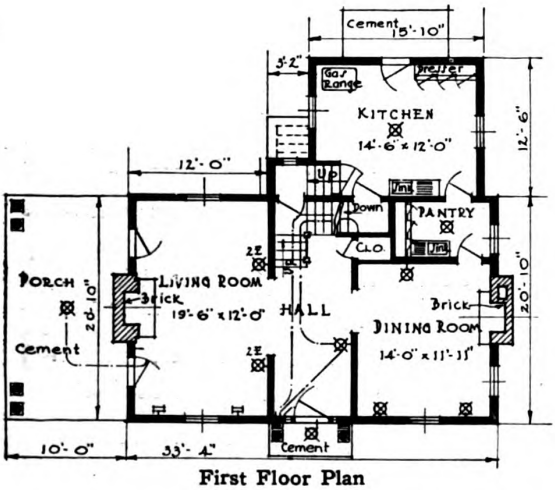
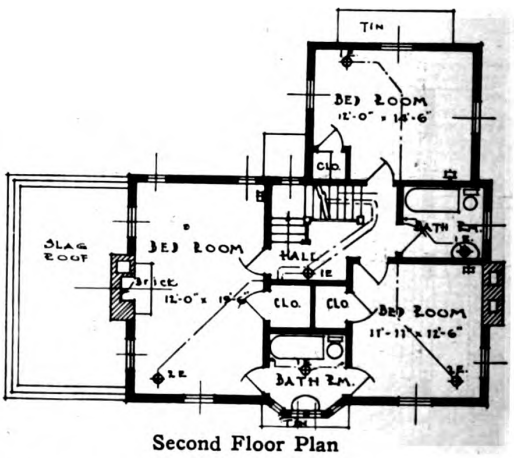
Front View



First Floor Plan



Second Floor Plan

HOUSE OF MRS. EVELYN S. RUNK, HAVERFORD, PA.

McIlvaine & Roberts, Architects

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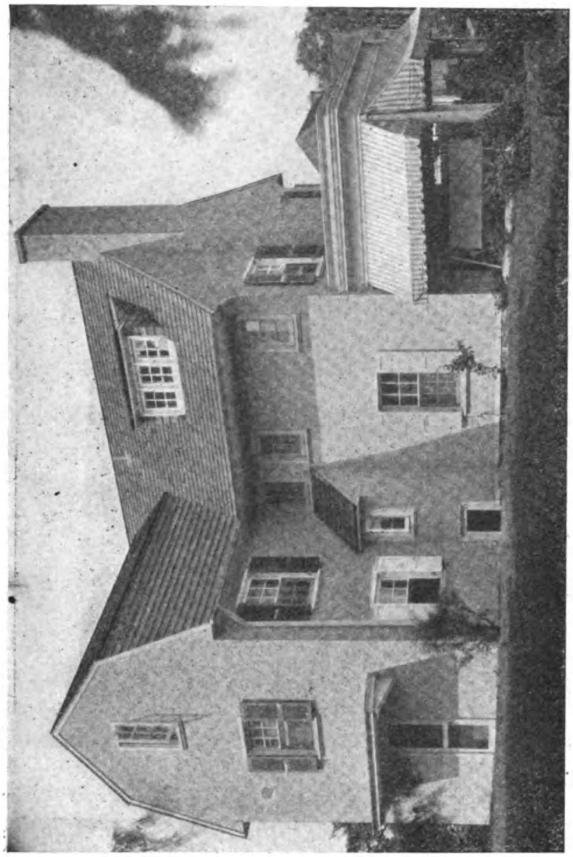
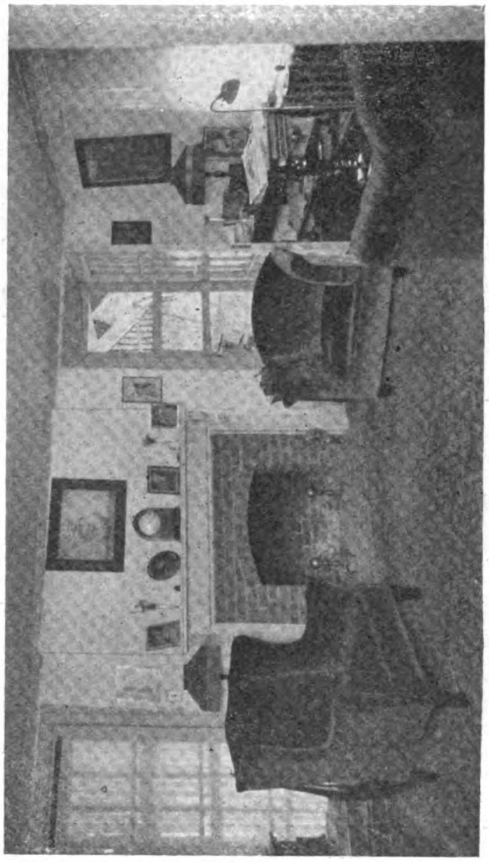
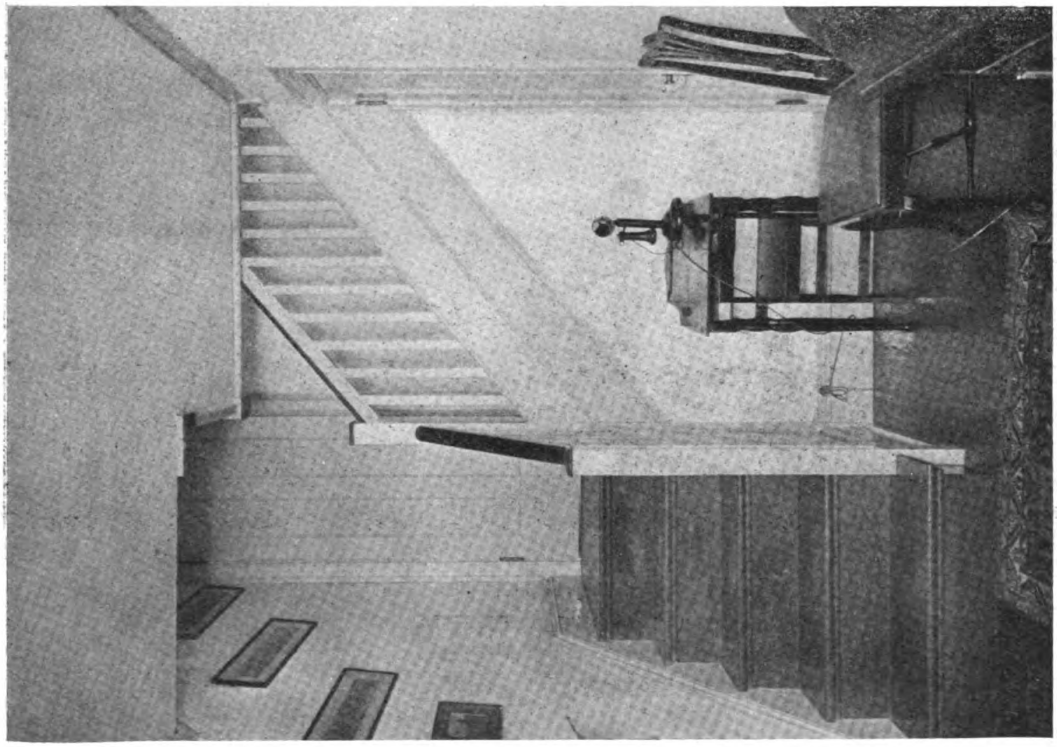


Rear View



Living Room



Entrance Hall

HOUSE OF MRS. EVELYN S. RUNK, HAVERFORD, PA.
McIlvaine & Roberts, Architects

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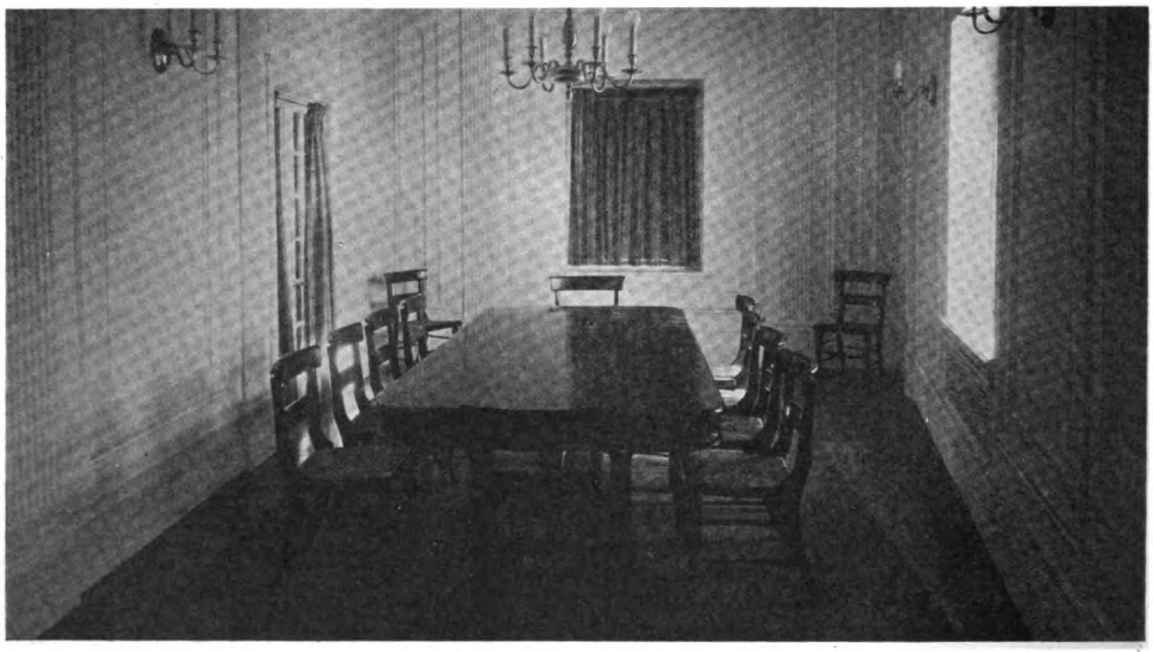
Main Elevation



Board Room

OLNEY BANK, PHILADELPHIA, PA.
John T. Brugger, Architect

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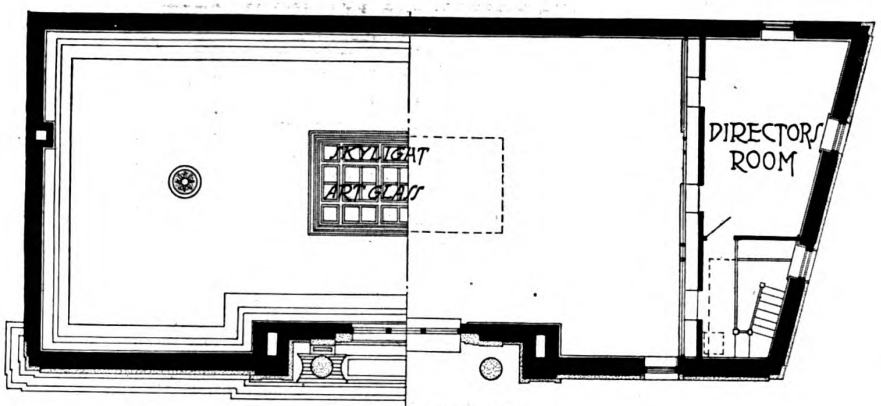
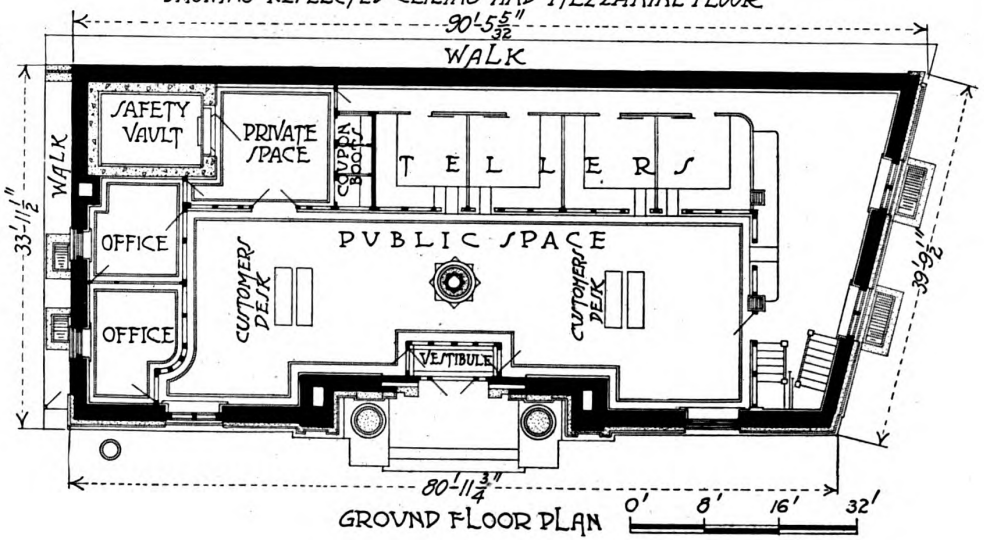
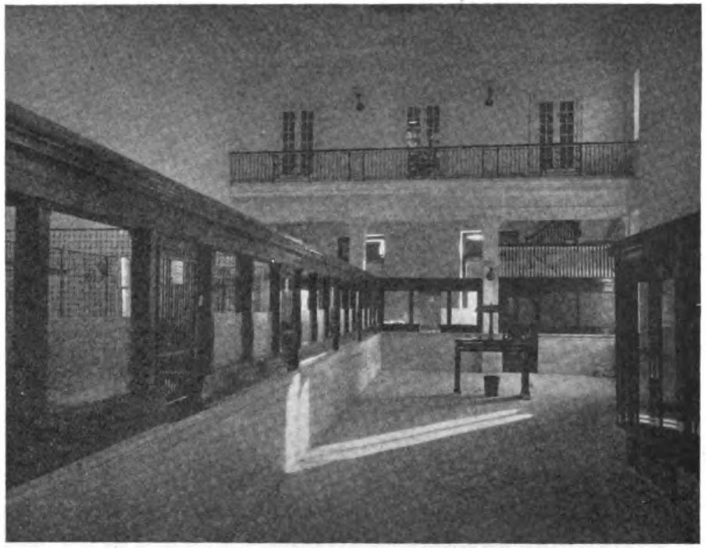


ONE HALF PLANS
SHOWING REFLECTED CEILING AND MEZZANINE FLOOR



GROUND FLOOR PLAN



Plans and Interior View

OLNEY BANK BUILDING,
PHILADELPHIA, PA.
John T. Brugger, Architect

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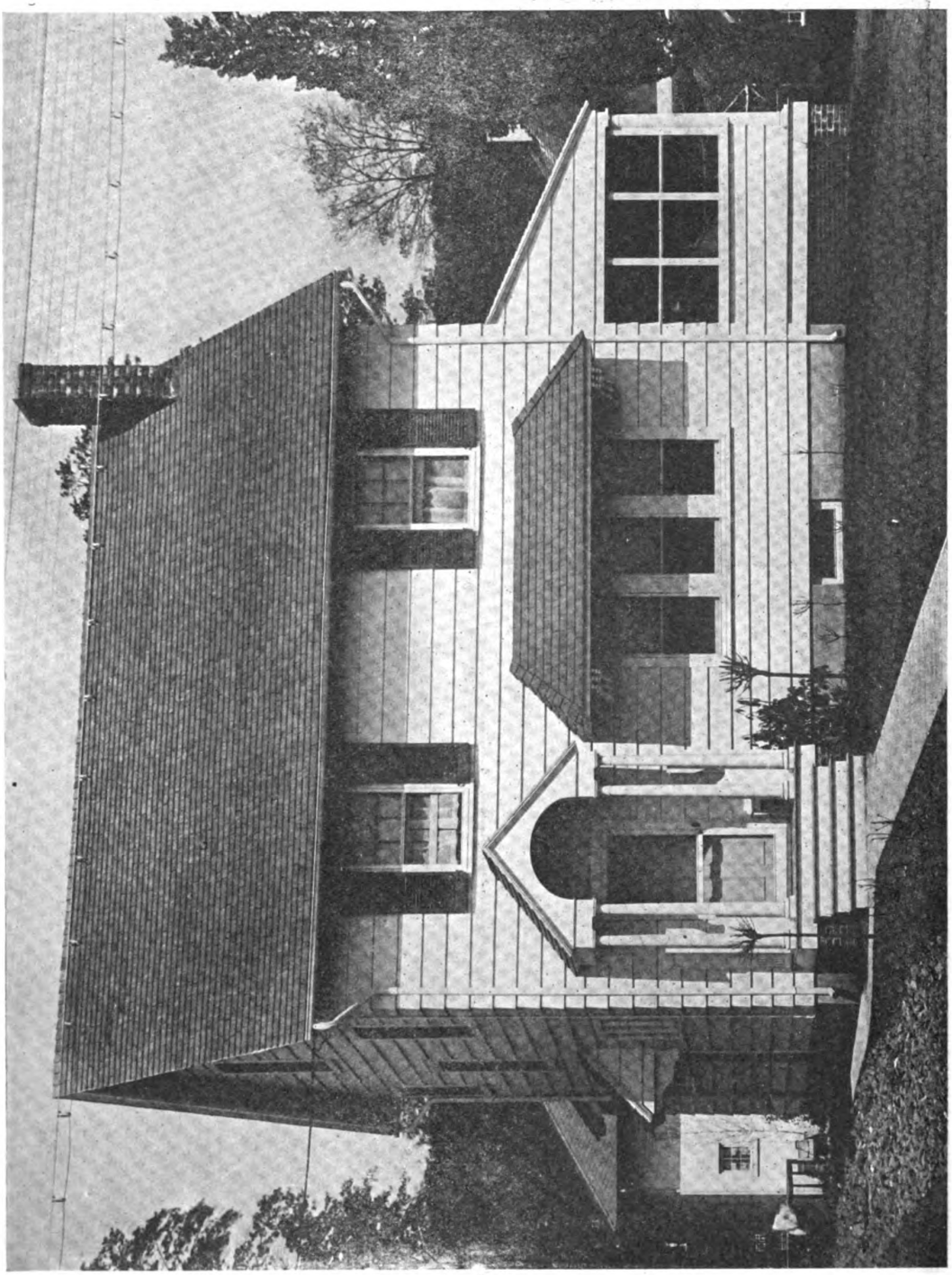

HOUSE OF DE WITT VAN NOTE, MAPLEWOOD, N. J.
F. W. Dalzell, Architect
(See following page for floor plans and description)

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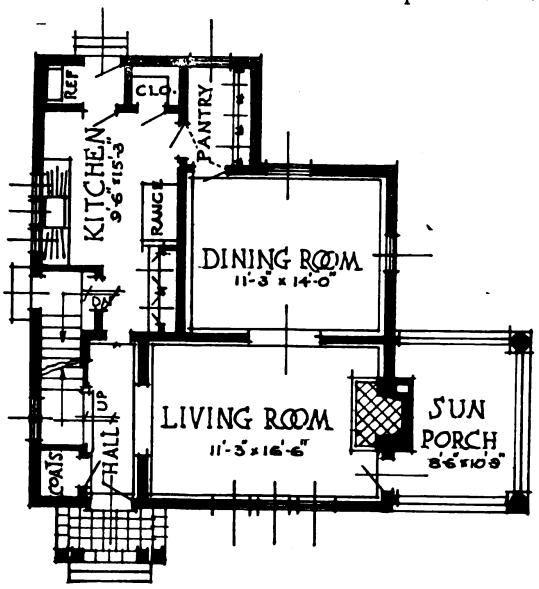
House of De Witt Van Note, Maplewood, N. J.

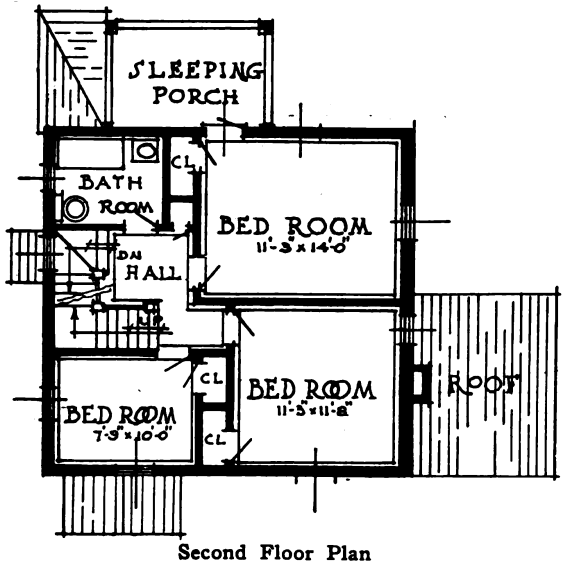
The Van Note house is a small residence with a touch of the Colonial in its design. The entrance constructed with slender columns and provided with



First Floor Plan

seats and paneled doors, together with the wide white clapboard siding and green shutters, tend to give a Colonial effect.

Being nearly square this house gives the maximum



Second Floor Plan

number of cubic feet per square foot of foundation and outside wall and is therefore economical in construction. The hood over the living room windows breaks the vertical lines and gives breadth to the design. The small hall, even with wide opening to the living room, affords a degree of privacy that is not obtained when opening directly into the living room. The kitchen and dining room are of good size, and the pantry is large with built-in dressers.

The second floor provides two fair-sized rooms and one small one, also a sleeping porch and bath. There is one room finished off on the third floor.

The living room and dining room are finished in hardwood, stained brown, the remainder of the house in white with mahogany doors. The finished floors are of oak in the first story and comb-grained pine in the second story. This house is built on a fifty-foot plot, which was large enough to provide room for a driveway.

Thirty Carpenters Take Course in Architecture

Thirty carpenters, many of them gray-haired, poring over their drawings and vieing with one another in their work, are the members of a class held every Friday evening by Professor Percy P. Adams, of the architecture department of the University of Oregon.

This class, which is composed largely of members from the carpenters' union in Eugene, is an extension class, organized at the request of the men, who asked that they might be permitted to study under the direction of the university some of the things they missed earlier. Professor Adams is giving two courses, Graphic Statics and Estimating, and most of the men are taking both.

Electricity by Wind Power

In Sweden there is a plant which combines ancient and modern power sources in an unusual way, generating electricity by means of wind. A windmill with four 18-foot sails, making thirty revolutions a minute, produces 6.22 horse power when the wind has a velocity of 23 feet a second. The wind lifts a two-ton weight, which in its fall develops the energy to drive the dynamo. The mill produces about 4,800 kw.-hr. a year, which is used for agricultural and pumping purposes.

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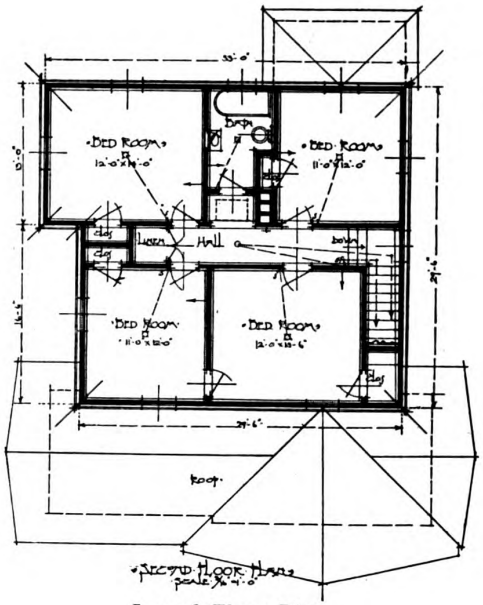
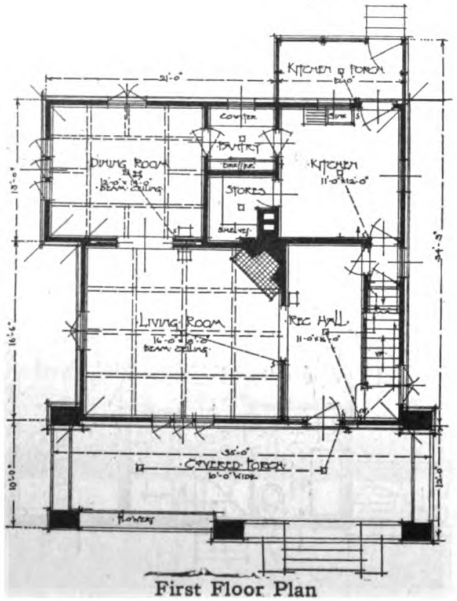
Front View



Second Floor Plan



First Floor Plan

HOUSE AT BIRMINGHAM, ALA.

William Leslie Welton, Architect

The acropolis, as it might be aptly termed, or that high plateau that surrounds Birmingham, is famous as the location of many well-planned houses of the semi-bungalow type, and the accompanying illustration is a typical example. The living room and dining room, both of them typically shaped, being almost square, have beamed ceilings, with a well-designed fireplace in the corner of the living room. The house is one of seven rooms, with ample closet space. The exterior design is typical of the section, and the pergola effect provides opportunity for a very attractive decorative scheme of trellises and their accompanying vines.

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Editorial

Loose Accounting Methods Versus Credit

RECENTLY W. L. Thompson, vice-president of the First National Bank of Portland, Ore., speaking at a convention of builders, made the following statement:

"The average contractor's account is not particularly attractive to the bankers. I think there are well-defined reasons for this attitude. I do not say that the contractor is entirely to blame; I believe the banker is partially to blame. But that attitude has been brought about by the looseness of methods of so many men who are engaged in the contracting business. I am sure that the average contractor's account could be made much more attractive if this looseness of method were eliminated. I refer particularly to the looseness with which your accounting systems are maintained. . . .

"My observation over a period of years in the banking business has been that most failures in all lines of business can be definitely traced to loose methods and the fact that the man in charge of the business did not know where he was at."

Such a statement from one of Mr. Thompson's standing should suggest to every builder that he turn the searchlight on his own accounting system.

Do you know where you stand? It is highly desirable that every builder keep an accurate accounting system suited to the size of his business, which is so devised that he may not only form an intelligent opinion as to his profits on each job, but that he may also readily show his client how the money is being spent. The practice of lumping a dozen and one items under that old classification, "overhead," is far from illuminating to the layman. Many an organization before this has toppled because of the great "overhead" it has had to carry. Before long every business man will be called upon to make out his income tax for the fiscal year ending December 31, 1920. This is no small task, and it may be more complicated by a poor accounting system. Carrying the bookkeeping department in one's vest pocket has been proved poor policy. Now is the time for a little self-examination.

Make *your* account an attractive one to your local banker by maintaining a cost accounting system that tells you exactly where you stand, and shows that your business always leaves a balance on the right side.

Mortgage Money and Building

ONE of the institutions now actively engaded in relieving the housing shortage by loaning money on real estate mortgages is the Metropolitan Life Insurance Company.

When Walter Stabler, comptroller of that company, referring to the shortage of homes, states that "the most serious shortage in the entire situation is that of money for mortgage loans to finance building operations," it is significant. This might be assumed to precede a statement that there was a shortage of money in the country, but Mr. Stabler continues:

"There is plenty of money in the country, but it has been taxed out of the mortgage market into other channels, where the chances of profit are greater or the income taxes less, or where securities are tax exempt. . . .

"Let us face the question squarely. Few of the many kinds of buildings that are now so much needed can be built unless mortgage money is obtained in large amounts. The life insurance companies, not subject to taxation in the same way as are individuals, can lend and are lending to the limit of their ability; but life insurance loans must be divided between city loans and farm loans, and farm loans do not increase housing to any extent. If all of the life insurance funds went into the building of places in which to live, they would be only a drop in the bucket to what is needed.

"It is, therefore, imperative that the funds of individual investors and estates be induced to return to the mortgage market if we are to have any resumption of building that will begin to relieve the present serious situation."

The remedy suggested by him is not more investigation, but is summed up as follows:

"Commissions and committees may meet, and resolve and report and suggest, but this does not produce housing. We have four years of nearly total cessation of building to make up, and we cannot make up and we can never catch up unless we go at it with unusual vigor. But we cannot go at it unless we have the usual funds for mortgages, and these funds cannot be had unless there is *relief from income tax requirements* on mortgage interest until the shortage is greatly relieved."

Exactly. Let us place mortgage money on the same attractive basis as other securities, otherwise capital will keep out.

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What of the Coal Question

By David H. Cuyler

APPARENTLY we have a problem to solve, and to the home builder it proves to be a very real problem, indeed. The obvious scarcity of anthracite coal and the soaring price of this commodity demands a most thorough consideration in the selection of a heating apparatus that will be adapted to the present fuel condition, both in the sense that it will be economical as well as efficient.

The whole civilized world is awake to the realization that something is decidedly out of gear in Coaldom. Things are certainly not as they used to be, when one could simply telephone the coal dealer and order him to deliver any desired amount of certain preferred grades at $4 to $5 per ton and then forget the matter. We find a condition today that seems to have placed the old relation of merchant and sought for customer in the discard, and to have clothed the would-be purchaser in the toga of an extremely humbled suppliant.

The fact of the case is that anthracite or hard coal is going to be an ever increasing luxury, and none of those to whom we may turn for advice hold out much encouragement that bituminous or soft coal will ever be adaptable for house warming apparatus. The retail prices of anthracite are soaring to dizzy reights and it is becoming scarcer and more and more difficult to obtain. We hear of suburban localities where a figure as high as $22 a ton is quoted and this with the restriction of a sufficient quantity for immediate needs only. And again it is evident to any one who will make a casual survey of the ash residue that the percentage of slag or slate content is higher, showing that a decidedly inferior grade of fuel is being marketed nowadays, and at a price that is two to three hundred per cent. higher.

WE have no reason to doubt that conditions in the anthracite coal industry are decidedly awry, and we fail to observe any faith provoking tendency on the part of those who have the destiny of this industry in their keeping that promises an attractive improvement of any interesting degree. Certainly the public as a whole tend toward a healthy optimism when there is a good basis for such a state of mind, but we have in this case very little, if any, reason for such optimism. Rising wage scales both for mine operatives and railway workers; shorter working hours; ever growing friction between capital and labor in all branches of industry bearing on coal production is not conducive to a faith that we will work out of the present situation and return to the economic concord of former days.

All of this tends to compel a careful speculation as to the final adjustment of these matters and what the true relation of this adjustment may mean to us as applied to our individual struggle for existence. This old world moves on in its well-known orbit, and fate or time will arrange things in the usual orderly fashion. It is seemingly hard at times for mankind to understand the trend of it all, but our natural propensity for adaptation at last places us in harmony with the re-adjusted scheme of things, and we continue to live and work and play, and the generations that follow after us will benefit through the fight we fought, for it ever has been that mankind gives birth to progressive thought in this travail of discontent with things as they are.

Taking this coal situation as it is, are we presumptuous if we ask ourselves: Is this, then, the passing of the coal age, and the beginning of some other fuel age that, when we have tasted of its offering, will prove to be another blessing after all?

When one considers the tiresome work; the dirt; the dreadful waste that attaches to the use of coal for house warming purposes, have we not every reason to expect something better of the future; some method for keeping our homes comfortable that will prove to be more in harmony with this age of labor-saving devices.

There are those connected with the engineering professions who think of this subject only as a problem, the set form of their plaint being that the public are face to face with the ordeal of producing a substitute fuel for coal as a medium for heating purposes. The writer prefers to make at least some effort to look beyond the mists that hide the future and speculate as happily as may be on what that future has in store for us. Nature will have her way with you, with me and with all material things, and her way has generally proved to be fair and commendable one in the final analysis.

THE problem of finding a suitable substitute for coal is already solved to a great extent. The larger types of heat producing plants are using fuel-oil in ever increasing quantities, and for the minor requirements, such as heating, cooking, drying, etc., we have both artificial gas, and in some localities, natural gas. Where hydro-electric power is available and electric rates are low, electricity has been

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found most satisfactory. In most localities, however, the rates are so high that the use of electricity for heating purposes is out of the question.

These fuels are here and ready for our use. We have but to adapt ourselves to the changed conditions their proper use demands of us. Heavy fuel-oil of the grade used in large plants cannot be efficiently adapted to home heating apparatus by any method that will prove beneficial. It requires an expensive equipment both for proper combustion and for storage, and in operation, the equipment demands far more expert treatment than the ordinary person will be willing to give it. There are several oil burning devices on the market for use with house heating boilers and furnaces. These make use of kerosene or partially refined oil, which, of course, is more expensive than the unrefined product. Undoubtedly, developments will be made along these lines. In selecting oil burning house heating equipment careful discrimination is necessary. Oil of any standard grade will carbonize and, unless the equipment is of the best this will cause trouble and demand frequent cleaning of the burner parts. The tank equipment for the storage of oil should meet the requirements of the insurance companies. In fact, to provide against undue fire hazard, it would be well to use only such equipment as has been tested and approved by the Fire Underwriter's Laboratories.

The acute ferment that is evident in the public mind must be met in some way. Manufacturers of all types of gas and oil burning apparatus report an ever increasing demand for some method that will eliminate the present dependency on coal. Hundreds of winter-weary men and women are investigating the many devices that are offered for their attention, and it is the truth that many of them are willing to try anything that offers a promise of ridding them of a condition that many consider is becoming intolerable. To the observant, it is obvious that we are on the rising crest of a wave that is going to sweep on until this demand has been met in some way that will benefit all concerned.

BE it understood that this paper is not advocating the adoption of either oil or gas as a fuel. The desire is to note the certain tide of discontent with present methods. There will be numerous interested people who will seriously consider the use of other fuels for house warming purposes who, upon investigation, will discover that the cost of this or that fuel will be quite beyond their present ideas of economy, and there are hundreds of others who have made a change and found the new equipment to be an unexpected acquisition of peace, comfort and adaptability.

For instance, the gas burning appliances that are at present on the market, are, many of them, more or less crude and some are largely experimental. Refinements which will result from mature investigation will be made and the subject will of necessity be studied from all points of view; but meanwhile it is more than interesting to note that such an authority as the editor of "Gas Age" has stated in a late issue of that periodical that "gas is undoubtedly the coming fuel for house heating purposes."

Artificial or natural gas as a fuel for producing heat for homes has been successfully adopted in many cities. Baltimore has hundreds of homes that are warmed by gas-fired apparatus, as has St. Louis and many more of the central western cities. In many of these cities, the block-rate system of gas charges is in vogue. By this plan, the larger consumer enjoys a much reduced rate over that allowed to the small consumer. This sliding scale is eminently fair and desirable, and as it has worked out without loss to the gas companies in these places, we may rightfully expect that it will be in more general use throughout the rest of the country before many years, especially if gas does become the popular fuel that the present outlook might seem to indicate.

Certainly the attractive features attached to the use of gas as a fuel are too well-known to need more than mere mention here. The utility of the gas cooking range over the ancient coal burner is proof enough for this claim. The almost total absence of labor; the entire absence of dirt or dust and the perfection of regulation that is possible with gas fuel places it almost in a class by itself.

We can at least make the most of this agitation, and profit through the good that comes of it. We have an intolerable coal situation as a very present problem; we have perforce to warm our homes and working places by some method. It will be for the future to adjust the supply to the demand, and as to gas fuel as a popular commodity we might expect and perhaps demand, a more willing and helpful spirit of co-operation on the part of the gas companies in some localities, in an effort to solve the problem in a way that will prove of lasting benefit to all that are concerned in the matter. It will be for the engineering profession to do their part in perfecting heating equipment which will insure a maximum efficiency together with a minimum operating expense. What the ideal fuel of the future is to be remains problematical. Whether electricity, oil, gas, or even as some now predict, wood alcohol, will prove most advantageous remains to be seen. However, one thing seems assured—coal as a universal agent for home heating is losing prestige—and the wise builder will carefully investigate all heating devices now available and install that which will prove most beneficial to the user.

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Beating the Overhead in Winter

By H. Colin Campbell

SOME of you may have heard of the Celtic lad who laboriously carried the family goat up a ladder and onto the thatched roof of the homely family abode so that the animal could eat the grass growing there, rather than cut the grass and bring it down to the pet. The reason given was that his grandfather used to do it this way—so why change?

Doesn't that apply to the far too common, in fact almost general, practice of suspending building operations in winter? What is the result? Overhead piles up, investment yields no returns, interest goes out instead of coming in. Why stop with cold weather? Getting the average building enclosed is the smallest part of the work connected with it. Just as soon as the exterior has been made reasonably weatherproof, all work becomes interior work, and but simple means are needed to facilitate continuance of

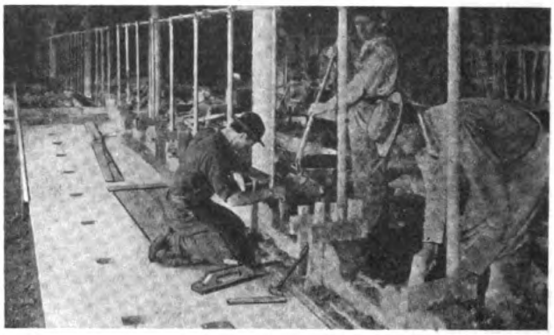


Working Under Cover
This hastily constructed shelter can be kept warm by the use of salamanders and the mixing done within the heated enclosure

construction with comfort to workman and profit to owner and builder.

One of the principal stumbling blocks to winter construction has been the concrete or masonry part of structures. As a matter of fact, in the average building such work is a relatively small portion of the entire structure. Concrete has become an almost universal foundation material, and foundation construction, using concrete, is one of the simples classes of concrete work to carry on during cold weather. The freshly laid concrete can easily be protected for the few days necessary against possible injury by freezing, then the remainder of the work can go on with even greater speed than that which might have applied to the foundation.

However, let us not consider a building using concrete in the foundation alone. The all-concrete building, regardless of its size, has for many years been proved a relatively easy all-winter job. The trouble is that few, or comparatively few, of the smaller builders and contractors have patterned after the larger ones who make cold weather concreting con-



Winter is a good time to make repairs to farm buildings, additions, etc., thus making ready for the spring and summer

struction a specialty. As a matter of fact, extreme cold weather, such as temperatures near zero enduring for several days, constitutes but a relatively small portion of the total winter. Between these extreme cold snaps are periods of milder weather that are no bar to any building operation.

Probably few of our readers have not at some time informed themselves as to the requirements of cold weather concreting. Probably most of them, however, have forgotten or neglected to apply these requirements and neglect has generally meant failure to prepare. The principal need is to anticipate work and store the necessary aggregates because when cold weather sets in the average gravel bank from which sand and pebbles must be obtained freezes up solid on the face and the materials are also filled with ice, so that they cannot be easily nor economically handled. With a good stock of sand and pebbles stored under any kind of a rough shelter that will keep them above freezing and dry, the greater part of the obstacle to winter concrete work has been overcome. If a large quantity of sand, for example,

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is to be used, it may be stored out of doors. The fact that it is piled in the form of a cone and may freeze two or three feet deep on the exterior simply makes this frozen section a roof for the material underneath, which can then be extracted by tunneling into the side of the pile. However, for the average



Warming the Aggregate
The sand and stone are piled over a large pipe, in which a brisk fire is kept burning

small job, this method of handling cannot be used, so the storage problem becomes one of providing a suitable shed that is weatherproof as far as snow and rain and extreme cold goes. Slight freezing of materials can readily be taken care of immediately prior to use, because sand, pebbles and mixing water must all be heated in order that concrete, when placed, will have a temperature of 80 degrees or more. In other words, concrete work in winter is merely duplicating by artificial means a few conditions which are natural to summer.

We know that concrete hardens best and most uniformly in the presence of warmth and moisture. If these can be maintained in cold weather, no matter how cold the weather may be, and can be maintained until the concrete has passed through the early hardening period, cold weather concrete work is a simple actuality. Immediately after the heated materials have been combined to form the concrete mixture, the concrete should be placed in forms free from ice and frost, which may if necessary be warned by steam or by throwing hot water on them, and also immediate protection must be applied to the concrete in place so that the warmth given it from the heated materials will not be lost until this warmth has had its proper influence in hastening the early hardening of the concrete.

Protection may be of various kinds. It depends on the nature of the work and how much it is exposed. Foundations are particularly easy to build in cold weather; the excavated trench furnishes practically all the protection required, except for such portion of the foundation as may be above ground level, and as this usually does not extend far above the ground, it is a simple matter to pile on hay, straw, or cover with tarpaulins and in that way retain heat and exclude cold for at least forty-eight hours, which is usually a sufficient time.

For exposed building walls the first protection comes from leaving forms in place. As a matter of fact, forms must be left in place longer in cold weather than during the warm weather, because, in spite of all cold weather precautions taken, the concrete will acquire its strength more slowly. Added protection may be given by hanging canvas over forms or nailing building paper on over form studs so that between paper and form sheathing there will be essentially a dead air space to act as insulation.

Interior floors such as barn, house, basement or floors of other buildings are very easy to build in cold weather because protection of concrete after placing is simple. Oil or coke-burning stoves may be kept going on the interior for a day or two and are certain to prevent freezing of concrete and to assist more rapid hardening.

Mixing water and aggregates may be heated in very simple ways. There are on the market coil heaters for mixing water, although devices quite similar can readily be improvised from any available old water or steam pipe.

Simply coil or form it similar to a radiator, prop it up and build a fire under the coils. Let the water circulate slowly through this coil by means of an open valve and you have a stove that supplies the warmed water. An old smoke-stack or boiler shell can readily be used to form a heater for the aggregates. Lay an old shell flat on its side, build a wood or any other kind of a fire within and pile the sand and pebbles on and about this stove, remembering to turn them over occasionally so that all particles will be equally heated.

Of course because of the few precautions necessary and different from the routine of warm weather work concrete work done in cold weather costs the contractor a little more, unless he arranges to specialize in it and do it regularly. In such a case the cost can



Thombone Coil for Heating Water
A fire built beneath the coil, which is filled with water, warms the water and starts circulation

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generally be passed along to the builder because the intending owner is quite likely to pay the small additional amount necessary to have uninterrupted progress on his work and hence earlier occupancy than have to wait until the whims of weather and season do not interfere. There is another advantage to the builder or contractor in that he may retain his efficient working organization intact, thereby fostering contentment in the organization because of more nearly continuous employment. All of these things reduce overhead and make interest come in rather than go out.

For the small contractor, who may be prevented by the whims of prospective customers from actually engaging in winter construction, there is the opportunity of preparing in winter for the early spring work. In other words, concrete block, cement brick and other special concrete products may be made in the workshop indoors during the winter, and by the regular building season be ready for immediate use. There is something in being able to stock up on permanent building units in this way during what would otherwise be slack seasons.

There has never been a time comparable to the present when the need for keeping things going was greater. A number of influences have prevented the past season from being as active in the construction field as was desired, and for this reason the then existing shortage of homes and other buildings has increased, and the pressure on contractors is likely to be great and hard to meet when our next regular building season opens. The winter months are a good time to keep going or to begin getting ready for an early start next year, and it should be remembered that the things which apply to concrete practice, making it possible to continue late in the fall, also make it possible to start early in the spring.

Facts About Fir Shingles

AS the quantity of red cedar logs diminishes and the price goes higher, the merits of Douglas Fir shingles are being exploited. No doubt our readers will be glad to obtain data on this subject. That obtained by *The Timberman,* which follows, should therefore prove of interest.

The Timberman: Your inquiry about fir shingles is at hand. The shingles are doing fine. We are making strictly vertical grain shingles and they will stand any test that cedar will.

They have been used both here in Edmonds and Seattle, both on the roof and for fancy side walls for bungalows. We shipped a car of kiln dried clears last week to Grand Rapids, Mich., a car of Star-A today to the same place, and at present have orders on hand for railroad shipments at last 25 days. In fact, the orders are coming in by telephone and we are beginning to figure on a larger mill to take care of the demand. * * *

Quality High. "I consider the fir shingle the equal if not the superior of the red cedar shingle, provided it is not made wider than six inches," states Frank C. Young, western representative of Nicola, Stone & Myers Co., at Portland, Ore. "We tried to introduce fir shingles to our trade about seven years ago," he continued, "but the price of cedar was so low they did not take well, and so we discontinued their manufacture.

"Back in Washington County, seven miles west of Portland, there is a store that was roofed with fir shingles 38 years ago and as far as I know they are still in service. They were put on when I was a boy and lived nearby."

Determined to see in what condition that roof was today, a representative of *The Timberman* and Mr. Young made an expedition to the site of the store and found it completely razed and a new building in its place. Fortunately the work had only been done this year and in a pile of old lumber were discovered samples of the old roof. Some twenty years ago an addition to the store was made which was roofed with cedar shingles. The cedar shingle shows considerably more wear than the fir shingles put on 18 years before. The fir shingles were hand rived and shaved.

When asked about the condition of the fir shingles, A. S. May, proprietor of the store, stated that most of them were sound when removed. The portion of the roof covered with them he stated never gave the slightest trouble from leaking.

As a further indication of the life of fir shingles, it is interesting to note that a barn belonging to Davis Barker, of Dorena, Ore., has a roof laid with white fir shingles which is over 40 years old and still in an excellent state of preservation.

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Laying Slate, Asbestos and Asphalt Shingles

By L. S. Bonbrake

Part IV

REFERRING especially to slate shingles, it will be found that a car load will vary in gage to some slight extent, and these shingles are assorted by roofers in various localities, the lighter slate going to the top, while the heavier are used at the bottom of the roof. A very good time for assorting these shingles—usually in two lots only—is when punching holes for nailing, with the machine.

It will be noticed that black slate splits lengthwise, while green breaks across the slate; hence, culls are looked for coming in that way. But, little trouble, however, will be experienced from that cause, for as a rule No. 1 slate is clean, sound stock, the larger sizes, if not perfect, being cut down at the quarry into good stock of smaller dimensions.

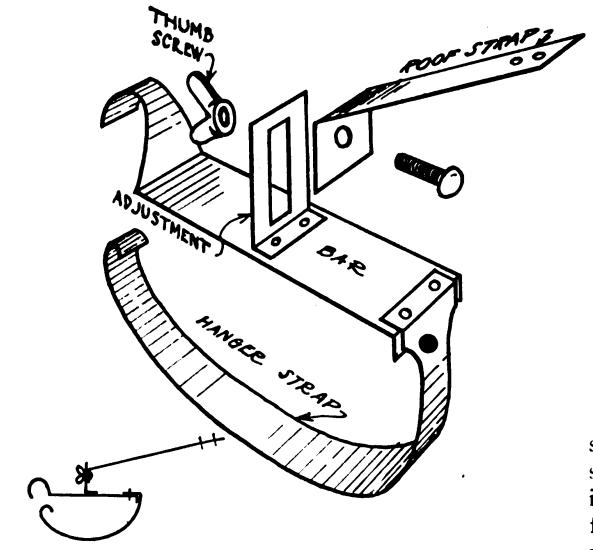
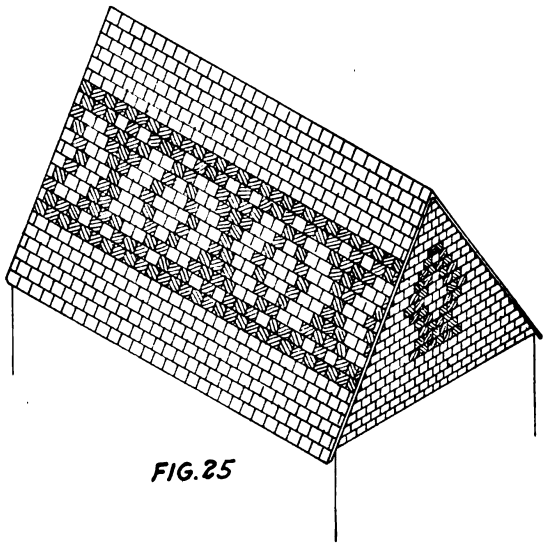


Fig. 24. Adjustable Eave Trough Hanger

The Hanging Eave Trough.—A hanging eave trough may be used without nailing through, or without detriment to the shingles, by either using brackets, or nailing the roof bars onto the sheeting as shown at J, Fig. 1, Part I (September issue). The bars are shown bent to the proper pitch for giving an easy flow of water; at the high point of the trough the bar is bent close up to the bolt hole with each successive one slightly longer in the direction of the outlet. These bars are nailed to the sheeting at intervals of approximately 3 ft., the bolt end projecting far enough forward to meet the slot standard (see Fig. 24) when the back of the trough is in position against the facia, as molding. Nailing through slate to secure eave trough hangers is to be deplored. By so doing the probability is that a number of pieces of slate will be broken, the nails will work loose with the inevitable result of leakage, and the slate condemned for something for which it is in no manner responsible.



Ornamentation with Colored Shingles

The eave trough hanger illustrated in Fig. 24, or any good type of adjustable hanger, will answer requirements, and bracket hangers may be purchased from the same dealers.

Ornamentation.—The several colors in which slate is quarried, and in which the other shingles under discussion are manufactured, give an opportunity for the display of taste in working up designs for orna-

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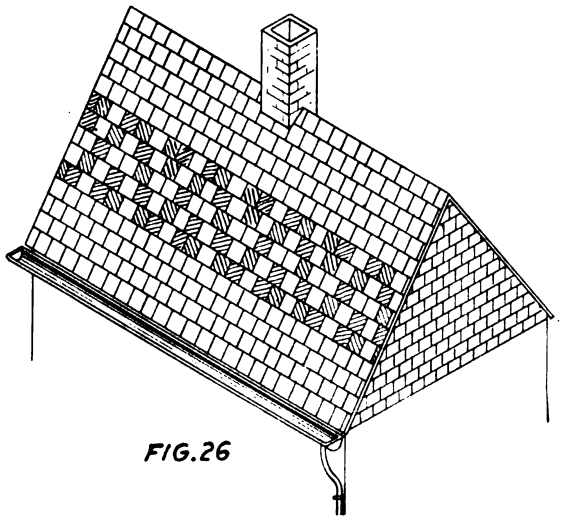
mentation with blendable colors which will add to the attractiveness of the work. Random color-blend work is becoming quite popular. Geometrical designs while used to a large extent several years ago, are not now so popular, although still followed extensively in some localities. Hence a general outline of the process may not be amiss here.

Red slate is used to some extent in several localities, but its high cost per square, owing to its scarcity, precludes its general use.

Purple for figure on a green body has been found quite satisfactory and harmonious for work at a moderate cost. Asphalt and asbestos shingles are made in various color tones, and the colors can be so variegated as to provide a pleasing effect.

Several designs are illustrated in Figs. 25, 26 and 27. In order to have the work balance properly, it is necessary to know the length of the rafters, and the width of the section to be covered, when a rough diagram may be drawn locating each shingle. The design shown in Fig. 25 is popular where used, and not hard to work out on the roof. In this case, it requires 23 courses of 10 x 20 in. slate to cover from eave to comb (rafters approximately 16½ ft. long), the color designs showing on eleven courses. It should start with the seventh course and work out balanced in center. Where shorter rafters are used, the solid band at top and bottom of design may be omitted, in which case the color should be started so as to center the design.

With the eave 31 ft. long, 37 shingles will cover

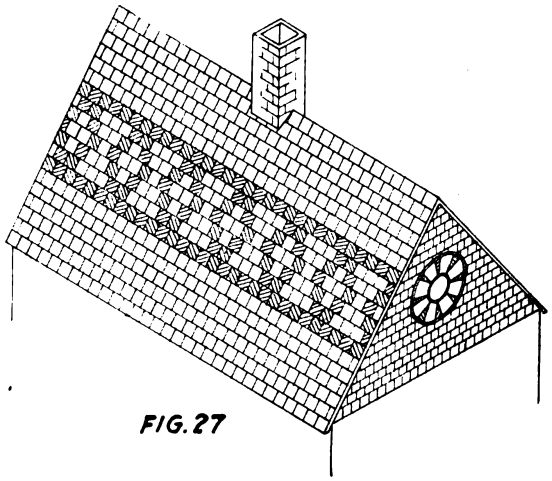


A Simple Pattern

from gable ends, by which a draft of the color scheme may be made, with a dot on each space designating color, making them easy to lay without retarding execution.

If the front end of a dwelling is to be sided with shingles above the eave level, as is sometimes the case, it is advisable to use one of the smaller sizes for appearance, and a small figure may be worked in as shown in Fig. 25 or 27.

The shingles are started at the square of siding for



A Good, Yet Not Difficult Design

the gable in the same manner as at the eave, with the "eave row" laid lengthwise over a lath, and are finished at the gable cornice by laying under the frieze board, or rather, lay the slate, and then nail the frieze board over their upper edges.

Measurement.—Roofing slate, asbestos and asphalt shingle manufacturers usually ship only sufficient pieces of the size specified (in each bundle) to lay a square, allowing the regular lap specified and no more. Hence it is necessary to charge for all loss of material required in cutting to fit valleys, hips, etc.

For a plain roof, of course, the length of the roof is multiplied by the length of the gable, no deduction being made for skylights, chimneys, scuttles, or other obstructions unless they measure more than 4 ft. square, when one half is allowed. If more than eight feet square the whole is allowed.

Hips and valleys are charged extra by adding 1 ft. to their length, as noted in Fig. 28. For the number of square feet in this section, add the top 4 ft. to the base 8 ft., which will equal 12 ft. Multiply this by half the length or perpendicular which in this roof is 12 ft., so that 12 x 6 = 72 sq. ft., to which add the length of the valley 13 ft. wastage, and the result will be 85 sq. ft. to be charged for.

Extra shingles required for a double thickness at the eave, will be a total loss unless charged for, which is almost invariably done by adding what the first course shows to the weather, by the length of the eave.

Estimate of Cost.—Experience has shown it to be

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incorrect to make one general price for all character of buildings, and under all conditions, especially for country or rural work, and it is suggested that estimates of this class of work be gone over with care, and notation made of all items entering into the expense or cost of each job.

An item to be observed in handling out-of-town work, especially slate, is to estimate accurately the surface sufficient to cover, and require at the same time at least a minimum carload, as slate cannot be

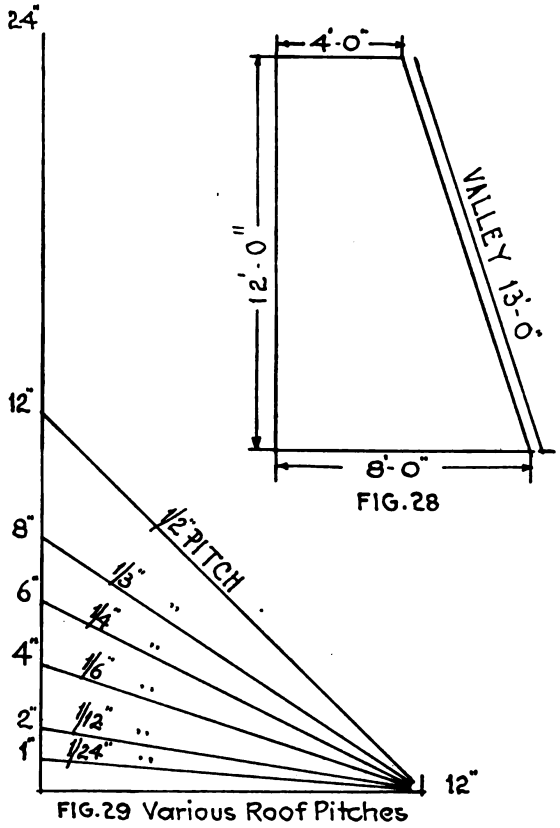

FIG. 28

FIG. 29 Various Roof Pitches

shipped locally on account of the excessive freight charges.

In rural communities an agreement can often be made with the owner of the building or buildings that he haul the slate from the nearest railroad siding to the premises where it is to be used, and that he also return all slate not used to the contractors home yard, or allow storage room until its disposal in that neighborhood can be effected; also that the men laying the roofing be boarded and housed, and the horse or horses used for conveying workmen to and from the job be fed during the time necessary to execute the contract.

Frequently an arrangement can be made for parties receiving shingles to pay the freight, which is an item of considerable moment, where the heavier materials are used. Having disposed of these matters the estimate of cost will be narrowed down to the cost of the delivered material; expense of time to and from work, which will vary according to the distance and conditions; felt under shingles, where used; nails, when not furnished, requiring 1 lb., 2 oz. 3 d galvanized, for 12 x 24 slate, and 1 lb. 11 oz. for 11 x 20 in., the amount increasing as the slate decreases in size; time in elevating and scaffolding on the roof, and extra time on dormers, gable ends, chimneys, deck, hips and valleys or other extra work as it may be encountered on the various jobs.

Cob, and hip cap or ridge roll, flashings, chimneys, decks, skylights, etc., all foreign work or material different from and additional to the material of the body of the roof is charged for extra, the same as in connection with wood shingles. For home work, drayage must be considered, with all the expense, or extras named, and more as they may come up, which may be adjusted according to conditions and judgment of the contractor.

If a price cannot be gotten which will justify doing the work well and using good materials throughout the roof, that particular job should be let alone; however, it is good policy to explain the matter to the owner fully, letting him know why you are higher, which may react to your future benefit.

Acute taper work, after the manner of the old style church steeple, is very tedious. When executed with the smaller size shingles having continuous cutting and wastage, especially where built in octagonal form, there is no fixed rule to meet the case for measurement or cost estimate. One added foot for the length of each of the eight hips will scarcely meet the condition for extra time, waste, etc., and will not count as large in square feet as to count each side of the octagon as straight from the base to the top, as is the practice in several localities.

As an example of actual practice, consider a steeple 21 ft. high, each octagon 3 ft. 8 in. at the base, and 4 in. at the top. The actual surface is 42 x 8 = 336 sq. ft. Add to this 21 x 8 = 168 sq. ft. for hips, making a total of 504 sq. ft. Compare with the method referred to, i. e., figuring each side as 3 ft. 8 in. wide straight up, or 8 sides each 21 x 3 2-3 = 77 x 8 = 616 sq. ft. This shows a gain of 112 sq. ft. over the other method, and is on the side of safety in figuring cost.

It is suggested that the better policy for work of this character is the cost-plus method. In this case the builder gets what he wants, and the roofer gets his pay without a gamble, plus a reasonable profit.

The Pitch.—A quick kink for tipping off any designated roof pitch, a hard matter for some flocks to get at, as named "one-third" or "one-fourth," etc.,

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is to divide twenty-four inches by the fraction of the pitch named as shown in Fig. 29. As an example take one-half pitch, ½ of 24 = 12 in. on each blade of the square; or one-third pitch, 1-3 of 24 = 8 in. on one blade (rise), 12 in. on the other (run), and so on along down the line for any pitch that may be named.

The various forms of shingles made of the several materials coming under the title of this article are largely advertised by their makers, who are always pleased to send literature describing their product. Such shingles present a good appearance, good wearing qualities and are fire resisting. Hence the carpenter and roofer will find it to their profit to get out after all the roofing needed in this neighborhood, contracting for roofing, and using shingles of this class. They are entitled to it as fully as any other work they do.

FINALE

About the year 1880 a certain firm found it was losing considerable money in the hardware business by not knowing how to lay slate shingles. Anxious to get into this business, it contracted to do the slate work on several buildings at the regular price of that date, also all the sheet metal work. The slate contracts were given over to a good practical slate roofer of another town at the price contracted and the writer helped lay the slate, thereby getting many practical lessons in slate roofing. In addition the firm made a profit on the sheet metal work. Since that time the writer has "tacked 'em down" by the thousands in all the several forms described, always with an eye open for new and meritorious types as well as improved methods. He can now lay down the hammer at this late stage of life with a gratification in knowing that his work in that direction has been well done.



Rear View
HOUSE OF MR. JONES, JR., DETROIT, MICH.
Harry Muehlman, Architect
(For front view and plans of this house see page 43)

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Messina: A City Arising from Its Own Ruins

LIKE the phoenix arising with renewed beauty and vigor from the ashes of its destruction, the city of Messina, a city beautiful, is arising from the devastation of the great earthquake of 1908, defying, with a new type of construction, the earthquakes which have so often wrecked the city.

Plans for rebuilding this city include a number of the most modern ideas in city planning. The center of the city has been established in a new section, one which has been completely leveled. Instead of the old, cramped streets, there will be a large plaza, around which will be grouped the municipal buildings. Nearby is the beautiful municipal theatre, one of the few structures which was not entirely destroyed by the last earthquake. Branching out from the square are lines of new curbs, sewers and graded



This photograph shows the masonry work completed for the first building in one of the villages of the Mugello district, wrecked by earthquake

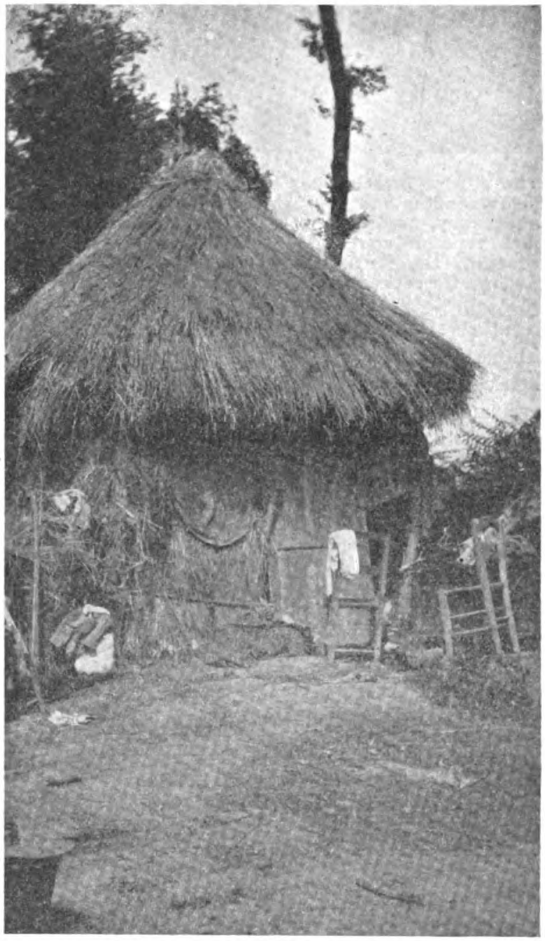
streets, marking wider thoroughfares than ever before existed.

The first of these new public buildings, the municipal building in which the headquarters of the local and provincial officials will be located, is now well under way. It is a great, broad structure four stories in height, its foundations resting upon the almost solid rock. The outside is faced with cut stone, which gives to the building an extremely artistic appearance, but the interior shell is of re-enforced concrete.

Reconstruction officials believe that in the use of this type of building, of re-enforced concrete and built upon solid rock, and of great bulk, they have solved the problem of circumventing the earthquake. For in only a few places was the bed rock broken during the upheaval of 1908.

Measures have been taken to enforce strictly, in the construction of new buildings of considerable size, the specifications of eminent Italian engineers and architects, whose structures will withstand any future shock equal to that which almost annihilated the city in 1908.

Little has been done, as yet, toward rebuilding



Huts that look like Fiji Island villages were erected in the yards of houses destroyed by the earthquake in the Mugello Valley, Italy. These were replaced by barracks sent by the American Red Cross to the earthquake committee. If the new type of construction used at Messina is successful the entire valley will be rebuilt in the same way

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the residence districts. A large part of the population is still housed in the barracks which were erected by the American Red Cross immediately after the earthquake. These barracks have been practically the only substantial shelter in Messina since the disaster.

Messina has been severely handicapped since the earthquake wiped out 70,000 people within the space of two minutes. Hundreds of the remaining population fled from the island. Others, many of them



The city of Messina has been standing for twelve years roofless and unrepaired. Plans are now well under way, however, for rebuilding the city with a new type of construction which will defy, it is thought, the earthquakes which have so often wrecked homes and buildings.

adventurers, hoping for the profits that would come with reconstruction, flocked in a few years later. Then came the war and all plans for reconstruction were laid aside until last winter, when the project was taken up again. The work was actually started a short time ago. The few who did reside in Messina, are just beginning to get upon their feet again and they are planning the reconstruction of their city with renewed energy. Messina is to be rebuilt on a grand scale, well-planned and well thought out, in keeping with its growing importance as a port in the Mediterranean.

Wet and Dry Sand for Concrete

Wet Aggregates Require More Cement Per Cubic Yard of Concrete

During the past month several series of tests of concretes made from Potomac River sand and gravel have been carried out, using various proportions of cement to aggregate from 1 :1½ :3 to 1 :3 :6 and with the extremes of flowability used in practical concrete construction work, according to an article in *The Scientific Monthly*. The results of these tests emphasize a feature of considerable importance to the contractor. When aggregates are proportioned by volume measure, as is customary on most constructional work, it is found that the use of wet aggregates requires from ½ to 1 bag more cement per cubic yard of concrete than do dry aggregates. Sand is generally wet or at least moist when used, so that the full difference may never be apparent in field practice, yet the use of sand from a pile which has just been exposed to rain will result in the employment of more cement for a given volume of concrete than would have been the case had the work been done on a dry day. The excess strength resulting from the increase in cement is unnecessary, providing that designed strengths were obtained with the drier materials. As above mentioned, this increased quantity of cement may be as high as one bag per cubic yard of concrete, and the increase in strength, due to the added cement in a cubic yard of concrete made with wet aggregates, is roughly proportional to the increase in cement. Therefore, if there is a marked increase at any time in the moisture carried by the sand the tendency on the job should be to use larger volumes of sand in the batch.

Marked improvement in the working qualities of the concrete will be noted under usual conditions when the relative volume of sand is increased and the gravel proportionately reduced. With well-graded river sand and gravel, such as is available in the District of Columbia, the "oversanding" may be beneficial up to the point where the volume of sand in the batch is equal to the volume of the gravel. Such concrete will not segregate for maximum flowability commonly used in construction work; it will be easier working, the quantity of cement required per cubic yard will be slightly less and there will be no reduction in compressive strength.

Are You a Leader in Your Town?

Initiative is given its word of praise in the current issue of *Forbes Magazine*. Have you, it asks, ever stopped to consider the value of being the first to do a thing in your town? Think of the free advertising John Wanamaker got, to say nothing of the tillsful of cash, by being the first to boldly advertise "20 per cent. off." And did you notice that Henry Ford, by being the first to start cutting automobile prices, was given free advertising on the front page of every newspaper in the land, many of them going so far as to print in detail the old and new price of each make of Ford car? It often takes courage to blaze a new trail, to embark upon an important experiment, to dare to be a pioneer. If you have simmering in your mind an idea which you feel would make a ten-stroke with the public, but which you hesitate to bring forth until circumstances may compel you to do so, just think of the experiences of Wanamaker and Ford. The people admire a leader more than a trailer.

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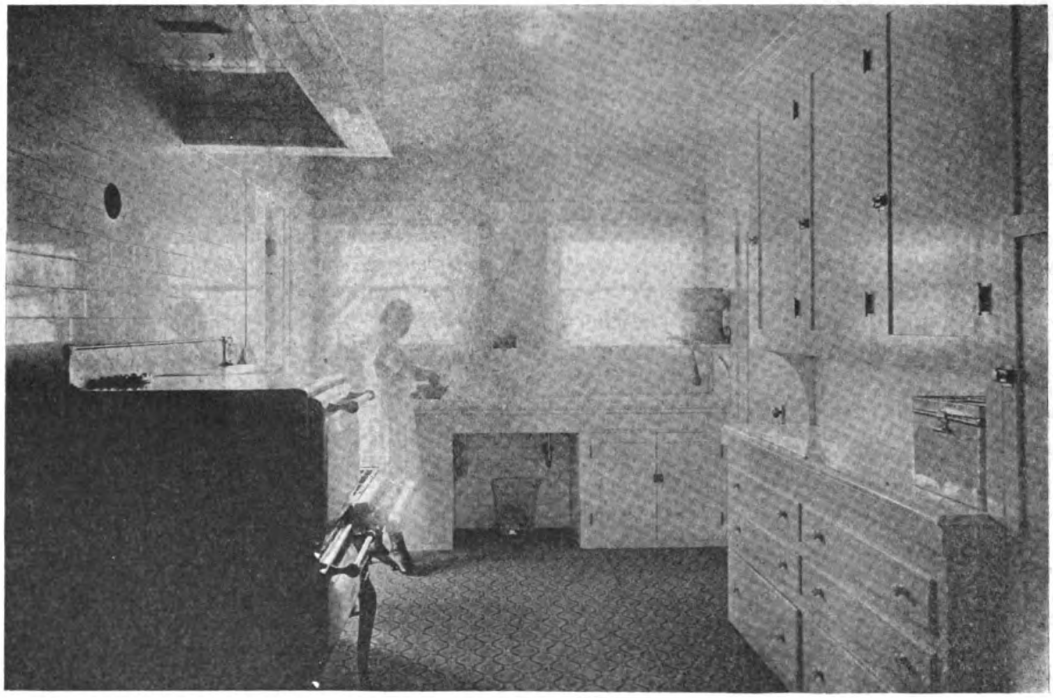
Planning the Bath-Room and Kitchen

By Charles Alma Byers

THE two rooms of the home in which the housewife of to-day is especially interested in having well-planned are the bath-room and kitchen. This is true even of the woman who can afford to employ servants, and can obtain them, and is particularly so of the housewife who prefers to or must do her own housework. The former is interested because she has frequently been made to realize how difficult it is to retain her "help" even under the most favorable conditions, and the latter is concerned for the very good reason that she naturally wants to be enabled to keep her house in order with the very least labor possible.

The bath-room and kitchen, to be kept clean and tidy, require, at best, a great deal of attention daily—doubtless far more than any other two rooms. This work, however, is very materially lightened, or reduced, as well as made more or less of a pleasure, if these rooms are planned and finished as they deserve to be—and as today, thanks to a better regard for the housewife's needs, they usually are. And it is, of course, largely to the builder or designer that the home-owner-to-be must look for suggestions along that line, as well as for their consummation. Hence, for designers and builders, as well as for future home-owners, the accompanying illustrations will no doubt have something to offer of practical interest, particularly in respect to the planning of built-in conveniences.

The bath-room shown, it will be observed, has a most excellently planned combination of built-in features, consisting of a pair of corner cabinets of shelves and drawers joined together by a box-seat. These are placed against the room's one outside wall, which is approximately eight feet in length, and, extending into the room but thirteen inches, top measurement, they naturally utilize very little of the floor space. Each corner feature is two feet eight inches long and reaches to a height of three feet four inches, while the countershelf comprised by its top is, as



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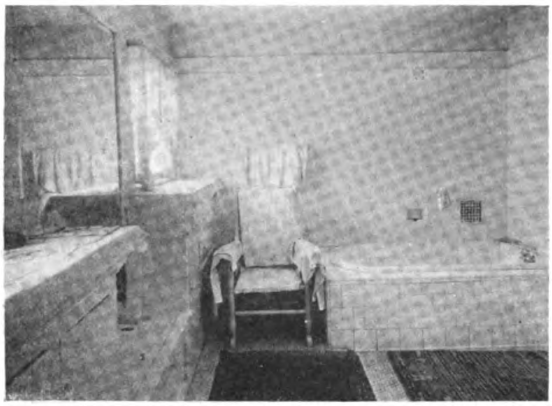
stated, thirteen inches deep. The cabinet in the farther corner contains a narrow compartment of shelves in the forward end and three shallow drawers and a clothes-chute receiver, with a bottom-hinged door, in the other end, the latter comprising about two-thirds of the total length; and the cabinet in the nearer corner, only a part of which is shown, consists only of three long shelves concealed by a pair of ordinary doors. The seat between these two features, which, being of the box type with a hinged top, serves both as a practical seat and a convenient receptacle, is about two feet eight inches long and fourteen inches high, while its depth virtually corresponds with that of the tops of the cabinets. Above each of the corner features is an approximately half-length window, and above the box-seat is a broad and especially serviceable plate-glass mirror. The shelves and drawers and the box-seat, by providing such



A bath room with built-in cabinets and box seats

convenient places for linen, toilet articles and other bath-room accessories, constitute a particular help toward keeping the room in order.

This bath-room, it should be further observed, is floored with tile, and the walls, to the top of the windows and doors, are also tiled, while the tub itself is tiled in. All woodwork, including the built-in combination, is finished in white enamel. The floor and walls, including the woodwork, are, therefore, easily washed and thus kept clean. The room is heated from a furnace, the radiator being in view over the bath-tub.

The kitchen shown by the other illustration is liberally provided with built-in cupboard space, comprised of drawers, door-concealed shelves, and so forth. Note, for instance, the special drawer section on one of the side walls, which contains a total of six drawers, and the shelf compartment, with its three doors, above; also that under one end of the sink drainboard is a two-door compartment of shelves and under the other end two deep drawers, while, further, there is a small and very shallow drawer in the top of each of these drainboard compartments. And not clearly shown in the illustration there is still another very convenient feature, in the nature of a special closet for pans and other cooking utensils, at the nearer end of the large cupboard of shelves and drawers. In the way of smaller details attention is invited to the water-container shelf over one end of the drainboard, the special recessed holder for soap above the sink, and the ceiling hood over the range.

The floor of this kitchen is of pine, covered with linoleum, and the walls, to the top of the doors and windows, are tiled, while tile is also used for the drainboards of the sink and for the countershelf above the side section of drawers. The woodwork is finished in white enamel. Hence this room is also easily kept clean and in order. Due to the white tile and woodwork and the two windows over the sink, the kitchen is bright and cheerful and a very pleasant place in which to work.

Surely a kitchen and bath-room of the kind here illustrated will appeal favorably to any woman directly concerned in the care of her home. However, they are presented mainly as suggestions, with the expectation that various ways of changing them to suit individual requirements the better will readily become apparent.

The Elusive Apartment

The following appeared in the questions and answers column of a recent issue of *Transatlantic Trade:*

Q. What are the prospects of an American, intending to return to Berlin to resume business, of securing an apartment?

A. There are today over 40,000 people in Berlin waiting to secure apartments. They have made application to the so-called Wohnungsamt and are taken up in order of their application. So long as you are outside of Germany your application will not be considered unless you can show that permission has been granted for you to enter. In the meantime it is possible to secure hotel accommodation, Pension, or single rooms in private apartments.

January Building Age

Following a usual custom, BUILDING AGE for January will be a special Planning Issue. A large number of constructive articles that will be particularly helpful to builders in securing new business will be features of the text.

In addition to the usual number of attractive illustrations there will be featured in this issue a recently decided competition for an important element of planning in domestic interiors. Watch for this!

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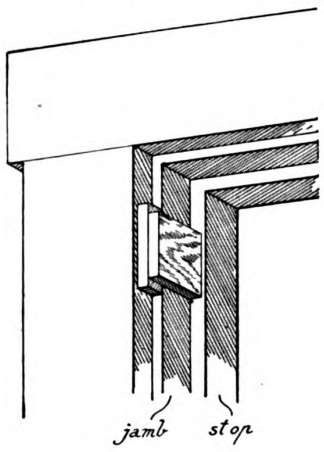
Combined Casing and Stop Gauge

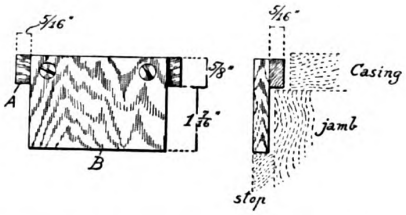
By Henry Simon

A VERY small and simple, but exceeding useful article for the carpenter and builder is the gauge shown in the illustration, which serves the double purpose of determining the position of the casing and that of the stops on doors or windows.

The instrument, consisting of a couple of wooden blocks fastened together, can be made in ten minutes, but on account of its remarkable usefulness, it will pay the carpenter to use hardwood and spend fifteen minutes in making an article which will last him for years and save untold time and trouble.

The block A is about three inches long, 5/8 in. wide and of a thickness corresponding exactly to the rabbet formed by the casing on the jamb, which is commonly 5116 in. or 3/8 in. The block B may be 3/8 in. thick, and its size is determined by the length of the block A and the thickness of the door or window. It extends far enough away from the inner face of A to set the stop off the required distance, plus 1/32 for clearance. Its width is such that it is offset





a distance exactly equal to the thickness of the block A (the size of the rabbet formed by the casing) at either end of the latter. It is best to cross the grain on the blocks if a permanent tool is desired, and to fasten them together with glue and screws.

In setting a casing, the block is first slid up against the header as far as it will go, when the top of the block A will indicate the height of the upright, or the heel of the miter in a mitered casing. The casing can now be cut and nailed on, the gauge being slid along as the casing is nailed. No marks are necessary or even desirable, since the proper position of the casing is indicated without fail whenever the casing touches the gauge.

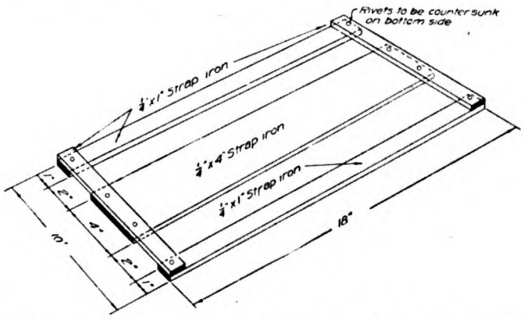
The position of the gauge remains exactly the same in setting the stops.

In addition to the greatly increased rapidity of working which this little instrument permits, it has the added and perhaps still greater advantage of rendering errors practically impossible, which is not the case where marks are depended upon. Nor is it possible to turn the tool the wrong way by any chance—it works in one position only, and yields results in none other.

Gauge for Concrete Blocks

The handy little gauge shown in accompanying illustrations is being used by the Voelker Realty Company of Dubuque, Iowa, states *The Concrete Builder*, to insure accuracy in laying up concrete





The gauge used by the Voelker Realty Company insures even mortar joints and regular block courses

block. It consists of three pieces of iron one-fourth inch thick, riveted together with strips across the ends.

The gauge is laid on the block, the closed portion in the center covering the opening in the block. Mortar is then spread in the open spaces and struck off even with the top of the gauge. This leaves an equal thickness of mortar at all points and insures straight, even mortar joints and regular block course.

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Lumber Market Review

Curtailment of Production Follows Price Decline—Demand Light—High Retail Prices Generally Maintained

PRICE readjustment in structural moods with exceedingly light buying, and a further decline in hardwood values, were outstanding features of the lumber market the past month. Toward the close of November the number of inquiries from dealers was on the increase, but there was no improvement in the volumes of business booked. Indications are that hardwoods have not yet struck bottom, although in construction woods, such as yellow pine, North Carolina pine and Douglas fir, the market is gradually struggling toward stabilization. No further general decline is looked for in these woods, although the process of readjustment to reestablish the natural spread between the different grades will doubtless continue. Undoubtedly the lower grades of pine and fir will not go any lower, and such items as roofers will probably advance two or three dollars, because these items are now selling below the cost of production.

Eastern, Western and Canadian spruces have dropped down more in line with competitive woods, and California redwood and Eastern hemlock have also undergone a readjustment, and will probably remain steady. Hemlock, for instance, is now wholesaling at New York on a $50 base. Eastern and Western white pines are very strong, with an upward tendency, and cypress is also very firm, but there is little buying. Spruce latch is wholesaling at around $8.50 per thousand, but it still very weak. Western red cedar shingles have been fairly firm the past month, but there is no buying and the prices may be forced lower.

Reports of the various lumber manufacturers' associations show that the tendency to curtail output is now general. More than 50 per cent. of the West Coast lumber mills and fully 60 per cent. of the shingle mills in the Inland Empire have closed down and the remainder are holding production down to 50 per cent. of normal. In the South fully 75 per cent. of the smaller mills which began operation during the rising market have shut down and the larger plants are materially curtailing production. Notwithstanding this, however, production, generally, continues to exceed both shipments and orders received at the mills, and stocks, accordingly, are increasing at points of production.

Fairly conclusive evidence that the market on structural woods has struck bottom is contained in lists recently issued by large yellow pine producers. These are known as "minimum lists," meaning that the producers will not cut prices another cent even if they are forced to shut down entirely. In imparting this information to the trade, the mills apparently did not intend to arbitrarily fix a price at which they could make a good profit, for they explained that many of the items listed were being sold under cost of production, and as soon as conditions improved they intended to bring these items up more in line with good business prudence. They stated most emphatically that they did not intend to continue in business for their health, and if prices did not justify their continuing operation they would close down.

Due largely to the fact that many wholesalers, some of them very large ones, have been caught with a quantity of high-priced lumber contracted for prior to the price landslide, there is a wide variance in quotations, in a few instances the prices differing as much as $30 to $50 on identical items. This especially applies to hardwoods of the better grades. The spread between grades of most structural woods is narrowing.

In all branches of the lumber industry the opinion is freely expressed now that little improvement may be looked for until after the first of the year and probably not until early spring. The inquiries received from the yard operators in the agricultural districts of the Middle-West indicate that these retailers are already beginning to figure on their 1921 requirements, but no orders of consequence have been placed. In the large centers, such as New York, Chicago, St. Louis and Philadelphia, the retail yards are in fairly good condition as to stocks on hand, so the demand for lumber from these consuming points will probably not reach any volume until spring.

While substantial price reductions have occurred in wholesale prices during the past two months, as yet these have not been reflected in the retail market.

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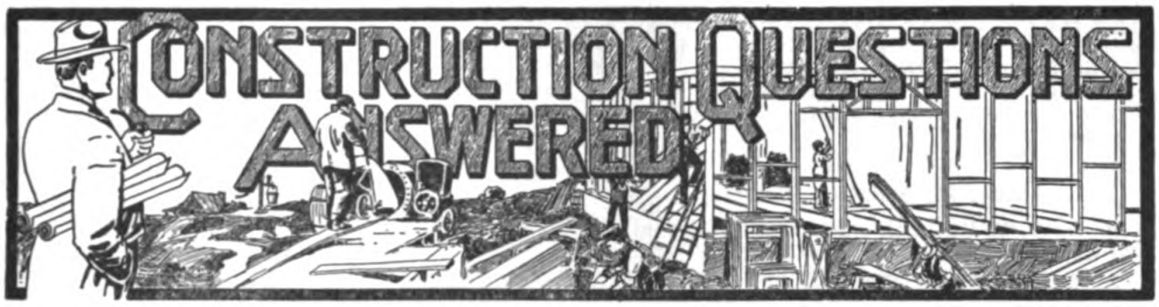

Roof Construction for a Barn

From F. W. S., Tucson, Ariz.—I would appreciate it if you would answer the following questions concerning the section of a barn shown in the accompanying blue print (Fig. 1): Would the truss as shown be sufficiently strong to support a shingled roof and resist average wind pressure? No snow load need be considered in this case, and the trusses are spaced 10 ft. 5 in. on centers. Would any other type of construction be more economical or satisfactory for the given width of barn (32 ft.) and height of hay loft (14 ft. 6 in) where it is desired to have the space unobstructed for storage purposes? Are girders, posts, etc., as shown, in accordance with the best practices of structural design?

Answer—After examining the framing shown in the blueprint I would advise you that this is adequate for the load you specify. For the size and arrangement of barns shown, I do not think any great economy could be obtained by a different arrangement. Framing for barns of this nature follows two general plans, namely, that shown in your drawing in which trusses are used, spaced from 10 to 15 ft. apart and the rafters carried on purlins, or of the type in which light truss members are spaced from 24 to 32 in. on centers and the roof sheathing nailed directly thereto. This type was

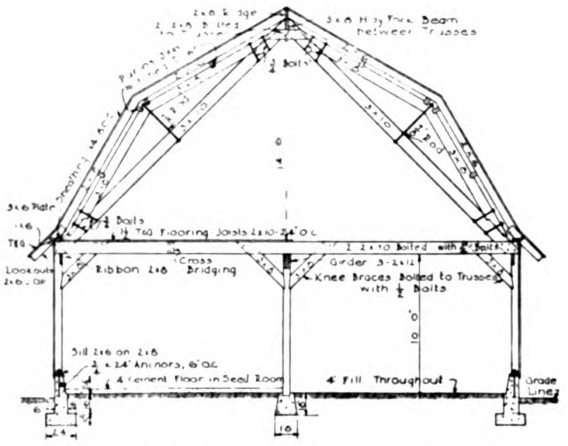

Fig. 1. Design submitted by F. W. S.

illustrated in an article appearing in the August issue of BUILDING AGE, entitled "A Group of Farm Buildings at Lantryville, Ill." The cross section is illustrated on page 32, the span in that case being 40 ft.

The accompanying sketch (Fig. 2) shows framing

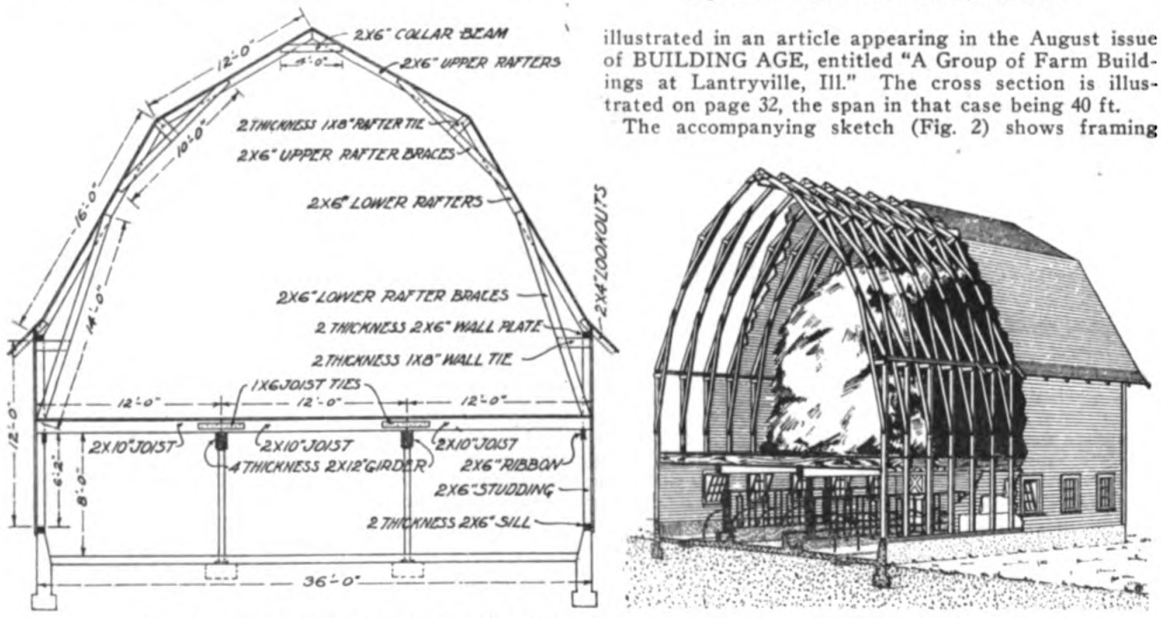

Fig. 2. Type of barn framing, using light trussed members, spaced 24 in. on centers

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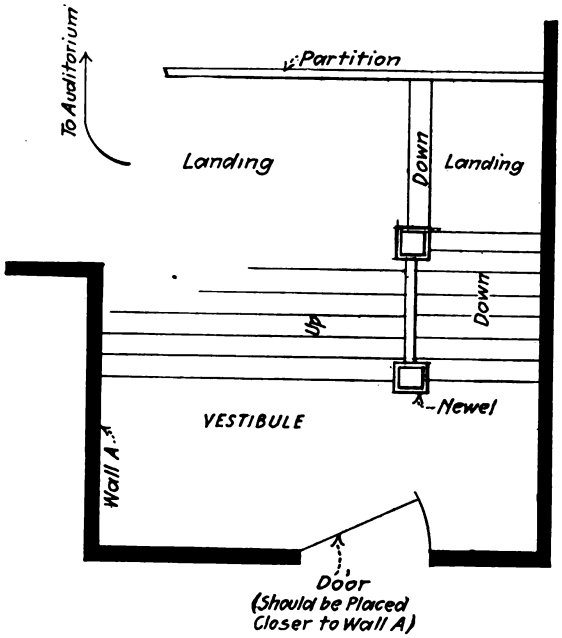
for a barn having a width of 36 ft., in which these light members are used, spaced 24 in. on centers. The sizes and arrangement shown would be satisfactory for the barn you contemplate building. This also permits a larger hay loft than is shown in your drawing. Many of the barns require this very large unobstructed hay loft.

The Mistakes of Builders

From R. W. W.—After reading an article entitled, the mistakes of builders, I recalled to mind several such instances. Fig. 4 is one of them. The structure is a church and the plans for it were drawn by a big city architect. The entrance way is in a bell tower.



The front door is in line with two stairways. The vestibule is small and every time there is a funeral, there is always much confusion in handling the casket in and out, the two newel posts being right in the way. The entrance door could have been placed closer to wall A, which would have been much better.

An Accurate Method of Laying out Studding

From A. P. S., Mont.—When you get a bright idea and after trying it out find it works it seems as though one should pass it along for the benefit of others. For some time I have been making use of a quick and accurate method of laying out studding for partitions, etc., by means of a marking template, and, believing others may profit by using the same, I will endeavor to explain this method.

The illustration Fig. 1 is an isometric drawing of floor joists, rough flooring, toe sill, top plate and marking template. The rough flooring is marked 1; the toe sill to which the studding is nailed at the bottom 2, and the top plate, 3, is tacked temporarily to the outside of the frame, with the edge up so that both sill and plate can be marked at the same time.

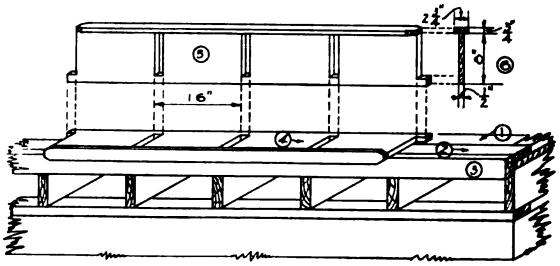


Fig. 1. Isometric view of floor construction and marking of template

After the stud markings are made the template is slid along, and another section is laid off in the same manner. Three views of the template are shown, marked 4, 5 and 6, the latter being a cross section. The gains in the template are laid off 16 inches on centers, as indicated on the drawing. The headers for windows are also laid out by this board. It is quick and accurate, and if moved correctly mistakes will not occur.

Estimating Earth Excavation

From C. O. T., Jr., La Crosse, Wis.—I would appreciate your assistance regarding the following: What would be a fair figure to use in estimating the excavation for a basement of a house, in clay soil, the soil to be removed by hand and loaded into the wagons which are to haul it away, i. e., how many cubic yards per man per 8-hour day?

Answer—A crew of good men, working eight hours a day, should be able to excavate from five to six cubic yards per man per day, provided the excavation is not deep. That usually encountered in residence work, namely, from four to five feet below the grade level, would be included for the figures given.

For excavating foundation trenches, the cost is somewhat more, and it would be well to figure the general excavation at, say, five cubic yards per man per day, and the trench excavation at the rate of four cubic yards per man per eight hour day.

It is usually necessary to back-fill against the basement walls after these have been constructed, and this back-filling should be figured additional. You should be able to figure back-filling at the rate of two cubic yards per man per hour, or, say, sixteen cubic yards of back-filling per man per eight-hour day.

The figures quoted are for efficient labor. It seems that since the war it has been difficult to get the same amount of work as it was prior to the war, and if the laborers in your neighborhood are less efficient than they were formerly, it would be well to modify these figures accordingly.

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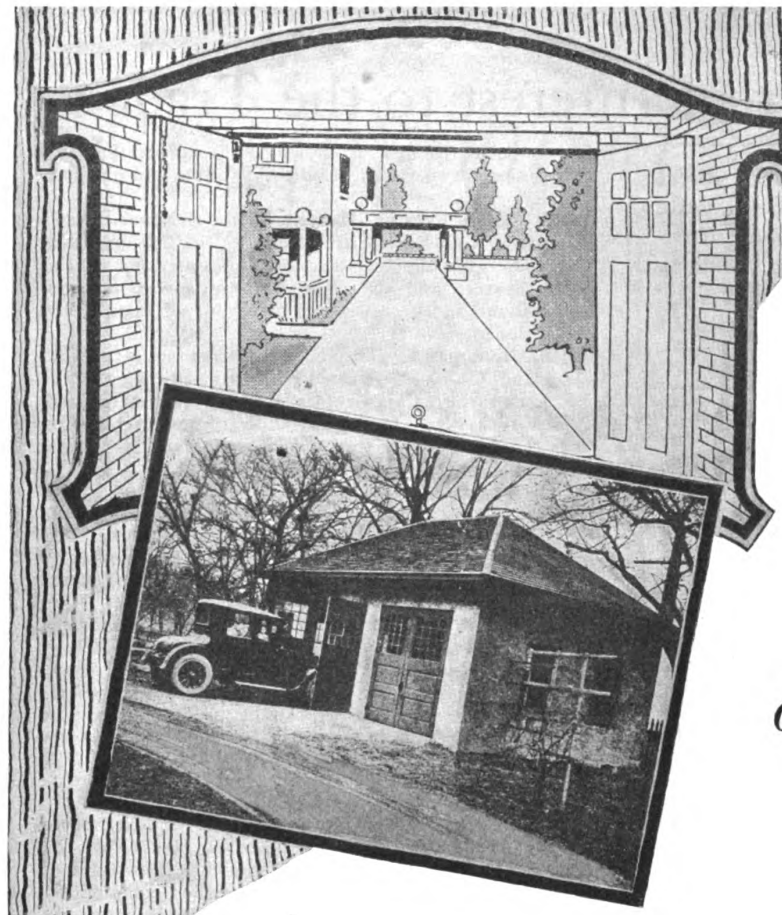

It's the Door

that makes or mars a good **Garage**

Our catalogue shows how NATIONAL HARDWARE makes the neatest and most convenient garage door on the market

We know that you will want to look this book over and note the up-to-date designs—one to fit almost every condition.

This book will be sent to any builder who will take the trouble to send us his name; without any obligation.

If your dealer does not handle NATIONAL Hardware, send us his name.

Ask us about National Garage Door Sets Nos. 805 or 806. The easiest working garage door set ever made.

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New Catalogs of Interest to the Trade

These catalogs may be secured direct from the manufactuer. If you prefer, write the date of this issue and the numbers of any catalogs on a postal and mail it to "Building Age," 243 West 39th Street, New York City, The catalogs will be sent you without charge or obligation.

349. The Dunham Handbook No. 114. C. A. Dunham Company, Chicago, Ill.—Handbook consisting of compiled information on Dunham products as well as some standard tables and data on subjects allied with heating. Many of the illustrations show several of the Dunham products, these being accompanied by text describing their construction and operation.

350. Monel Metal. The International Nickel Company, New York City.—Illustrated booklet describing the physical properties of Monel metal, its advantages and the various uses to which it is adapted. Valuable data is given on the working of Monel metal, including annealing, forging, welding, polishing and finishing this product, etc.

351. Defend Your Steam. The Magnesia Association of America, Philadelphia, Pa.—Profusely illustrated book which resolves itself into a comprehensive study of the subject of heat insulation, and covers exhaustively every phase of the subject of heat and fuel saving with 85 per cent. Magnesia pipe and boiler coverings. This book contains valuable information upon heat and heat losses, tables and data on coal saving, tables and data for use in the preparation of specifications for heat insulation, etc. A list of users of 85 per cent. Magnesia coverings is given.

352. Corrugated Zinc Roofing and Siding. American Zinc Institute, Inc., New York City.—Service Sheets 1 and 2, No. 38, contain standard specifications for the use of corrugated zinc sheets, and point out the many advantages to be gained from the use of zinc. Diagrams, detail drawings, tables, and photographs of roofs covered with zinc are incorpoarted in these service sheets.

353. Nonpareil Insulating Brick. Armstrong Cork Company, Pittsburgh, Pa.—72-page book dealing with the subject of insulation of high temperature industrial equipment, such as boilers, furnaces, stills, hot blast stoves, ovens, kilns, etc. Operating records, with and without insulation, are given, actual dollars-and-cents savings demonstrated, and the economy and advantages to be secured by the use of Nonpareil brick described. The book is conveniently divided into sections, each dealing with a particular type of industrial apparatus so that any one can find data for the equipment in which he is especially interested. It is extensively illustrated.

354. Novalux Ornamental Street Lighting Units. General Electric Company, Schenectady, N. Y.—Bulletin No. 43503 B illustrates and describes the numerous types of Novalux units made by this company. Illustrations show streets in different section of the country where these Novalux units are being used. Accompanying this bulletin is a little booklet entitled "Novalux Street Lighting Units (Pendent and Bracket Types) for Mazda Series Lamps" from which the correct lighting unit for business streets, residential streets and outlying districts can be selected.

355. Reilly Water Heater. The Griscom-Russell Company, New York City.—Bulletin No. 260 describes and illustrates the construction and operation of the Reilly heaters, and also points out the special features to be found in these heaters. Methods of installation are included.

356. Sanymetal. The R. F. Carpenter Mfg. Co., Cleveland, Ohio.—Illustrated catalog describing the advantages to be gained from the use of sanymetal partitions for toilets, lavatories, showers and factory offices. Diagrams show some typical installations. A few of the Sanymetal users are listed.

357. Federal Traffic News. Federal Motor Truck Company, Detroit, Mich.—October 15th issue contains articles describing the use of motor trucks in the various fields of industry. This house organ is extensively illustrated, showing numerous photographs of Federal motor trucks in actual operation.

358. The Proper Treatment for Floors, Woodwork and Furniture. S. C. Johnson & Son, Racine, Wis.—Handsomely illustrated booklet showing the various color effects obtainable from the use of Johnson's Artistic Wood Finishes which can be used to advantage in every part of a house. All Johnson products are enumerated and mention is made of just where they can be used to best advantage. A charge of twenty-five cents is made for this booklet.

359. Reach Out for More Business. Mesker Store Fronts Are Trade Magnets. Geo. L. Mesker & Co., Evansville, Ind.—Book showing the different styles of attractive store fronts which are furnished complete by this company. Several construction detail drawings are included. All illustrations are accompanied by text which makes them very understandable.

360. Industrial Plants Need This Hoist. Gillis & Geoghegan, New York City.—Booklet illustrating and describing the G & G hoist which is designed for economical and efficient raising and lowering of light loads (approximately 500 lbs.) at industrial plants, and for the removal of ashes and rubbish from all types of buildings. The different models of hoists manufactured by this company are described and illustrated.

361. Facts Concerning the Canvas Lock. John W. Wallace & Co., New York City.—Illustrated folder describing this new device which was invented and patented to improve on the old method of sewing canvas on the pipe after the necessary covering has been applied, and to make the final covering look neat and trim. Directions for using are given.

362. Concrete Floor Insurance. The General Fireproofing Company, Youngstown, Ohio.—Pamphlet describing GF Crystalrox, a chemical solution which, it is claimed, actually hardens the floor surface from 30 to 50 per cent. Some of the buildings in which concrete floors treated with GF Crystalrox can be found are shown in this pamphlet. A sample book of concrete showing the effect of this protective material will be furnished on request.

363. Universal Prepared Finish. United States Gypsum Company, Buffalo, N. Y.—Booklet describing this new plaster finish which contains no lime. Benefits derived from the use of this material are pointed out.

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Unnoticed Service



THE architect in his work on the plan and perspective drawings does much which the layman neither sees nor appreciates. These little added touches mark true craftsmanship. Were they omitted architectural development would suffer. Unnoticed service is often the most valuable.

For more than 3000 years hinges have been serving man—without applause. But by passing unnoticed they serve their purpose best. A creaking, squeaking hinge ruins architectural perfection and cheapens expensive workmanship.

For fifty years McKinney Hinges and Butts have set a standard for architects and builders who take pride in the buildings they create. To them the selection of hinges is part of their service and the name McKinney in a specification solves the hinge question permanently.

There is a McKinney Hinge or Butt to fit any architectural design. Whether for office building, home interior or barn door they combine artistic taste with practical everyday usefulness. There is a size to fill every hinge need perfectly—without interruption.

The McKinney illustrated catalog will be gladly furnished if you do not have one in your files. You will find it valuable in matching artistic designs and in meeting unusual hinge demands.

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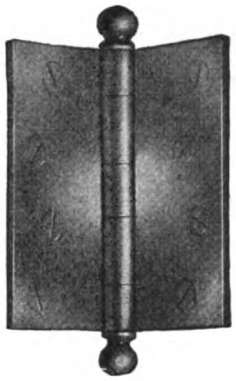

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WHEN IS A HOUSE "TWO FULL STORIES?"

Since we received and answered a query concerning what constitutes a "two story house," within the meaning of a building restriction embodied in a deed (see October, 1920, Building Age, pp. 80-82) the Michigan Supreme Court has handed down a decision on a similar question. The observations of the court will be found to be in harmony with the views expressed on the first-mentioned query.

In the Michigan case, plaintiffs unsuccessfully sought to establish a claim that defendant was violating a restriction providing that all buildings should be "at least two full stories and not more than two and one-half stories in height with at least eighteen foot studding." The house being built by defendant is to embody a first story 64 feet long and 40 feet wide. The second story is 37 feet long and 16 feet wide. It was contended by the plaintiffs that the house will not be a 2-story house because the second story is grossly less in floor area, because none of the exterior walls continue up to and support the roof of the second story, and because none of the exterior walls are equal in height to 18-foot studding. Deciding the case in defendant's favor, the court says:

"It is gathered from a study of the restrictions that the idea back of them was to create a class of houses on the subdivision which would be as nearly uniform in price, size, and height as was reasonable or practicable. According to the restrictions, nothing less than two full stories would suffice, and anything in excess of two and a half stories would be a violation thereof. The words 'two full stories' were doubtless used in contradistinction to the one and a half-story house, in which some portion of the sides and ceiling of the second story is cut off by the roof. This view is strengthened by the fact that the words 'two full stories' are used in connection with the requirements as to height, and not in connection with the width or floor area, and this view is further strengthened by the fact that the wording of the restriction gives evidence that the framers thereof had in mind 'half stories' as well as 'full stories.' It is quite evident from this view that the words 'two full stories' have reference to the space between the joists, and not the space between the studding. There is no claim that the second story is not a full story as to height; neither is there any claim that any portion of the sides or ceiling of the upper rooms are cut off by the roof. Such a house would therefore appear to be in substantial compliance with the restriction. But it is said that the studding are not 18 feet long. It is true that there are no 18-foot studding in the outer walls, but we apprehend that this means nothing more nor less than that the two stories, when completed, shall be equal in height to a house built with 18-foot studding. It nowhere apears that the exterior walls shall be 18 feet in height.

"The point is made that the area of the second story is so grossly less than the floor of the first story that it is not a two-story house. We do not think we could say, as a matter of fact, that because the second story is not more nearly equal in floor area to the first floor, it is not a two-story house. With nearly all houses, which are concededly two-story houses, some portions of them is only one story, and this appears to be true of some of the houses already constructed on this subdivision, and which have received the approval of plaintiff." (Palmer Woods Co. vs. Nelson, 178 Northwestern Reporter, 724.)

RIGHT TO COMPENSATION FOR UNUSED PLANS

The Builder's Relation to Town Committees

From N. F. W., Mass.—A town voted that a committee of six be appointed to consider the needs of the town for additional school room, to procure plans and estimates, and to report at the next annual town meeting. I prepared sketches for the committee, which approved them, covering a four-room school house and a two-room addition to a present building. I had no written contract with the committee, and nothing was said about compensating me, other than that one of the committee stated that as there was no money appropriated by the town for architects' fees, they were not prepared to [pay] for these sketches, but that they desired me to make plans and secure estimates upon which the committee were to report. That if the town voted to build the writer was to be hired to complete the plans and write specifications. I furnished the desired plans, secured figures from contractors, and turned the same over to the committee, on which they reported. The town afterwards voted that, the figures being so high on the small school and addition, the need should be met by building a high school. They appropriated the money and instructed the committee to secure plans and specifications, and to build the above-mentioned high school. The committee then hired another architect to do the work. Have I any right to recover the value of my services? My claim is that the committee did not

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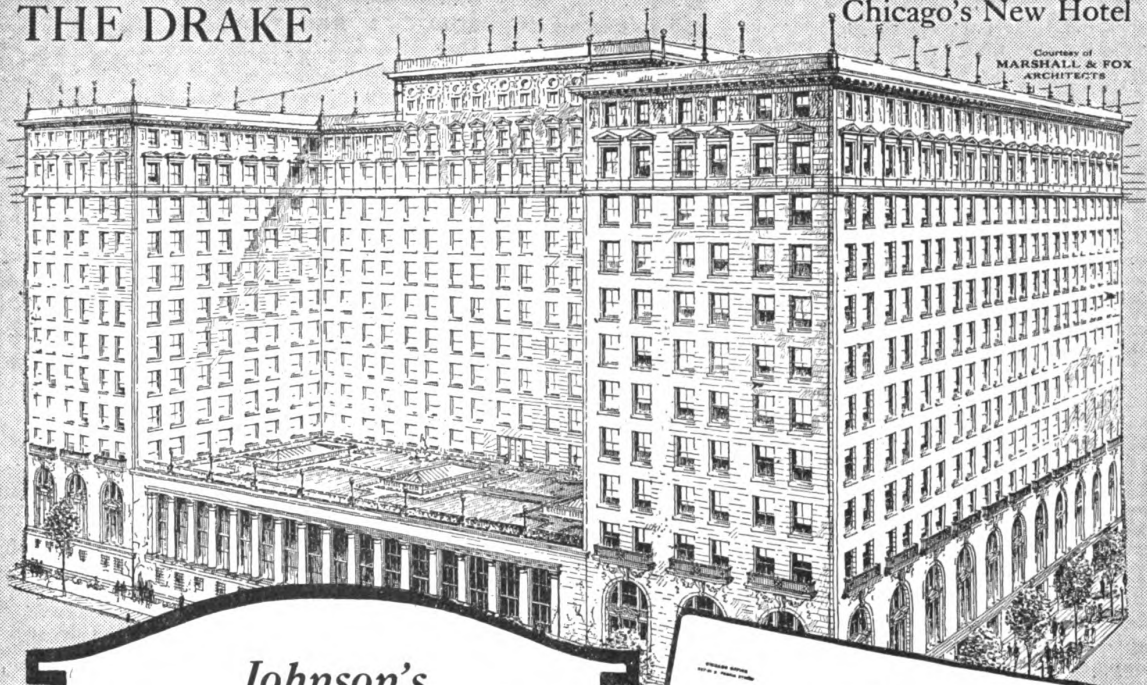
THE DRAKE

Chicago's New Hotel



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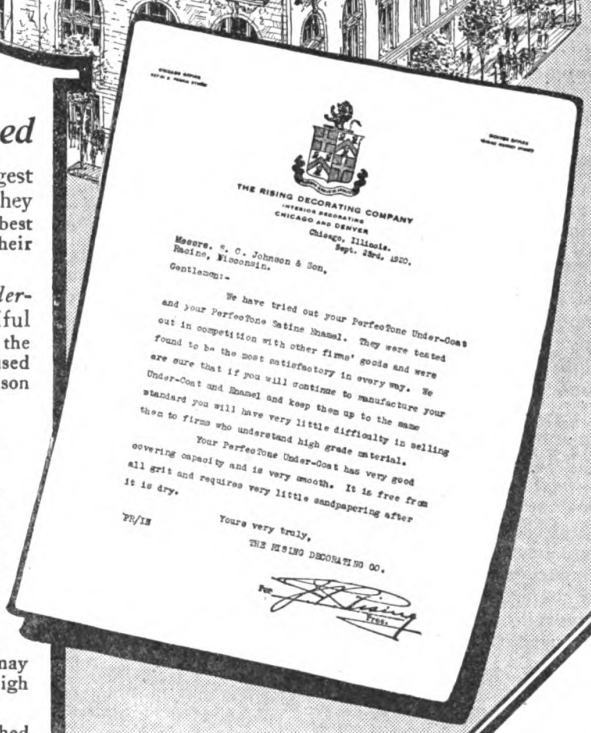

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Chicago, Illinois.
Sept. 23rd, 1920.

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Your PerfecTone Under-Coat has very good covering capacity and is very smooth. It is free from all grit and requires very little sandpapering after it is dry.

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Yours very truly,
THE RISING DECORATING CO.
Per J. H. Rising
Pres.

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JOHNSON'S PERFECTONE UNDER-COAT is the perfect foundation for an enamel job—it is elastic, durable, non-porous, has great covering power, works freely under the brush and dries hard in from 18 to 24 hours. It will not run, sag, lap, chip, check, crack or peel. Has wonderful smoothness and opacity and will not absorb the enamel.

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carry out their part of the understanding. Although the same plan that I furnished was not used, still the same end was gained—the need of more school room.

Answer.—Regretfully, we reach a conclusion that you are not legally entitled to recover anything for your services. The vote of the town, authorizing a committee "to procure plans and estimates," may have amounted to authority to employ an architect to furnish plans and procure estimates, although there may be something in the Massachusetts Town Law to require a contrary conclusion on this question as to the committee's authority. It may be that there is a requirement for the making of a specific appropriation before such a contract could be authorized, or some other condition not observed. But, be that as it may, there is no liability in this instance, because the committee never exercised such authority, if it was validly granted by implication. On the contrary, it was made clear to you that the town was not to pay for the service rendered. The only promise made to you was that *if* the town voted to build, you were to be hired to *complete* the plans and write the specifications. In the first place, if you were to sue the town, it might be able to defeat your claim on the ground that this agreement contemplated a vote to build according to your sketches and preliminary plans. But this point may be taken in your favor, by assuming that the committee promised you, in effect and as you seem to contend, that if the town voted to build any sort of a building you would be chosen as the architect. Still you are not entitled to compensation, because the committee was not at that time authorized to bind the town by any such promise. The committee's authority was to "procure plans" for consideration at the next meeting of the town. As noted above, this may have empowered the committee by implication to agree to pay a reasonable compensation in cash for preparing the plans desired by the town at that time, but it cannot be construed as being broad enough authority to empower the committee to obligate the town to employ you as architect for such building as the town might afterwards vote to build and authorize this or some other committee to proceed with.

It seems that you did just what is probably too often done by architects: you furnished valuable services, realizing that you might not get paid for them, especially if the building project should be abandoned. You took a chance on the committee recognizing your moral claim to preference in the selection of an architect, because of your liberality in furnishing preliminary services without obligating the town to pay for them. The town's authorities may have disregarded a moral obligation in this respect, but it gives you no foundation for a legal claim.

To give an architect good solid ground for a claim for compensation, it is desirable, although not necessarily essential, that the town vote that a committee be empowered to employ an architect to prepare the plans, or render the other architectural services in contemplation, at a certain figure not exceeding a certain sum, and that that sum be set apart for use to such extent as necessary in the judgment of the committee. In any event, the architect who expects compensation for services of this kind should remember that he can have no right to compensation excepting as it is distinctly contracted for, and unless the contract is one properly authorized in conformity to all statutes defining the powers of public officials.

THE BUILDER'S RELATIONSHIP TO THE ARCHITECT.

Among the Appellate Court decisions involving principles of building law recently announced, the decision of the Appellate Division of the New York Supreme Court in the case of Charles Meads & Company vs. City of New York, 181 New York Supplement, 704, is of more than ordinary importance.

One point decided in the case is that a contractor is entitled to select his own construction methods so long as he produces results conforming to his contract. On this point the opinion says:

"The architect, against the protest of plaintiff [a contractor] required him to pour the concrete continuously in a monolith, both in some of the foundation slabs and in the walls. The walls were to be 40 feet high. The architect required him to pour 27 feet continuously, then 10 feet continuously, and then 3 feet. The plaintiff claims that the work could have been done equally well and much more economically by pouring in layers of 2 or 3 feet in thickness. The fact that plaintiff's method would produce work up to the specifications is proved, not only by expert testimony as to the value of the two methods, but because, toward the end, the plaintiff refused to follow the architect's method in pouring the dome slab and the work was satisfactory. The general power of control over the work, which the contract gave to the architect, made his right to prescribe the method of doing it fairly debatable; but I think this particular requirement was beyond the rightful exercise of that power.

"I think the law is that, so long as a contractor produces work which satisfies the specifications, he can, in the interest of economy, choose his own methods. This is not only law, but common sense; for when a contractor bids, his estimates, which influence the bid, are necessarily based on his own methods of work, so long as those methods are not controlled by the specifications."

Other propositions decided by the court in this case are as follows:

Where a crack in foundation walls of a public library resulted from a defect in the plans, the contractor was entitled to recover, notwithstanding refusal of the architect and the borough president to give the required certificate; their refusal of a certificate under such circumstances being unreasonable.

Where the architect, representing the owner, requires the contractor to do work on plausible, but erroneous, interpretation of the contract, and the contractor protests, he may submi, do the work, and have his action against the owner for the additional expense, on the theory of a breach of contract.

DAMAGES FOR PREVENTING PERFORMANCE OF CONTRACT.

The measure of damages for the breach of a building contract where the plaintiff builder has been wrongfully prevented from fully performing is the difference between what it would cost to complete the entire work according to the contract and the contract price. The same result may be reached by allowing the plaintiff as damages or the work done such proportion of the entire price as the fair cost of that work bears to the fair cost of the whole work, and in respect to the work not done such profits as the evidence shows he would have realized by doing it. (Kansas Supreme Court, McGrew vs. Ide Estate Investment Company, 187 Pacific Reporter, 887.)

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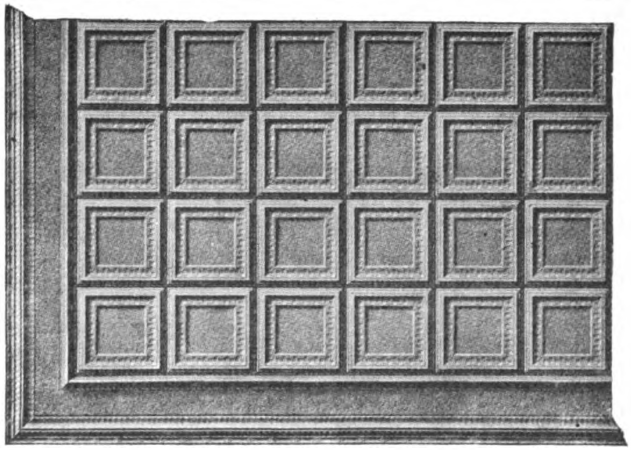
SCHOOL BOARDS

Will make extensive repairs and changes during the Holiday recess.

"Invisible Joint" TRADE MARK

METAL CEILINGS AND SIDE WALLS

could be erected in every room in a large school building in a short space of time, because they can be erected over cracked and unsightly plastered walls, making an artistic, fire-resisting interior out of an ugly, combustible, dangerous one.



"Invisible Joint" TRADE MARK Metal Ceilings have repressed beads and die cut nail holes, which makes them very easy to erect. No time lost or fingers jammed in putting them up. They are made in a large variety of designs, many of which are especially appropriate for schools and public buildings.

"Invisible Joint" TRADE MARK Metal Ceilings can now be furnished promptly for any purpose. Write for circular showing Popular Distinctive Designs.

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CONTRACTOR'S HANDY AUTO TRAILER

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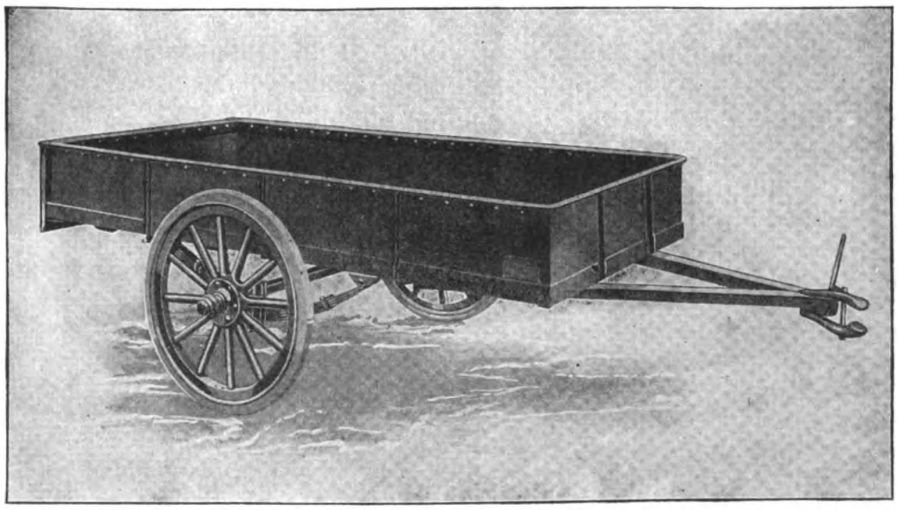

Capacity—2,000 pounds. Body—8 feet long, 46 inches wide, 12 inches high. Body and under frame built of open hearth steel. Axles—1½ inch square bed, special high carbon steel. Springs—Semi-elliptic, oil tempered and double heat treated. Bearings—Roller. Wheels—1½ inch spoke, artillery type, second growth hickory. Tires—32-2, solid rubber. Weight—534 lbs. Other models with gates at front; also extension tongue which permits carrying lumber, poles, ladders, etc., 30 feet long.

Write for Catalog A

ALL STEEL TRAILERS — EVERY TYPE — 1 TO 10 TONS CAPACITY

ROGERS BROTHERS COMPANY **Albion, Penna.**

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Tight as a Bottle

A customer writes, "I have burned everything in my furnace, from garbage to anthracite, and I get all the heat there is in any of it."

Quite worth while in these days of scarce and high priced fuel.

That's one reason why HESS WELDED STEEL FURNACES have been in greater demand than ever during the past year, both the PIPE and the PIPELESS sorts.

CLEAN HEAT from ANY FUEL

is due to two outstanding features:

1. A *welded steel radiator* inclosing the fire-box, grates and ash pit. This is a welded seamless body—every seam closed by melting the steel—and is everlastingly as *tight as a bottle.* A bottle never leaks. A Hess radiator can't leak.

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There are other big features—we'll mention them next time. Ask for our handbook on heating. It's interesting; it's free.

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Make More Money-Be a Bigger Builder

The Good Things—the Big Things—of Life are for those who will reach out for them. You can have them for the grasping—just an energetic thought—saying "I Will" and they are yours. Are you content to make a small profit slowly on hand labor or—will you make a large profit quickly by means of a modern machine? Which?

IT'S EASY

Let The Magic Mixer-Mix Your Concrete

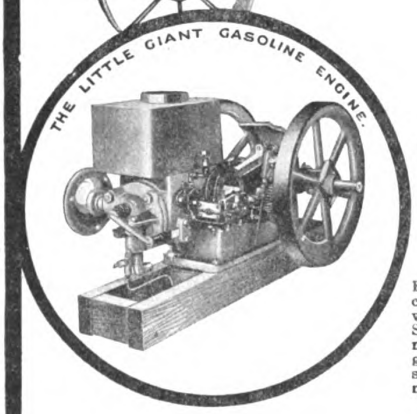


Does it faster—better—cheaper

This Mixer will put you in position to do all kinds and classes of concrete work. It will enable you to work faster, do more work, do bigger work, do better work—and will help you build up a permanent and substantial business.

$25 BRINGS IT TO YOU

Balance on Aloe's Easy Rental Purchase Plan—you have TEN MONTHS TO PAY—and the mixer will be making money for you faster than the easy payments come due. Certainly this is a rare opportunity for you to get away from the old shovel method and get into the class of the big men who are doing the big jobs in the modern way.



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With this wonderful machine and two men you can do as much work as you formerly did with six men. And you can do it easier, quicker and better, producing an absolutely uniform batch every time. It will mix 4½ to 5½ cubic feet per batch—can be speeded up to a batch every minute—over 2,000 cubic feet per day. It is the most practical and efficient mixer made—scientifically constructed of the best materials—light in weight, portable, simple and durable. Backed by the Aloe iron-clad guarantee to give the utmost service and satisfaction.

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Fitted with 2½ horse-power four cycle, horizontal gasoline engine with high-grade Webster magneto. Simple, powerful, reliable, economical—requires only two gallons gasoline a day. Protected by all-steel housing. Two doors at rear make it easy to get at.

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Nothing complicated—nothing to get out of order. Can be operated by anyone who will read and follow the simple directions which are furnished with each mixer. It comes complete—ready for work the day you get it.

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So confident are we the Magic Mixer will please you in every way we will gladly send it to you for 10 DAYS FREE TRIAL on payment of only $25.00. Take it out on your jobs—put it to the most severe tests. Then, if you can be induced to part with it again ship it back at our expense—and we will promptly return your money without a word.

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You ought to have this booklet of invaluable facts about the wonderful opportunities the Magic Mixer offers you. Sent FREE together with full particulars of our Easy Rental Purchase Plan by which the Magic Mixer will pay for itself and put you on the road to greater success at the same time. Get this remarkable offer.

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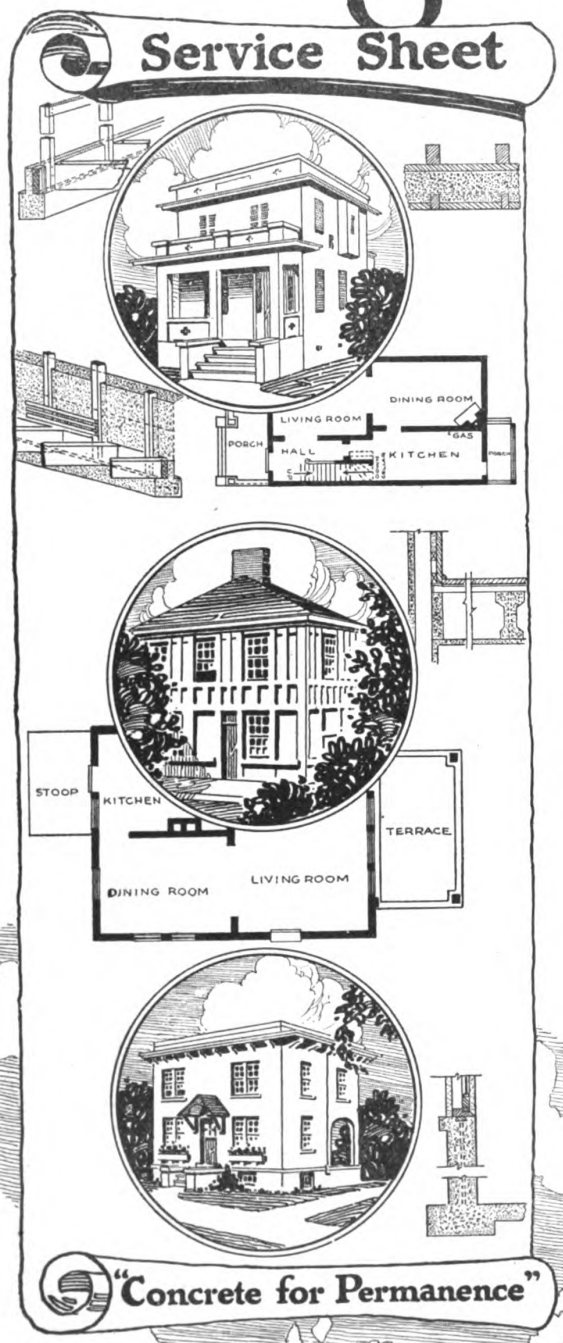
Valuable Information on Workingmen's Homes



Several years ago the increasing interest in small homes of permanent, fireproof type prompted us to prepare a Service Sheet on a type of employes' house that we had built at two of our own plants.

This Service Sheet proved to be so popular that we prepared three others—the series of four sheets giving fairly complete details, working methods, specifications, etc., of (1) Pre-cast Slab and Beam house construction, (2) the Gunite-and-Frame Method, (3) Solid and Double-Wall Construction with special forms and (4) the Ingersoll Home System, which has lately attracted considerable attention.

We have a small reserve stock of these practical Service Sheets and will gladly send copies to any manufacturer, engineer, architect, contractor, builder, Chamber of Commerce, or property owner interested.

Copy of the 96-page ALPHA Handbook will also be sent free of obligation. No charge if you live east of the Mississippi River. We feel obliged to ask those living out of our sales territory to send fifty cents to cover cost of printing and mailing this literature.

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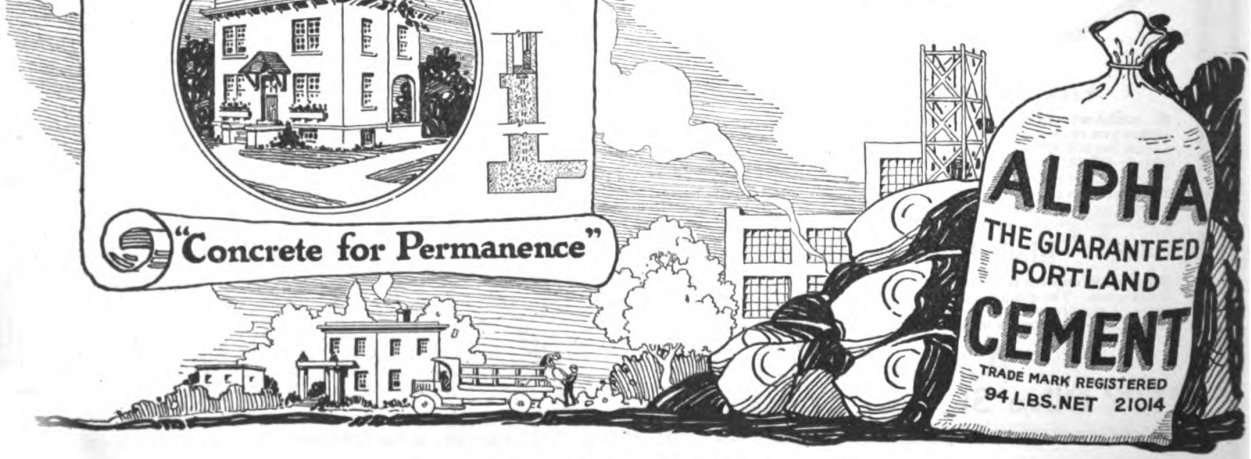

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And this reliable paint costs you less per gallon than any other paint you would think of using.

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A well-painted house sells readily. The use of Dutch Boy paint materials helps you to sell the homes you build, because it shows you are using products of established reputation.

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BUILT FOR BUSINESS

The Duplex 4-Wheel Drive Truck Is the Most Efficient Trucking Unit Ever Designed for Heavy Duty

It Stands to Reason Too—When You Think of its Advantages—That This Truck Should Prove to be the Most Economical Heavy Duty Transportation Unit

The picture herewith shows the Duplex 4-Wheel Drive Truck owned by the Stewart Construction Company, Chicago, traveling from Denver, Colo., to Broadmoor—80 miles—with a six-ton concrete mixer loaded on the truck and trailer.

The railroad asked $58 freight, the company to load and unload the machine on the cars at an additional cost of $25—total cost, $83.

The Duplex Truck delivered the load for the total cost of $23.83, including the driver's time.

The trip was completed in eleven hours over gumbo roads and through a hail and rain storm.

You know and we know that consistent truck performance is never an accident—but that it is due to something a great deal more solid than salesmen's arguments or paper specifications.



Here Are Some of the Reasons Why the Duplex 4-Wheel Drive is the Best Truck Ever Made for Contractors' and Builders' Use

Every wheel is a *drive* wheel—the power application is continuous and even. There is no inertia or "dead" resistance to overcome.

This may be a new principle to you—but the first Duplex 4-Wheel Drive Trucks were made ten years ago and are *running yet*. It is a mathematical and engineering principle that four driving wheels will do three times as much as two driving wheels. Think a moment and you can figure this for yourself.

This means that the Duplex 4-Wheel Drive Truck will *not* slip the wheels, burn the tires and waste gasoline.

It reduces the strain on working parts by *equalizing* the strain—reduces repair bills and lost time.

The Duplex 4-Wheel Drive will take a load over roads and into places where no two-wheel drive truck can go, no matter how good that truck may be.

The Scientific American magazine says that four driving wheels "utilize" the entire weight of the truck.

Have you ever stopped to figure that a steam locomotive never uses less than four drivers? The same reasons that make this principle efficient in locomotives makes it true in this wonderful Duplex 4-Wheel Drive Truck—America's road locomotive.

Don't Experiment With Trucks Any Longer—Buy the Proven Truck

Get a demonstration of the Duplex 4-Wheel Drive. Your truck purchase represents a big outlay.

You owe it to yourself and to the welfare of your own business to see that this investment is wisely made—that it is a practical investment and a paying investment.

Go to the Duplex Dealer near you. Let him prove this wonderful truck to you under real operating conditions.

Pitted against any other truck of any other make that you know of or that you feel is a good truck and on the basis of its superior performance, you will find the Duplex the superior unit.

The Duplex 4-Wheel Drive Truck is 3½-ton capacity and it sells for $4,250, F.O.B. Lansing, and is a *real Business Truck—and it is worth every dollar of it.*

If you use medium capacity high speed trucks at all—then by all means take the time to look over the Duplex Limited—Medium Capacity, Pneumatic Tires, Full Electrical Equipment, High Speed—$2,775, F.O.B. Lansing.

This is the truck that recently ran for 24 hours consecutively 935 miles without a stop—a world's record.

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The Reductions Are 28% to 35%

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Our new prices are much below our present costs, also our anticipated costs for 1921. We suggest that you lower your present average cost of stock on hand by purchasing at these new prices. In fact, all Flex-a-Tile distributors are urged to buy now for immediate and anticipated requirements.

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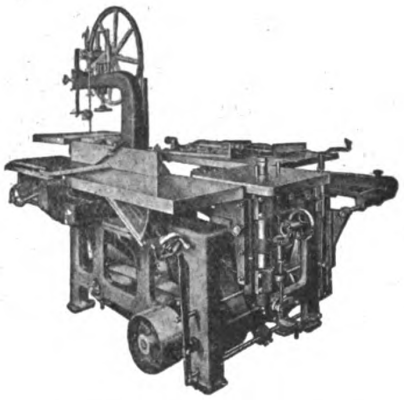

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Another thing users of Parks Machines like about this equipment is the price. The work the Planing Mill Special does—the time it saves—the labor-cost it eliminates—the speed with which it produces—and the price for which it sells—combine to make it the most profitable equipment any contractor and builder can install.

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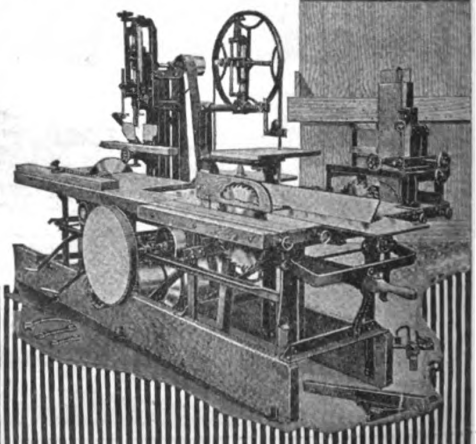

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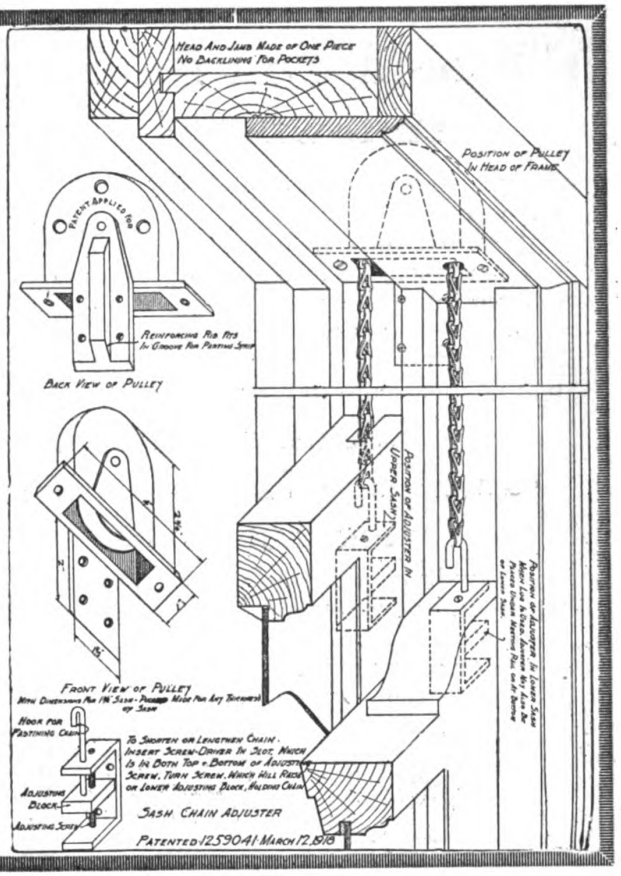

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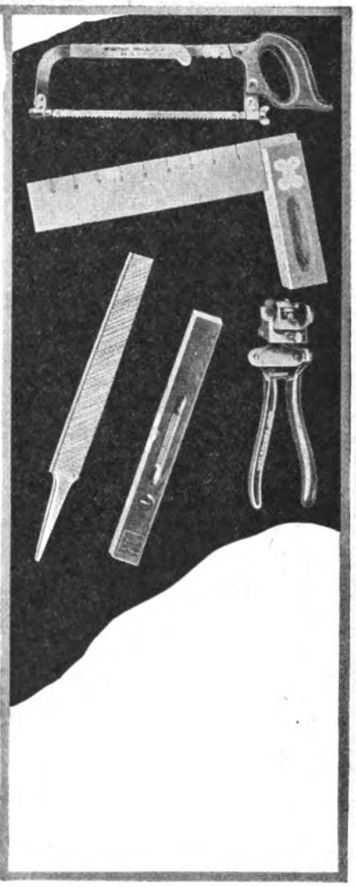

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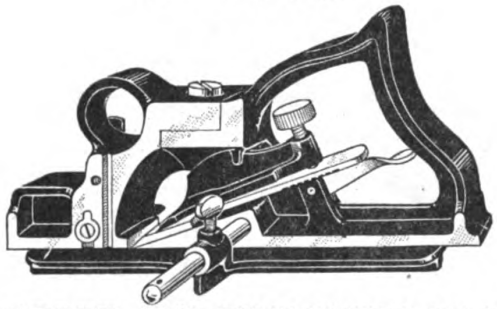

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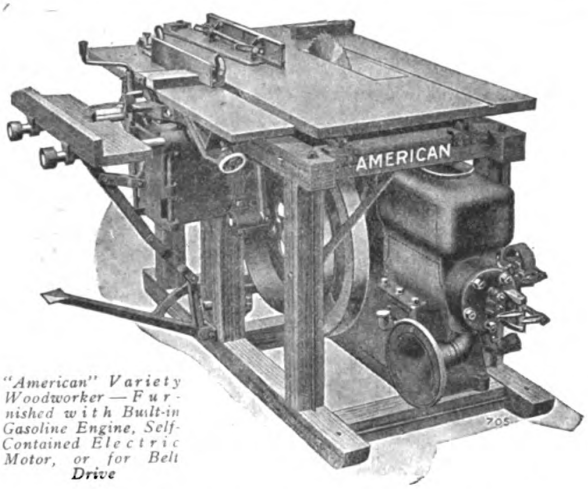

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Think of having 12 machines combined in one self-contained unit, with practically all the functions of a complete woodworking plant. This is what the

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The "AMERICAN" line is fully described in Catalog 20. It covers saw mill, edgers, bolters, trimmers, planers, matchers, moulders, shingle mills, lath mills, excelsior machines, woodworkers, saw benches, bandsaws, rip and cut-off saws, wood lathes, etc. Ask also for Bulletin 77 on Woodworkers and 10 on Hoists.

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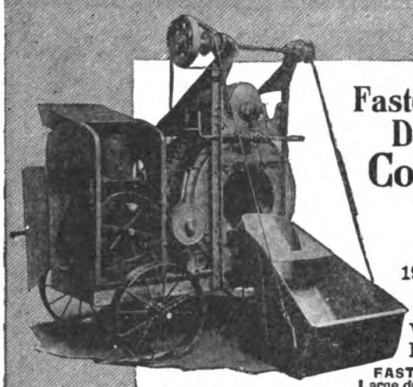
Woodworkers Saw Benches
Rip and Cut-off Saws
Hoists



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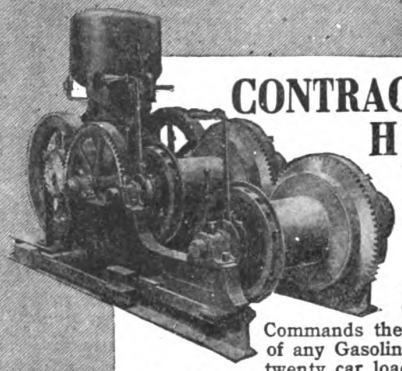

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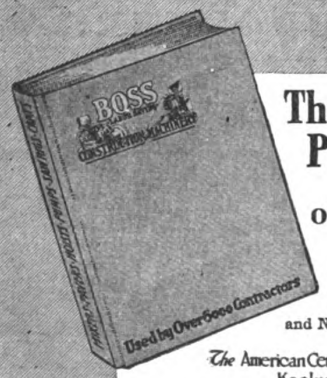

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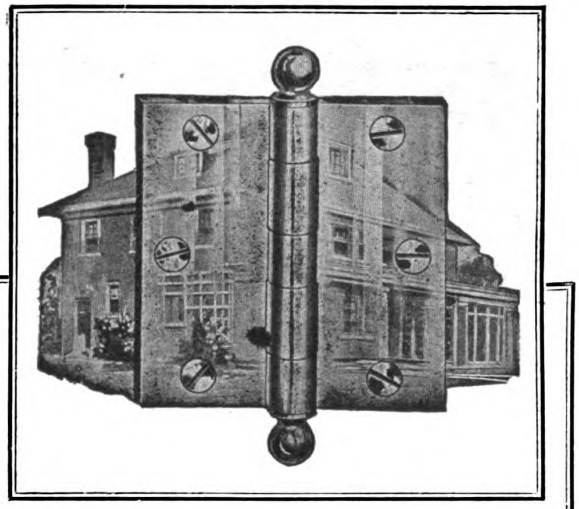

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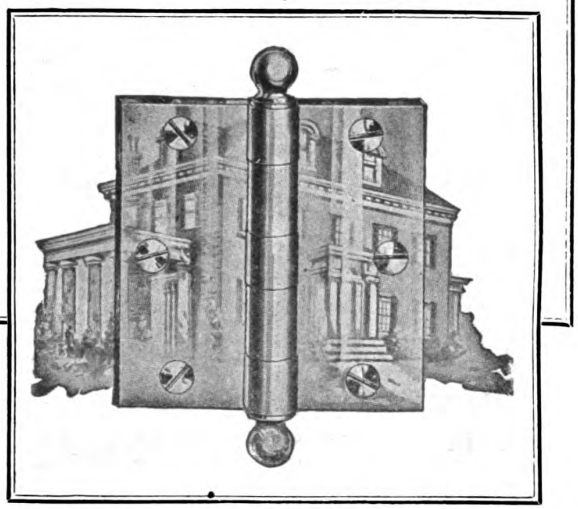



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SHELDON'S SLATES
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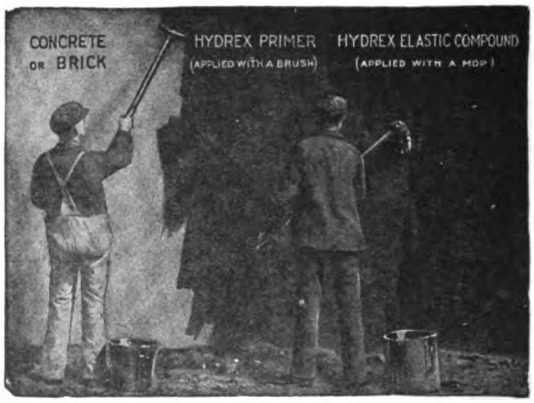

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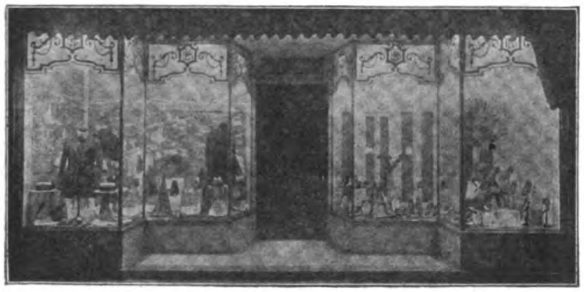

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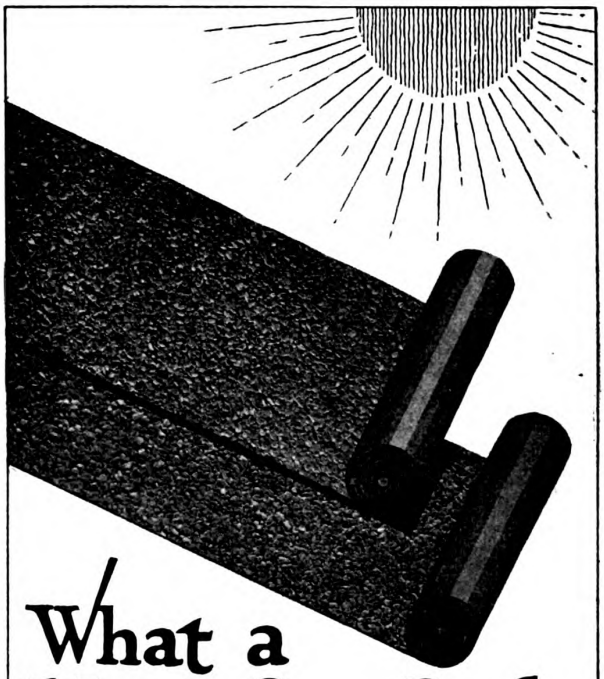

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IF you could take the time to lay your stock of slate-surfaced roofing out in the sun for a year, you wouldn't need the Sta-so label to distinguish genuine Sta-so'd roofing from other slates—the "fade-y" kind—or from imitation slate.

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For it's the label that gives you an advance guarantee that the roofing beneath it is genuine Sta-so'd roofing.

Therefore, ***it can never fade.***

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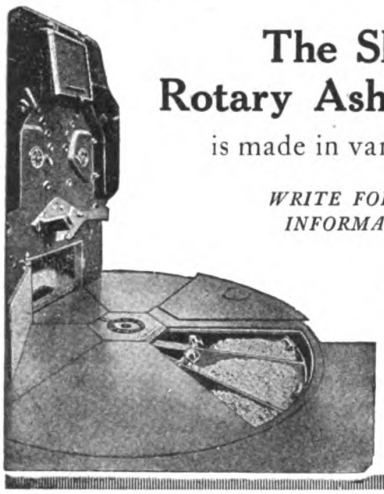
"When I showed him the Sharp Rotary Ash Receiver installed in his cellar, he was certainly pleased."

He knew what a change it would be not to shovel ashes, and to see the old ash can out of sight.



The Sharp Rotary Ash Receiver

is made in various sizes

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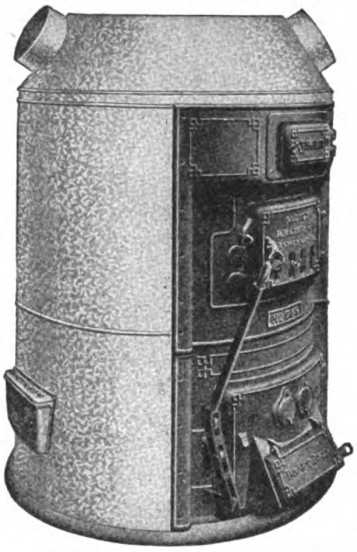

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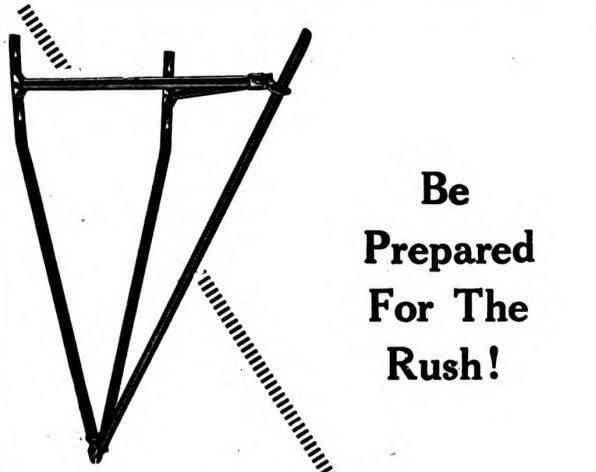

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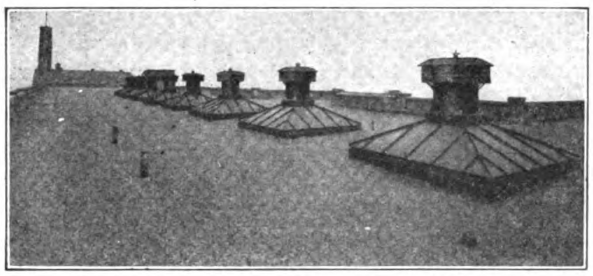

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Uninterrupted long service life is *built* in Koehring mixers. Freedom from breakdown delays, fast charging—fast discharging, the many automatic actions, are extra yardage profit factors that make Koehring mixers the most profitable to possess.

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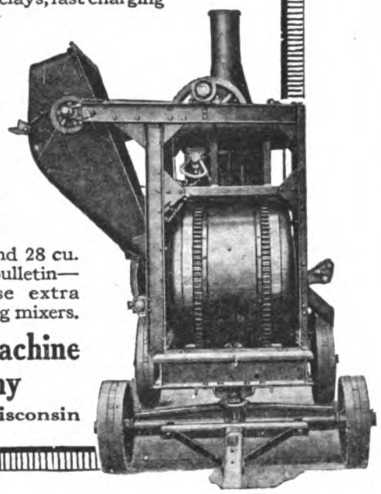

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A Circular Saw for Any Kind of Woodworking

no matter whether it be a Mitre Saw, a Dado Head for cutting perfect grooves with or across the grain, Band Saws, Solid Tooth Circular Saws, Lock Corner Cutters, or any one of the other numerous varieties in our line.

Our catalogue showing this complete line will be highly valuable to you as it will acquaint you with many saws that will increase your production and bring down your overhead cost.

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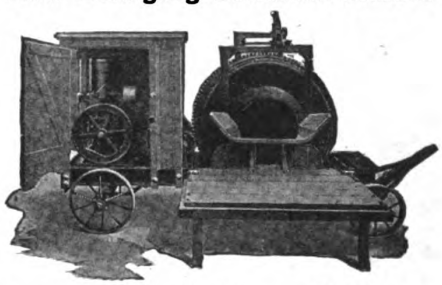

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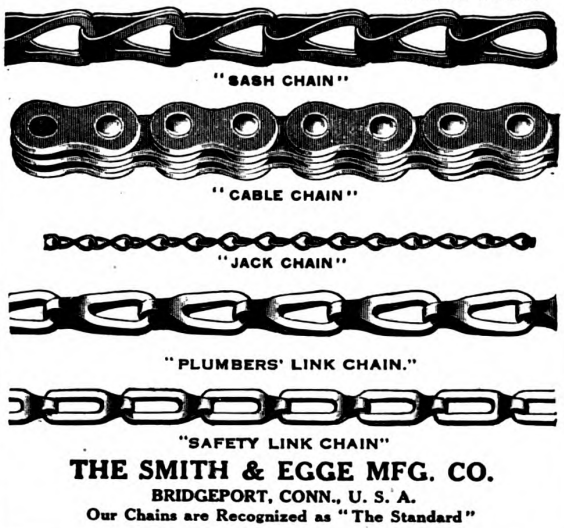

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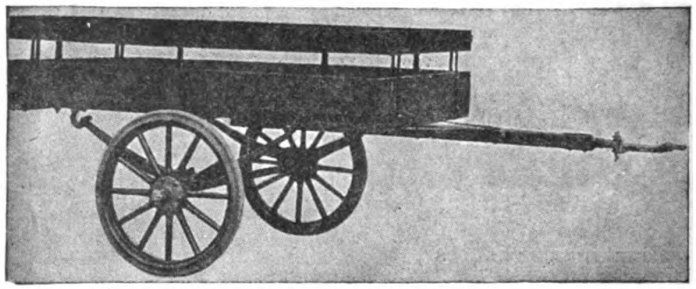

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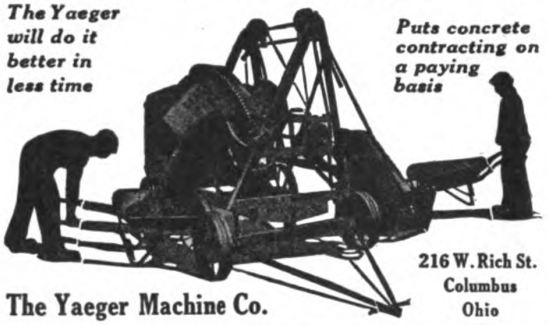

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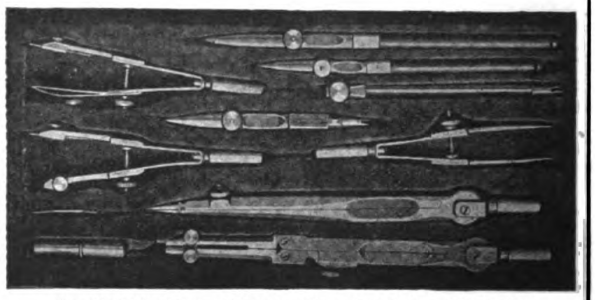

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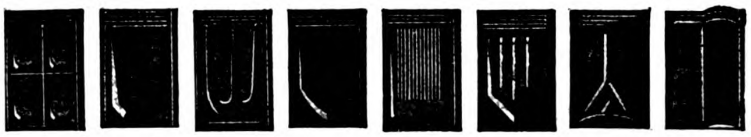

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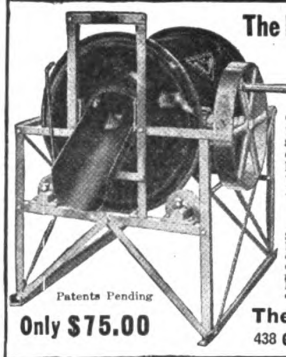

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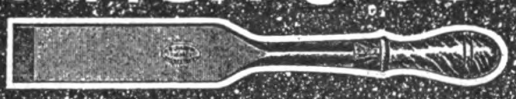

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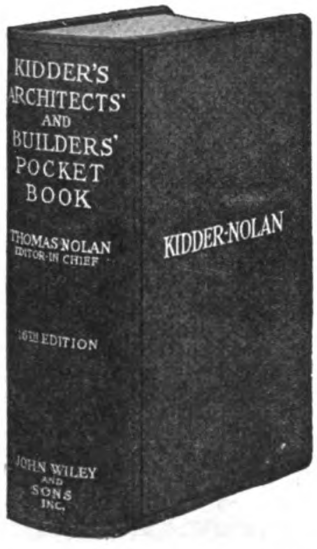

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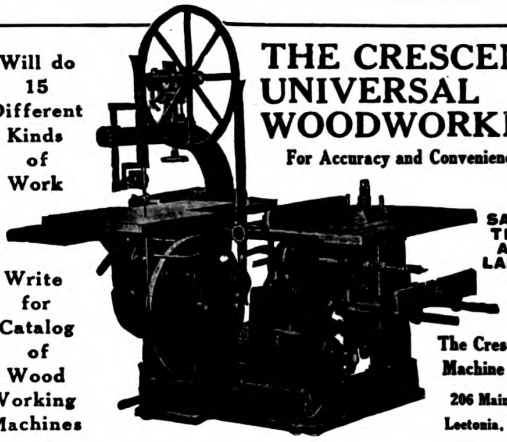

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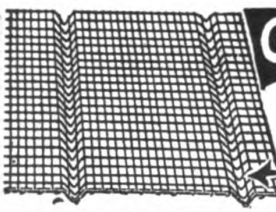

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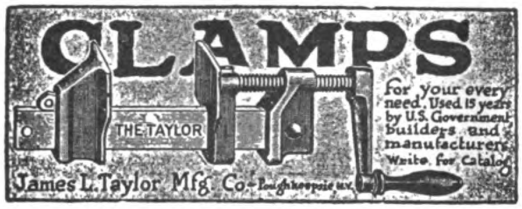

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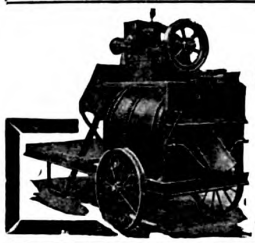

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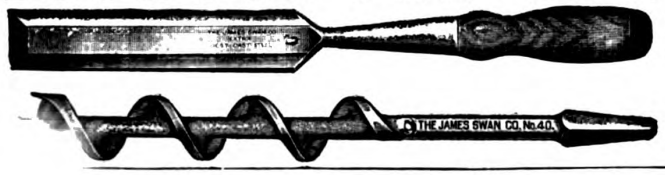

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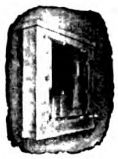

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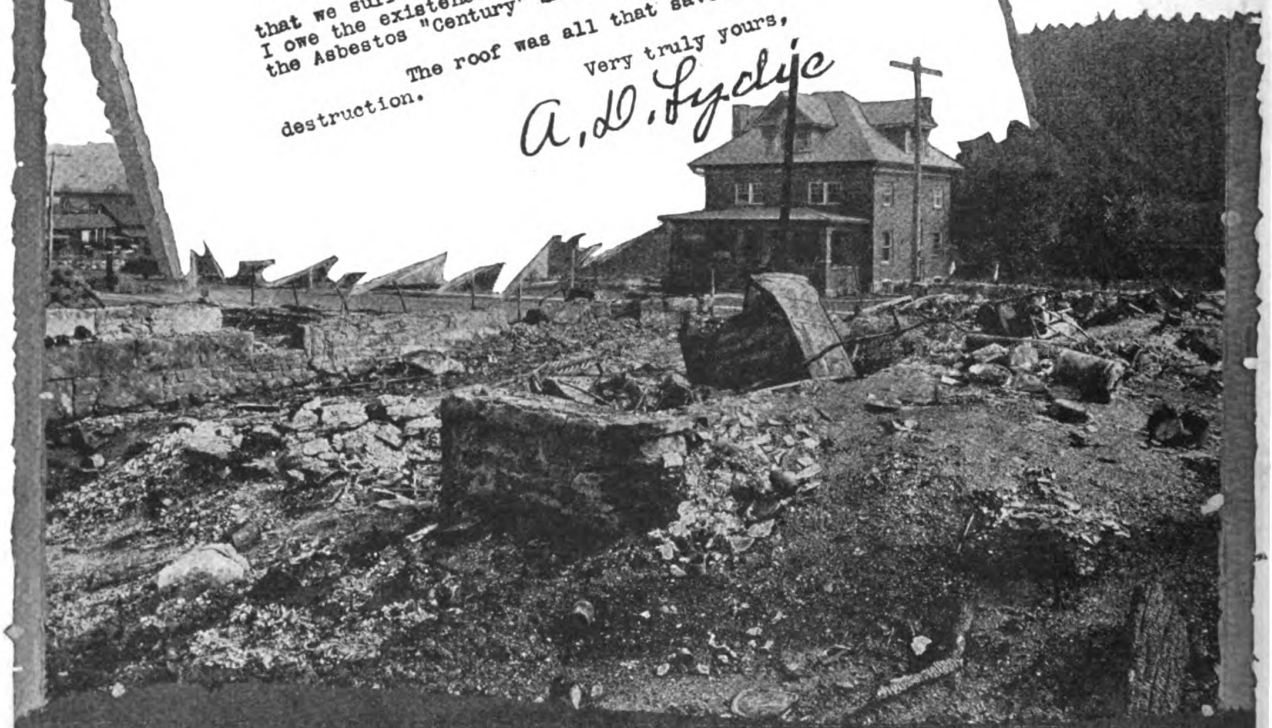
Illustration shows Mr. Lydic's house after fire referred to in letter



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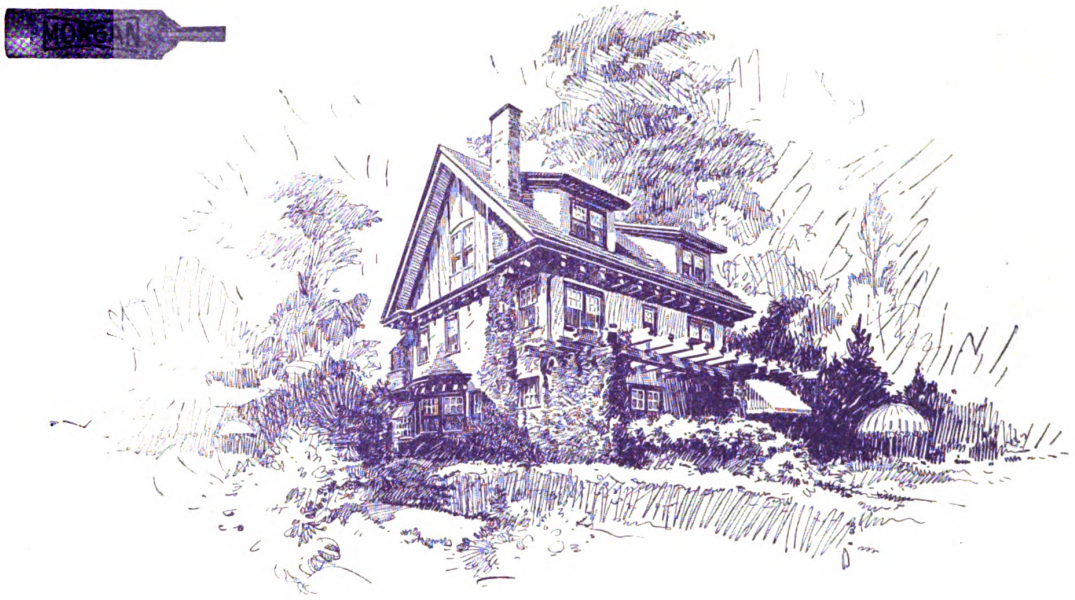

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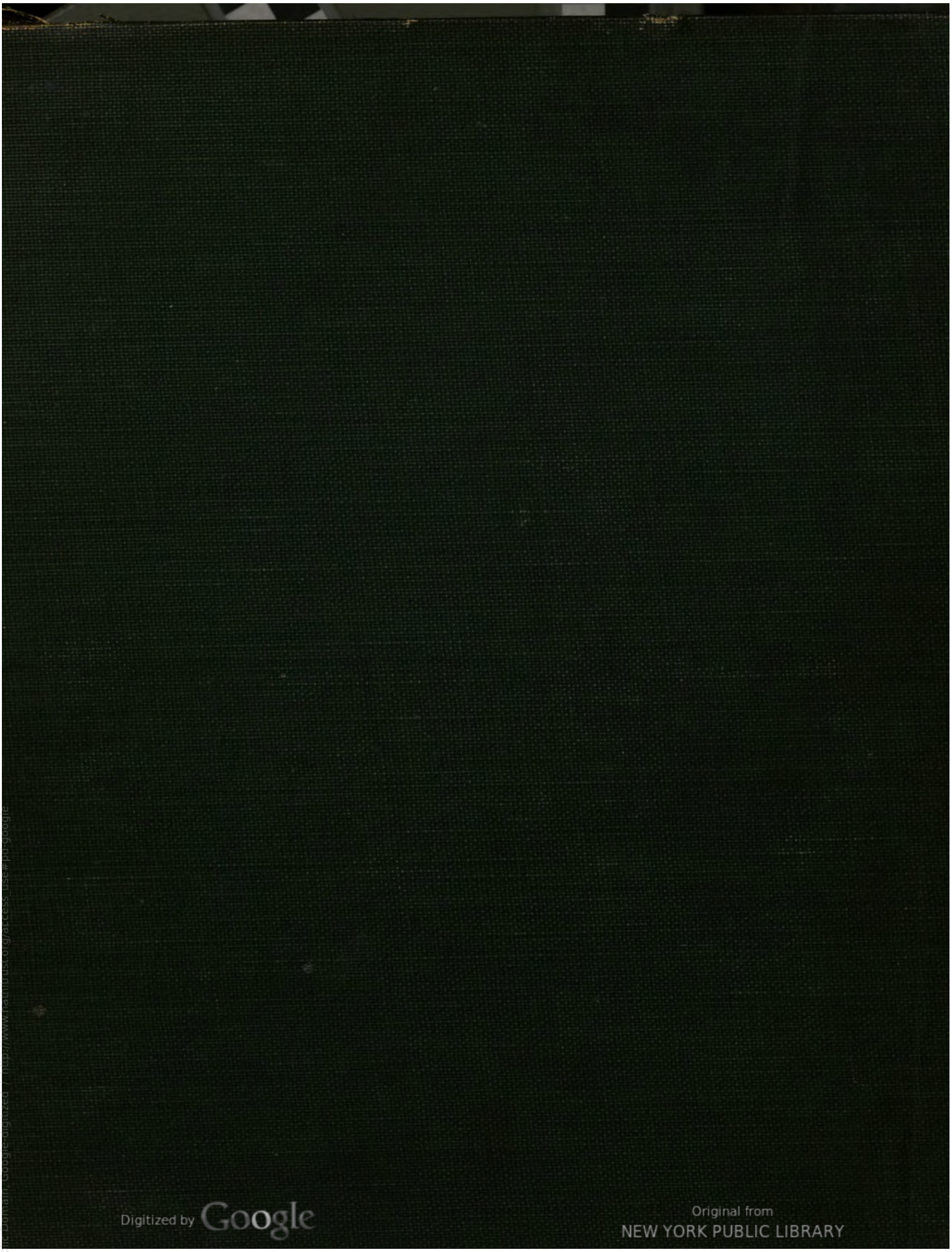
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